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FINAL SITE 4 AND YOUTH POND REMEDIAL INVESTIGATION REPORT FISC WILLIAMSBURG VA
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Final

Site 4 and Youth Pond
Remedial Investigation Report

Naval Weapons Station Yorktown, Cheatham Annex
Williamsburg, Virginia

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Executive Summary

This report presents the findings of the Remedial Investigation (RI) at Site 4 and Youth Pond, Naval Weapons Station (WPNSTA) Yorktown, Cheatham Annex (CAX), in Williamsburg, Virginia. Based on the results from previous investigations, the RI was conducted to characterize the nature and extent of contamination within all media at Site 4 and Youth Pond and to assess the potential risks posed by exposure to contamination for human and ecological receptors.

Test-pitting activities conducted at Site 4 indicate that the extent of buried debris has been delineated and is contained within two separate burial areas totaling approximately 4 acres in size (Burial Investigation Area 1 and Burial Investigation Area 2). At Burial Investigation Area 1, buried debris includes asphalt, bricks, concrete, metal, construction and wood debris, automotive parts, tarpaper, shingles, and a 55-gallon drum. At Burial Investigation Area 2, buried debris consists of medical supplies, metal, and construction/fill debris. In some areas, the buried debris is in direct contact with either the groundwater or surface water/sediment within Upstream Pond.

The objectives of the RI have been achieved: data gaps have been filled, the nature and extent of contamination have been sufficiently defined, the conceptual site model (CSM) has been updated to reflect the compilation of data from all investigation activities to-date, and human health and ecological risks have been assessed.

Surface debris and buried debris within the two burial investigation areas represent the only identified source of CERCLA-regulated contamination at Site 4. Stormwater runoff originating in the vicinity of the debris areas has the potential to be impacted by contaminants associated with the debris. These contaminants may then be transported via stormwater runoff and deposited in sediment within drainage channels, Upstream Pond, and Youth Pond. Stormwater originating in the vicinity of the debris areas drains to Upstream Pond, which is connected to Youth Pond via a culvert beneath D Street. When surface water in Youth Pond reaches a certain height, excess surface water flows into a flood control structure within the pond and discharges down a slope and into the York River through Outfall #NR-30. In addition to contaminant transport via stormwater runoff, contamination associated with surface and buried debris may impact subsurface soil and groundwater via contaminant leaching from waste material and associated soil contamination. Dissolved contaminants in groundwater may be transported downgradient with groundwater flow.

While a portion of the volume of stormwater runoff discharging to Upstream Pond and ultimately Youth Pond is potentially impacted by Site 4, a considerable portion of the volume of stormwater runoff draining to these ponds may be impacted by non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-regulated contaminant sources unrelated to Site 4. For example, polycyclic aromatic hydrocarbons (PAHs) are ubiquitous in urban environments from sources that include atmospheric emissions from industrial facilities such as power plants, automobile exhaust, tire particles, and asphalt. Stormwater draining from a considerable portion of the developed and industrialized areas north, west, and south of Upstream and Youth Ponds has been in contact with asphalt-paved parking lots, roads, and building rooftops. In addition, a large component of the stormwater flow that ultimately reaches Youth Pond does not flow through Upstream Pond and is not impacted by Site 4. Consequently, there is significant potential for contaminants found in soil and sediment within drainages, sediment in Upstream and Youth Pond, and surface water to have originated from non-CERCLA-regulated sources rather than sources specific to Site 4. Based on the data evaluations presented in this RI, buried debris and the following potentially site-related constituents of concern (COCs) posing risk to either human health or the environment were identified:

- Soil at Site 4: PAHs and arsenic detected within Burial Area 1, and mercury and zinc within Burial Area 2 (potential ecological receptors).
- Groundwater at Site 4: Benzene, ethylbenzene, 1,1-biphenyl, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-cd)pyrene, naphthalene, arsenic, iron, and manganese (potential human health risk).

- Sediment in Upstream Pond: Cadmium, copper, lead, silver, and zinc (potential ecological receptors).
- Surface water in Upstream Pond: None.
- Youth Pond surface drainage features and Youth Pond sediment and surface water: None.
- York River Drainage Channel sediment: None.
- Upstream and Youth Ponds Fish Tissue: None.

Other COCs were identified in the Human Health Risk Assessment (HHRA) and/or Ecological Risk Assessment (ERA) as posing potentially unacceptable risks to human health or ecological receptors and included:

- Soil at Site 4: PCBs, dieldrin, aluminum, iron, lead, and thallium
- Groundwater at Site 4: dieldrin, aluminum, chromium, and thallium
- Sediment in Upstream Pond: PCBs
- York River Drainage Channel sediment: PAHs and lead.
- Upstream and Youth Ponds Fish Tissue: dioxin-like PCBs, Arolcor-1254, Aroclor-1260, and chromium.

Of these COCs, dieldrin, lead, and PCBs were determined to not be site-related while aluminum, chromium, iron, and thallium risks were determined to be acceptable.

A Feasibility Study (FS) should be performed to develop and evaluate remedial alternatives to address buried debris and potentially unacceptable human health or ecological risks associated with potentially site-related COCs in soil and groundwater at Site 4. In addition, while the RI findings indicate that the PCBs in Upstream Pond are not likely to be related to a Site 4 source, the FS should include remedial alternatives to address PCBs in Upstream Pond sediment and PAHs detected in the drainage channel directing surface run off from the roof of CAD Building and the adjacent paved areas to Site 4.

While there are several possibly site-related metals posing potentially unacceptable ecological risk in sediment within Upstream Pond, given its small size and relative isolation, Upstream Pond contains a fairly abundant and diverse aquatic community. The results of the sediment toxicity testing in the Baseline Ecological Risk Assessment (BERA) did not indicate any consistent impacts from COCs to organism survival, growth, or reproduction at any of the Upstream Pond locations. There also do not appear to be any widespread impacts from COCs to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of the BERA. However, any intrusive remedial actions to address the calculated potential ecological risk would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time, if natural processes are relied upon for recolonization, since there are no natural sources of colonizing organisms other than Youth Pond. Furthermore, since urban runoff from the stormwater system is also a possible source for the COCs, there would also be the potential for recontamination following any intrusive remedial action in the pond itself. For these reasons, it is recommended that this medium not be carried forward to the FS.

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Acronyms and Abbreviations

°C	degree Celsius
°F	degree Fahrenheit
µg/kg	microgram per kilogram
µg/L	microgram per liter
µm	micrometer
ALM	Adult Lead Method
AOC	Area of Concern
AST	aboveground storage tank
atm-m^3/M	atmosphere per cubic meter per mole
AVS	acid-volatile sulfide
BCF	bioconcentration factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
bss	below sediment surface
BTAG	Biological Technical Assistance Group
CAD	Cheatham Annex Depot
CAX	Cheatham Annex
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
COC	constituent of concern
COPC	constituent of potential concern
CSM	conceptual site model
CTE	central tendency exposure
CTO	Contract Task Order
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DI	deionized
DO	dissolved oxygen
DoD	Department of Defense
ELCR	Excess Lifetime Cancer Risk
EqP	equilibrium partitioning
ER	Environmental Restoration
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
ESV	ecological screening value
FI	field investigation
f_{oc}	fraction of organic carbon
FS	Feasibility Study
ft/day	foot per day
g/cm^3	gram per cubic centimeter
GPS	Global Positioning System
HHRA	Human Health Risk Assessment
HI	hazard index

HMW	high molecular weight
HQ	hazard quotient
HSA	hollow-stem auger
ID	inside diameter
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IV	intravenous
K_d	distribution coefficient
K_h	horizontal hydraulic conductivity or Henry's Law Constant
K_{oc}	organic carbon partition coefficient
K_{ow}	octanol-water partition coefficient
LMW	low molecular weight
LOAEL	Lowest Observed Adverse Effect Level
LOEC	Lowest Observed Effect Concentration
MATC	Maximum Acceptable Toxicant Concentration
MCL	maximum contaminant level
mg/kg	milligram per kilogram
ml/g	milliliter per gram
MLE	multiple lines of evidence
mg/L	milligram per liter
MS	matrix spike
mS/cm	milliSiemen per centimeter
MSD	matrix spike duplicate
mV	millivolt
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NOEC	No Observed Effect Concentration
ORP	oxidation-reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
ppm	part per million
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RI	Remedial Investigation
RME	reasonable maximum exposure
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SEM	simultaneously extracted metals
SERA	Screening-level Ecological Risk Assessment
SI	Site Inspection
SLC	Screening-level Concentration
SOP	Standard Operating Procedure
SVOC	semivolatile organic compound
TAL	Target Analyte List

TCL	Target Compound List
TOC	total organic carbon
TRV	Toxicity Reference Value
UCL	upper confidence level
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit
VDEQ	Virginia Department of Environmental Quality
VPDES	Virginia Pollutant Discharge Elimination System
VOC	volatile organic compound
WPNSTA	Naval Weapons Station
yd^3	cubic yard

SECTION 1

Introduction

This Remedial Investigation (RI) Report presents the data and findings obtained from field investigation (FI) activities conducted to characterize the nature and extent of contamination and to assess potential risks to human health and the environment at Naval Environmental Restoration Program (ERP) Site 4 and Youth Pond, Naval Weapons Station (WPNSTA) Yorktown, Cheatham Annex (CAX), Williamsburg, Virginia. This report was prepared under the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Atlantic Division, Comprehensive Long-term Environmental Action—Navy (CLEAN) 8012, Contract N62470-11-D-8012, Contract Task Order WE04, for submittal to NAVFAC, the United States Environmental Protection Agency (USEPA) Region III, and the Virginia Department of Environmental Quality (VDEQ). The Navy, USEPA, and VDEQ work jointly as the CAX Tier I Partnering Team.

The RI field activities discussed in this report were conducted in October and November 2012 to fill data gaps, to further characterize the nature and extent of contamination, and to support an assessment of potential environmental and human health risks associated with exposure to contaminants in site media at Site 4 and Youth Pond. Site 4 field activities were conducted in accordance with the Uniform Federal Policy (UFP) – Sampling and Analysis Plan (SAP) titled *Tier II Sampling and Analysis Plan, Site 4 – Remedial Investigation, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia* (Site 4 SAP) (CH2M HILL, 2012a). Youth Pond field activities were conducted in accordance with the UFP-SAP titled *Remedial Investigation, Sampling and Analysis Plan, Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia* (Youth Pond SAP) (CH2M HILL, 2012b).

1.1 Objectives and Approach

The objectives of the RI are to characterize the nature and extent of potential contamination in soil, groundwater, sediment, surface water, and biota tissue and to assess the potential risks posed by this contamination to human health and the environment.

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

- Excavation of test pits to delineate the extent of debris at Site 4
- Collection of surface and subsurface soil, surface sediment, fish tissue, frog tissue, and earthworm tissue samples from Site 4
- Installation of six shallow monitoring wells at Site 4
- Completion of a groundwater elevation survey and collection of groundwater samples from all new monitoring wells at Site 4
- Completion of horizontal hydraulic conductivity (or Henry's Law Constant) (K_h) testing at Site 4
- Collection of surface soil samples from the surface drainage features that drain stormwater into Youth Pond
- Collection of sediment, surface water, fish tissue and frog tissue samples from Youth Pond
- Completion of an aquatic biological survey at Site 4, Youth Pond, and an offsite reference pond (Cheatham Pond)
- Collection of sediment, surface water, fish tissue and frog tissue samples from an offsite reference pond (Cheatham Pond)
- Quantitative assessment of the potential human health and ecological risks associated with exposure to contaminated site media, where identified

1.2 Site Background

This subsection provides a general summary of background information for CAX, Site 4, and Youth Pond, including site descriptions and environmental history.

1.2.1 CAX

CAX consists of 2,300 acres of land on the York-James Peninsula, northwest of WPNSTA Yorktown (**Figure 1-1**). CAX was the location of the former Penniman Shell Loading Plant, a large powder and shell loading facility operated by DuPont during World War I. The facility closed in 1918, and the property was used for farming or remained idle until CAX was commissioned in 1943 as a satellite unit of the Naval Supply Depot to provide bulk storage facilities and serve as an assembly and overseas shipping point throughout World War II. In 1987, CAX was designated the Hampton Roads Navy Recreational Complex. Today, the mission of CAX includes supplying Atlantic Fleet ships and providing recreational opportunities to military and civilian personnel, with outdoor recreational facilities including cabins, camp sites, an 18-hole golf course, swimming pool, ball fields, freshwater and saltwater fishing areas, boating, wildlife watching, and hunting.

CAX is bordered by the Colonial National Historical Park on the northwest and east, the Queens Lake subdivision to the west, and the City of Williamsburg to the south and southwest. The majority of CAX is undeveloped and heavily wooded. Major surface water features at CAX consist of Youth Pond, Cheatham Pond, Jones Pond, Penniman Lake, and the York River. Potable water supply at CAX is provided by Newport News Waterworks (ASTDR, 2004).

In October 1998, control of CAX was transferred from the Fleet and Industrial Supply Center to WPNSTA Yorktown. Comprehensive Environmental Restoration (ER) activities at CAX began in 1984 under the Navy Assessment and Control of Installation Pollutants program and the ERP. On January 2, 2001, CAX was added to the National Priorities List, which required all subsequent ER activities to be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Navy, Commonwealth of Virginia (through VDEQ), and USEPA executed a Federal Facilities Agreement in March 2005, which identified a total of 12 Sites and seven Areas of Concern (AOCs) to be addressed under CERCLA (Navy, 2005).

1.2.2 Site 4

Site 4, the Outdated Medical Supply Disposal Area, is composed of two burial investigation areas (Burial Investigations Areas 1 and 2), approximately 4 acres in size and located west of D Street, between Cheatham Annex Depot (CAD) buildings 11 and 12 (**Figure 1-2**).

The history of Burial Investigation Area 1 (formerly identified as AOC 3 and later incorporated into Site 4) is unknown. It was originally identified as a surface debris pile of metal banding, a few empty drums, and charred wood with approximate dimensions of 20 feet by 20 feet by 10 feet high; the surface debris pile is located in the southwest corner of Burial Investigation Area 1 and adjacent to Upstream Pond (**Figure 1-2**). However, test pits excavated as part of the Site 4 and AOC 3 Site Inspection (SI) revealed buried debris in this area as well (CH2M HILL, 2011a).

Regarding Burial Investigation Area 2 (formerly known as Site 4 before Site 4 was expanded to include AOC 3), the 1984 Initial Assessment Study reported out-of-date medical supplies (including intravenous[IV] injection sets with syringes wrapped in aluminum foil or plastic, empty IV bottles, numerous sharps [both] metal and plastic]), and 1-inch metal banding were disposed on the bank of Upstream Pond and covered with soil in the 1968/1969 timeframe (C.C. Johnson and Associates, Inc., and CH2M HILL, 1984). After heavy rains, syringes and tubing were seen floating in Upstream Pond and downstream in Youth Pond located across D Street (C. C. Johnson and Associates, Inc., and CH2M HILL, 1984). As much as 7,000 cubic yards (yd^3) of material were reported to have been disposed; however, in 2002, the volume of medical supplies, as well as overburden soil cover material, was estimated at 2,100 yd^3 (Baker, 2002).

1.2.3 Youth Pond

Youth Pond is a manmade, freshwater surface water body approximately 2.5 acres in size located in the northeastern portion of CAX (**Figure 1-2**). Several drainage pathways from the surrounding area combine into two separate drainages, which ultimately discharge into Youth Pond. One drainage pathway flows under D Street and connects Site 4 (including Upstream Pond) to Youth Pond, and the other pathway receives combined drainage from stormwater drains located within the CAD area, Outfall #34, and an unnamed drainage channel (**Figure 1-2**). Surface water within Youth Pond itself then discharges through an underground culvert into the York River through Outfall #NR-30. The historical purpose and uses of Youth Pond are unknown; however, it is currently used by military personnel and their families for recreational activities, though it is not open to the general public. Following identification of polychlorinated biphenyls (PCBs) within pond sediment during the 2000 Pond Study, a catch-and-release fishing restriction was implemented for the pond in 2000 as a conservative measure[1].

1.3 Summary of Previous Investigations

This section presents a summary of the findings from previous investigations conducted prior to the 2012 RI field activities. While the results of the previous investigations are briefly mentioned in this section, earlier data were combined with the current RI data for evaluation in this report, and are discussed more thoroughly in Section 4.

1.3.1 Site 4

Previous investigations that helped characterize potential contamination at Site 4 are the 1998 Debris Removal (Baker, 2001a), the 1999 FI (Baker, 2001a), the 2001 Test Trench Excavation (Baker, 2002), the Screening-level Ecological Risk Assessment (SERA) (Baker, 2005a), and the 2009 Sites 4, 9, and AOC 3 SI (CH2M HILL, 2011a).

1.3.1.1. 1998 Debris Removal

During a site visit on May 4, 1998, with VDEQ officials, packages of unused needles wrapped in aluminum foil were found at the northeastern end of the site in a small drainage ditch near Upstream Pond. Later in May 1998, approximately 200 pounds of surface debris and 13 pounds of sharps (metal and plastic) were removed from the site. Surface debris removed included IV injection sets, many contained in aluminum or plastic bags, and small quantities (15 containers) of injectable drugs. The injectable drug containers contained either residue or small volumes (a few milliliters of liquid) and had either no labels or labels that were not legible. Additional surface debris, including metal banding, railroad ties, metal, corroded 55-gallon empty drums, and beverage containers, was observed at the site, but not removed.

1.3.1.2. 1999 Field Investigation

In November 1999, soil samples were collected from the site, and sediment samples were collected from Upstream Pond. These samples were analyzed for Target Compound List (TCL) organic compounds (volatile organic compounds [VOCs], semivolatile organic compounds [SVOCs], pesticides, and PCBs), Target Analyte List (TAL) metals, cyanide, and explosives constituents. The results indicated that there was a potential for risk to human health due to the polycyclic aromatic hydrocarbons (PAHs) detected throughout the site. These results were summarized in the Final SI Report for Site 4 and AOC 1 (Baker, 2001a) and were included in the 2011 SI Report data evaluation (CH2M HILL, 2011a).

1.3.1.3. 2001 Test Trench Excavation

In November 2001, 14 test trenches (4-TT01 through 4-TT14) and six test holes (4TH01 through 4TH06) were excavated and examined to characterize and delineate the extent and types of buried waste within Burial Investigation Area 1. Based on the results of this investigation, the southern, eastern, and the southwestern subsurface debris boundaries were delineated. Buried material was observed to be thickest in the eastern portion of the site, where waste was encountered up to 5 feet below ground surface (bgs). The volume of buried material and overburden soil cover material was then estimated at 2,100 yd^3. Surface debris, consisting of railroad ties, metal, and various trash items, was also encountered along the northern and western edges of this disposal area.

[1] The restriction was implemented without biota sampling or a Human Health Risk Assessment.

1.3.1.4. 2005 SERA

In 2005, a SERA was completed for soil, sediment, and surface water to determine if potential risk to ecological receptors warranted either additional investigation beyond the conservative screening steps of the Ecological Risk Assessment (ERA) process or the removal of the site from further ecological consideration. In addition, the SERA was completed to identify any data gaps or areas of uncertainty that would require the collection of additional data to support ERA evaluations beyond the screening level. Results of the SERA indicated that there are multiple constituents of potential concern (COPCs) in soil, sediment, and surface water, including VOCs, SVOCs, pesticides, PCBs, and metals. Since multiple COPCs and complete exposure pathways were identified, the SERA recommended proceeding with Step 3A of the ERA process; however, additional data would need to be collected.

1.3.1.5. 2009 Site Inspection

In 2009, field activities for an SI were conducted and included the excavation of test pits, surface and subsurface soil sampling, temporary groundwater well installation activities, groundwater well development and sampling, temporary groundwater well abandonment activities, and surface water and sediment (surface and subsurface) sampling. Results from the SI indicated that the extent of buried debris in Burial Investigation Area 2 had been delineated, but additional test pitting would be required to delineate the extent of buried debris in Burial Investigation Area 1. In addition, sampling results indicated potential risks to human health and ecological receptors, and an RI was recommended to further characterize the extent of contamination and to quantify the risks to human health and ecological receptors.

1.3.2 Youth Pond

Previous investigations that helped characterize potential contamination and contaminant sources at Youth Pond are the 2000 Pond Study (Baker, 2001b), the 2009 Sites 4, 9, and AOC 3 SI (CH2M HILL, 2011a), and a 2011 site visit.

1.3.2.1. 2000 Pond Study

In 2000, a Pond Study was conducted to provide analytical data for ecological and human health risk screenings, as well as to determine if bioaccumulative COPCs were present in the sediment and surface water at Youth Pond. Investigation activities included the collection of two co-located surface water and surface sediment samples from Youth Pond for analysis for TCL organic constituents (VOCs, SVOCs, pesticides, and PCBs), TAL metals, and explosive compounds.

Based on the Aroclor-1260 concentrations detected in sediment, a catch-and-release fishing restriction was implemented as a conservative measure. At that time, biota sampling and a Human Health Risk Assessment (HHRA) were not conducted and further investigation was recommended to determine the source of contamination within Youth Pond and to quantify potential risks to human health and the environment.

1.3.2.2. 2009 Sites 4, 9, and AOC 3 Site Inspection

In 2009, an SI was conducted to determine if a CERCLA-related release occurred at Site 4 and AOC 3 (now known as Burial Investigation Area 1 of Site 4) located directly southwest of Youth Pond. The Site 4 study area includes the surface water body Upstream Pond, which is connected to the downstream Youth Pond by a culvert that runs underneath D Street (**Figure 1-2**). Based on the results of the investigation, AOC 3 was incorporated into Site 4, and an RI was recommended to further delineate the vertical and horizontal extent of buried debris near Upstream Pond, to characterize the extent of contamination within soil, groundwater, and sediment, and to further quantify the risk associated with all site media.

1.3.2.3. 2011 Site Visit

On October 25, 2011, CH2M HILL personnel conducted a site visit to identify potential sources for the constituents detected in Youth Pond surface water and sediment samples collected during the March 2000 Pond Study. Site 4 was identified as a potential source of contamination to Youth Pond, via the culvert running underneath D Street that connects Youth Pond to Upstream Pond. In addition, other surface drainage features outside of Site 4 contributing stormwater drainage to Youth Pond were identified (**Figure 1-2**).

Youth Pond receives stormwater runoff from a surrounding developed and industrialized area of considerable size upstream of the pond. A portion of the volume of stormwater runoff that ultimately discharges to Youth Pond is potentially impacted by Site 4, while a considerable portion may be impacted by non-CERCLA-regulated contaminant sources unrelated to Site 4. For example, PAHs are ubiquitous in urban environments, as they occur naturally in coal and petroleum products and are formed by the incomplete combustion of organic matter, including wood and fossil fuels (Mahler et al., 2012). As a result, PAH sources in urban environments include atmospheric emissions from industrial facilities such as power plants, automobile exhaust, tire particles, and asphalt.

Stormwater runoff originating in the vicinity of the debris areas (Burial Areas 1 and 2) that is potentially impacted by contaminants associated with the debris drains to Upstream Pond, which, as noted earlier, is connected to Youth Pond via a culvert beneath D Street. However, Upstream Pond also receives a substantial amount of stormwater runoff that has the potential to be impacted by non-CERCLA-regulated contaminant sources that are not associated with Site 4, such as potential impacts from stormwater draining from asphalt-paved parking lots and roads as well as building rooftops. For example, stormwater draining from a considerable portion of the impermeable surfaces in the industrial area west and southwest of Upstream Pond is directed to Upstream Pond via stormwater piping that terminates at Outfall #2 or via drainage channels originating near the paved road immediately south of Site 4 (**Figure 1-3**). In addition, a large component of the stormwater flow that ultimately reaches Youth Pond does not flow through Upstream Pond and is not impacted by Site 4. As shown on **Figure 1-3**, stormwater draining from a significant portion of the impermeable surfaces in the industrial area north and northwest of Site 4, including the area north of the CAD 12 Building, is directed to Youth Pond via stormwater piping that terminates at Outfall #34 and via other surface drainage features identified on **Figure 1-3**. This component of stormwater flow is not impacted by Site 4, but has the potential to be impacted by non-CERCLA-regulated contaminant sources originating from asphalt-paved parking lots, roads, and building rooftops.

1.4 Report Organization

The RI Report is organized as follows:

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

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

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 1-1 - WPNSTA BASE LOCATION MAP.MXD JCROCKETT 10/29/2013 12:17:10 PM

Legend

- Youth Pond
- Site 4 Boundary
- Cheatham Annex Boundary

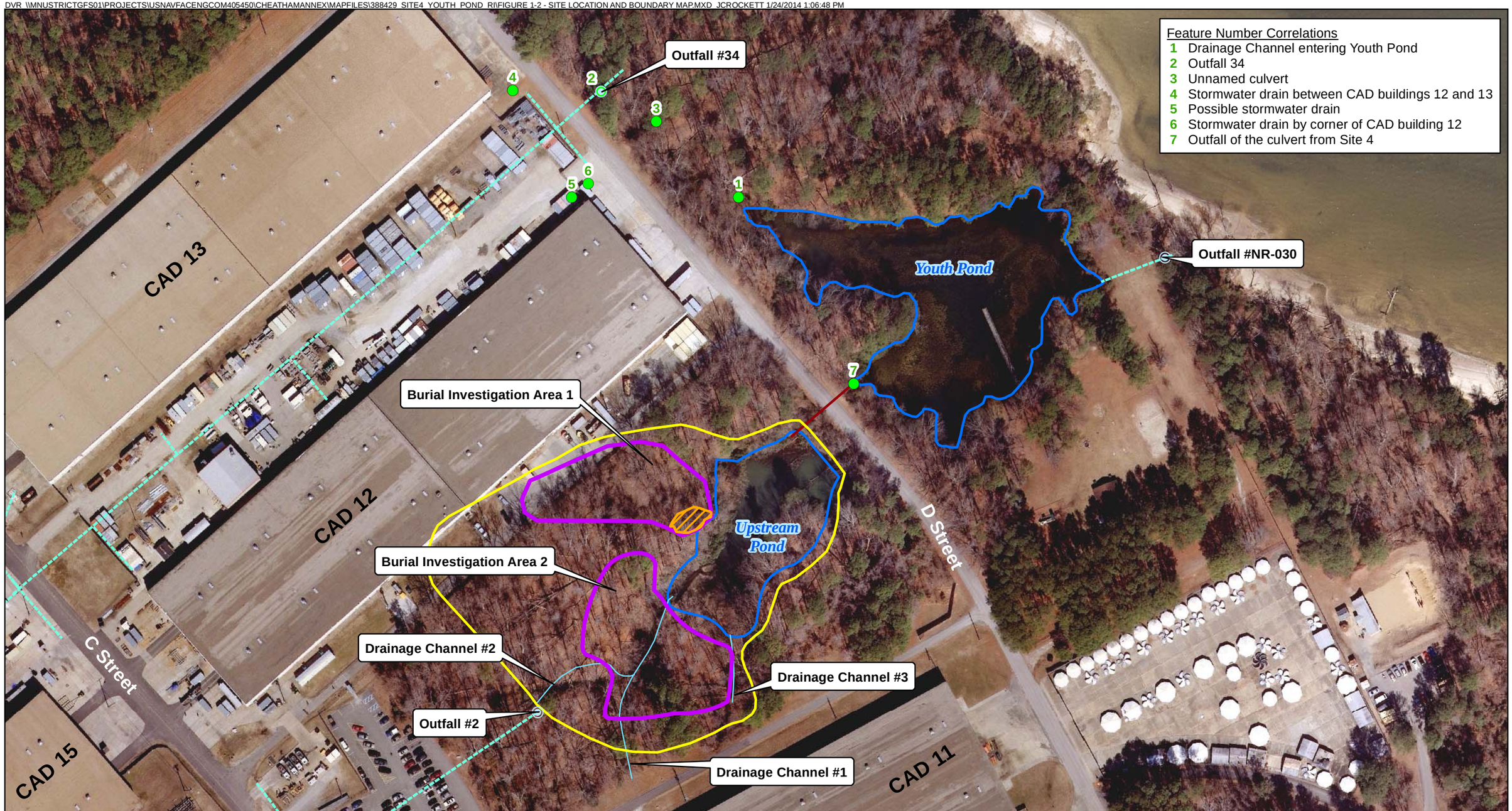
N
W E
S

0 1,000 2,000 Feet

Figure 1-1
Base Location Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 1-2 - SITE LOCATION AND BOUNDARY MAP.MXD JCROCKETT 1/24/2014 1:06:48 PM



Legend

- Outfall
- Surface Feature Location
- Culvert
- Drainage Channels
- Storm Water Line
- Burial Investigation Areas
- Surface Debris Pile
- Water Body
- Site 4 Boundary

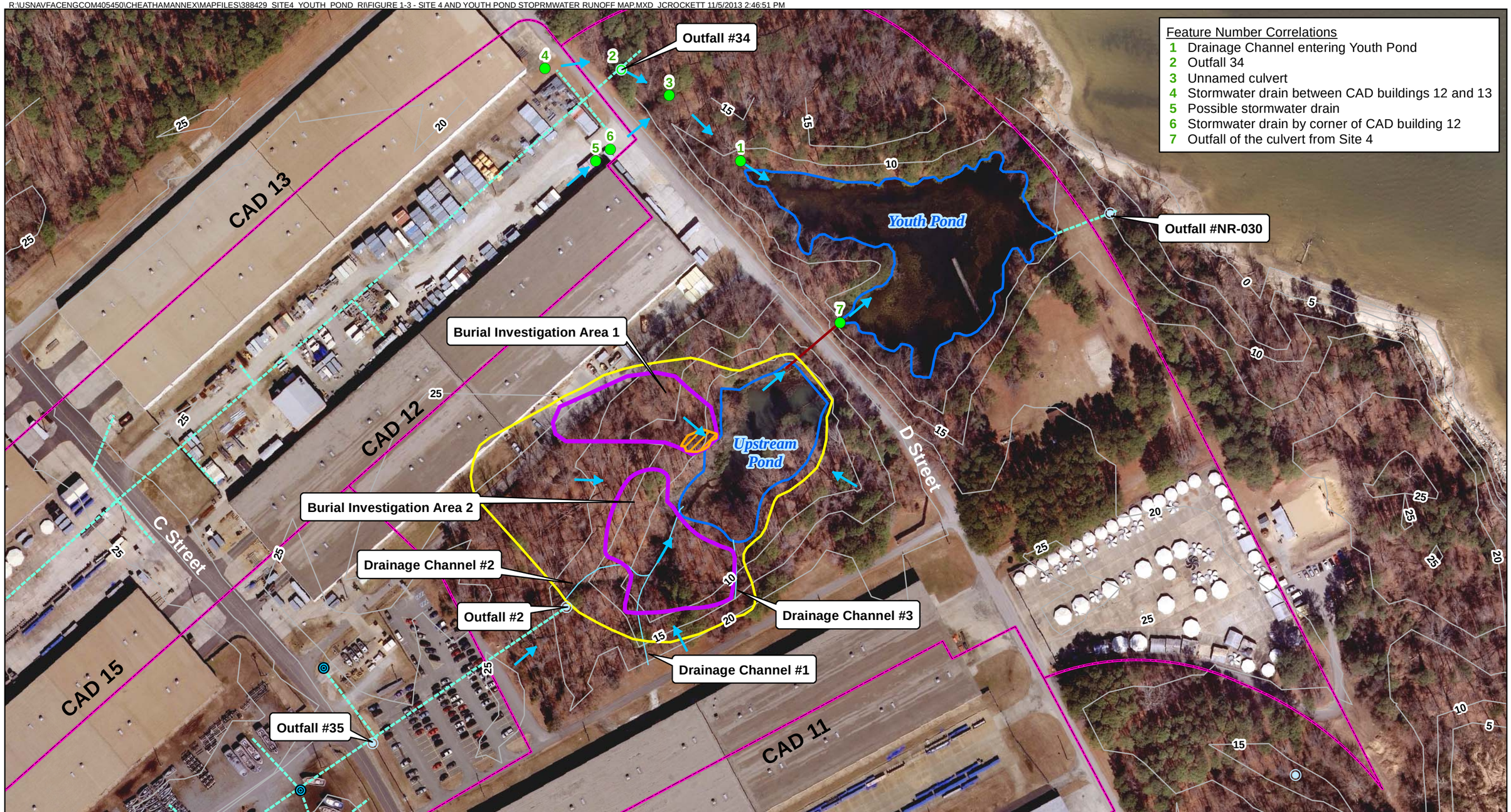
N
W E
S

0 130
Feet

Figure 1-2
Site Location and Boundary Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL®

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 1-3 - SITE 4 AND YOUTH POND STOPRMWATER RUNOFF MAP.MXD JCROCKETT 11/5/2013 2:46:51 PM



Legend

- Outfall
- Surface Feature Location
- Drop Inlet
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Runoff Flow Direction
- Elevation Contour (5 ft interval)
- Surface Debris Pile
- Burial Investigation Areas
- Drainage Area Boundaries
- Water Body
- Site 4 Boundary

N W E S

0 150 Feet

Figure 1-3
Site 4 and Youth Pond Stormwater Runoff Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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SECTION 2

Field Investigation Methods

This section describes the approach and methodology for the FI activities conducted as part of the RI at Site 4 and Youth Pond. Field activities for Site 4 included buried debris delineation through test pitting, surface and subsurface soil sampling, surface sediment sampling, biota tissue sampling, monitoring well installation, groundwater monitoring and sampling, K_h "slug" testing, and reference pond surface and subsurface sediment sampling, surface water sampling, and biota tissue sampling. Specific details of the sampling rationale and objectives for the Site 4 field activities are provided in the Site 4 SAP (CH2M HILL, 2012a). Field activities for Youth Pond included site drainage feature (surface soil and sediment) sampling, surface and subsurface sediment sampling, surface water sampling, biota tissue sampling, and reference pond surface and subsurface sediment and surface water sampling. Specific details of the sampling rationale and objectives for the Youth Pond field activities are provided in the Youth Pond SAP (CH2M HILL, 2012b).

Table 2-1 summarizes all of the environmental data that were evaluated during this RI, including the numbers of samples collected, sample nomenclature, the media sampled, the sample collection methods, and the analyses performed. **Figure 2-1** depicts the locations of all samples collected during the RI in various environmental media, while **Figures 2-2** through **2-8** present the locations of the individual media samples.

The investigation activities were implemented to support:

- Development of the hydrogeologic conceptual model of Site 4 and Youth Pond (**Section 3**)
- Assessment of the nature, extent, fate, and transport of contamination, potential sources of contamination, and development of a contaminant transport conceptual site model (CSM) (**Sections 4 and 7,** respectively)
- Assessment of potential risks to human health and the environment (**Sections 5 and 6,** respectively)
- Information required for the potential completion of a future Feasibility Study (FS) (**Section 8**)

2.1 Site 4

2.1.1 Pre-Investigation Activities

Prior to the 2012 RI FI activities, an underground utility clearance was conducted at Site 4 by Accumark, Inc., of Chesapeake, Virginia.

In addition, a reconnaissance survey was conducted at Site 4 prior to field sampling to characterize the basic physical characteristics of Upstream Pond in order to select a suitable reference pond and associated reference pond sample locations to allow a comparison of site data to reference data for the purpose of discerning potential non-site-related contaminant impacts. Cheatham Pond was ultimately selected by the CAX Partnering Team as the approved reference pond. As part of the reconnaissance survey, depth to water, water temperature, pH, conductivity, salinity, turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP) data were collected throughout Upstream Pond, in the surface water column above the sediment sample locations (**Table 2-2**). In addition, a habitat characterization and a qualitative description of the sediment within Upstream Pond were recorded (**Appendix A**).

2.1.2 Buried Debris Delineation

During the 2009 SI, test-pitting activities were conducted at Site 4. While the extent of buried debris within Burial Area 2 was defined during the SI activities, the lateral extent of Burial Area 1 remained incompletely defined at the conclusion of the SI. Therefore, test-pitting activities were conducted on November 8, 2012, to complete the definition of the lateral extent of buried debris present at Burial Area 1. Test-pitting activities were conducted in accordance with the Standard Operating Procedure (SOP) entitled *Trenching for Landfill Delineation* (CH2M HILL, 2012a).

A total of two test pits (CAS04-TP03 and CAS04-TP04) were excavated to delineate the lateral extent of buried debris within Burial Area 1 (**Figure 2-2**). Test pits were excavated between 6 and 6.5 feet in depth and between 13 and 14 feet in length. During excavation, organic vapors within the test pits were monitored with a photoionization detector (PID). Any responses from the PID (readings ranged from 2.2 to 13.1 parts per million [ppm]) were noted in the field logbook and test pit log. Test pit logs are provided within **Appendix B** of this report. Following excavation, all soil was placed back into the associated test pit, and compacted, re-graded, and seeded.

2.1.3 Soil Sampling

Surface (0 to 6 inches) and subsurface (6 to 24 inches) soil samples were collected to better define the extent of soil contamination and evaluate potential risks associated with exposure to soil at Site 4 (**Figure 2-3**). The soil samples were divided into three groups:

- Surface and subsurface soil samples collected southeast of Upstream Pond
- Surface soil samples collected from drainage ways within the vicinity of surface soil samples CAA03-SS06 and CAS004-4-HA06
- Surface and subsurface soil samples collected from areas with elevated chromium concentrations from the SI
- The soil sampling activities were conducted in accordance with the SOP entitled *Shallow Soil Sampling* (CH2M HILL, 2012a). Surface soil samples, collected with a hand auger, were obtained from a depth of 0 to 6 inches bgs while subsurface soil samples, also collected with a hand auger, were obtained from a depth of 6 to 24 inches, as outlined in the approved Site 4 SAP. Following sample collection, organic vapors from each soil sample were monitored with a PID. Any responses from the PID were noted in the field logbook.

2.1.3.1. Soil Sampling Southeast of Upstream Pond

Co-located surface and subsurface soil samples were collected from two locations (CAS04-SS/SB06 and CAS04-SS/SB07) on the southeast side of Upstream Pond (within the vicinity of the proposed test pits) to supplement the SI data in order to determine the extent of soil contamination and evaluate potential risks to human health and the environment at Site 4.

In accordance with the approved Site 4 SAP, soil samples were analyzed for PAHs, PCBs, metals, total organic carbon (TOC), pH, and grain size (**Table 2-1**). After collection in sampling containers, the samples were packed on ice and shipped to the laboratory (Katahdin Analytical Services of Scarborough, Maine) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a). Soil borings were monitored with a PID to determine the presence of organic vapors during sample collection. While maximum PID readings of 13.1 ppm were observed during sampling, this value only indicates that low level volatile compounds were present in the soil during sampling.

2.1.3.2. Soil Sampling from Drainage Channels

Surface soil samples were collected from six locations (CAS04-SS08 through CAS04-SS13) within the drainage channels in the vicinity of SI surface soil samples CAA03-SS06 and CAS004-4-HA06 to determine if there has been any contaminant migration via stormwater runoff from upstream areas with potentially high contaminant concentrations. These drainage channel locations did not contain any standing water at the time of sampling, but may be underwater during and after major storm events. Preliminary sample locations were agreed upon by the CAX Partnering Team prior to mobilization; however, the exact sample locations were field-determined, based on the locations of the drainage ways at Site 4.

In accordance with the approved Site 4 SAP, soil samples were analyzed for PAHs, PCBs, metals, TOC, pH, and grain size (**Table 2-1**). After collection in sampling containers, the samples were packed on ice and shipped to the laboratory (Katahdin Analytical Services of Scarborough, Maine) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a). Soil borings were monitored with a PID to determine the presence of organic vapors during sample collection. While maximum PID readings of 38.4 ppm were observed during sampling, this value only indicates that low level volatile compounds were present in the soil during sampling.

2.1.3.3. Hexavalent Chromium Sampling

Two surface and two subsurface soil samples (CAS04-SS14, CAS04-SS/SB15, and CAS04-SB16) were collected from those areas where elevated chromium concentrations were detected during the 2009 SI in order to refine the HHRA for Site 4 by determining the ratio of trivalent chromium to the more toxic hexavalent chromium. In accordance with the approved Site 4 SAP, soil samples were analyzed for total and hexavalent chromium (**Table 2-1**). After collection in sampling containers, the samples were packed on ice and shipped to the laboratory (Columbia Analytical Services of Rochester, New York) for analysis, in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a).

2.1.4 Surface Sediment Sampling

Surface sediment samples were collected from 14 locations (CAS04-SD10 through CAS04-SD23) from Upstream Pond in order to complete a Baseline Ecological Risk Assessment (BERA) and to assess the potential risk to ecological receptors (**Figure 2-4**). General sampling locations were jointly selected by representatives from the Navy and the USEPA Biological Technical Assistance Group (BTAG) in the field and subsequently agreed to by the CAX Partnering team.

All sediment sampling activities were conducted in accordance with the SOP entitled *Sediment Sampling* (CH2M HILL, 2012a). Surface sediment samples, collected with a hand auger (due to the shallow depth of surface water), were obtained from a depth of 0 to 4 inches below sediment surface (bss) in accordance with the approved Site 4 SAP.

In accordance with the approved Site 4 SAP, all sediment samples were analyzed for PAHs, PCBs, metals, pH, TOC, grain size, and acid-volatile sulfide (AVS)/simultaneously extracted metals (SEM) (**Table 2-1**). In addition, six surface sediment samples (CAS04-SD18 through CAS04-SD23) were evaluated for toxicity using laboratory-based 42-day sediment tests (endpoints of survival and growth) with the invertebrate *Hyalella azteca*, sulfide, and ammonia. Following sediment core collection, AVS/SEM samples were collected first by pushing the bottleware directly into the sediment core. After the AVS/SEM samples were collected, the remainder of the sediment was homogenized in a stainless steel bowl and then transferred to the appropriate laboratory-provided sample containers for all other sample analytes. After collection in sampling containers, the sediment samples were packed on ice and shipped the same day for overnight service to the laboratory for analysis in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a).

The following deviation from the SAP occurred with regard to the sediment sampling:

- As proposed in the approved Site 4 SAP, the six surface sediment samples evaluated for toxicity were to be evaluated using laboratory-based 28-day sediment tests (endpoints of survival and growth) with the invertebrate *Hyalella azteca.* However, longer 42-day sediment tests with the same invertebrate *Hyalella azteca* were conducted instead. The 42-day test includes the full 28-day test but extends it to encompass the *Hyalella azteca* reproductive endpoint; therefore, the requirements of the SAP were met, and this deviation has a positive impact on the project quality objectives.

2.1.5 Aquatic Community Characterization

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Upstream Pond to determine the presence and type of aquatic community existing within the water body. The results of this survey were used to characterize the ecological receptors that are present in Upstream Pond and to guide the collection of tissue samples. In addition, a semi-quantitative survey of benthic macroinvertebrates was conducted to characterize the type of benthic community that is present.

2.1.5.1. Fish and Aquatic Organisms

A qualitative survey of fish and amphibian species present at Site 4 was conducted to determine the presence and type of aquatic community that exists within Upstream Pond.

A variety of methods was used to collect the fish and frog/tadpoles, including backpack electroshockers, gill nets, seines, minnow traps, dip nets and baited trot lines. The locations of all nets and traps were determined with a

Global Positioning System (GPS) unit. All trapped or collected fish and frogs/tadpoles were identified, weighed (to the nearest gram), and their total length measured to the nearest centimeter (**Table 2-3**). In addition, all fish were visually examined for abnormalities in terms of gross external morphology.

The results of this survey were used to guide the collection of tissue samples.

2.1.5.2. Benthic Invertebrates

At each of the 11 surface sediment sampling locations, benthic invertebrates were collected as part of a semi-quantitative, reconnaissance-level evaluation of community characteristics (that is, number and type of taxa, relative abundance) in support of the BERA. The organisms were collected in the manner described as follows:

- Deeper water areas without large amounts of rooted vegetation were sampled with a petite Ponar (6 x 6 inch) dredge; a single grab sample was collected. Shallow vegetated areas were sampled with a D-frame dip net (United States Standard No. 30 mesh or 500-micrometer [µm] sieve). The net was jabbed/swept in a standardized motion (each jab/sweep covered a linear distance of approximately 0.5 meter) through the rooted vegetation or representative habitat areas to collect a single invertebrate sample within an area of approximately 2 square meters. This level-of-effort was standardized among all locations where this sampling method was employed (across water bodies, including the reference pond).
- Three subsamples were collected around each sediment sampling location, each 5 feet from the center point and 120 degrees apart, and composited into a single sample. Depending upon habitat conditions present at the sampling location, the composite sample may have been composed of both grab (dredge) and net (jab/sweep) sub-samples or may have been totally composed of one or the other sub-sample types. The resulting composite sample was sieved through a United States Standard No. 30 mesh screen or screened wash bucket (500-µm opening size).
- The contents of each sieved sample were identified and enumerated in the field. Organisms were identified to the lowest taxonomic level practical (generally order or family) and enumerated (**Appendix A**). Samples were not preserved.

2.1.6 Tissue Sampling

Based on the results of the initial site reconnaissance at Site 4 (described in Section 2.1.1) and the aquatic community characterization activities (described in Section 2.1.5), five frog (four adult and one juvenile) tissue, seven fish tissue, and one composite earthworm tissue samples were collected to support the HHRA and/or BERA. The numbers and species of tissue samples were agreed to by the CAX Partnering Team (and their associated technical support) during an October 22, 2012, phone call prior to submittal of the samples to the laboratory.

Fish and frog tissue samples were collected during the aquatic community characterization activities (described in Section 2.1.5). An earthworm tissue sample was collected by compositing earthworms within a 3-foot by 3-foot area surrounding surface sediment samples CAS04-SD15 through CAS04-SD17 (**Figure 2-4**), adjacent to the streams west of Upstream Pond. The earthworm sample was collected by digging up soil and sorting it by hand to pick out the worms.

All frog tissue samples and five whole-body fish tissue samples were analyzed for dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture. One whole-body fish tissue sample and the earthworm tissue sample were analyzed for dioxin-like PCBs, PCB homologues, and metals (as discussed in the SAP deviations bullets as follows). One composite fish tissue sample was divided into a filet and offal sample, and the filet was analyzed for PCBs (Aroclors), dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture and the offal was analyzed for dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture.

Following tissue sample collection, all samples were first wrapped in pre-rinsed aluminum foil (provided by the laboratory), placed in a food-grade Ziploc bag, labeled, and then placed within a second food-grade Ziploc bag. Tissue samples were frozen using dry ice and shipped via overnight service to the laboratory following the CAX Partnering Team phone call on October 22, 2012.

The deviations from the SAP with respect to tissue sampling are discussed as follows:

- Filet fish tissue samples were not proposed in the approved Site 4 SAP, as fish of sufficient size were not expected to be found in Upstream Pond. However, during the characterization of the aquatic community, several largemouth bass were found in Upstream Pond. As a result, the CAX Partnering Team agreed during the phone call on October 22, 2012, to have the laboratory analyze one composite largemouth bass sample. Once the samples arrived at the laboratory, the largemouth bass were filleted. The filets and the remaining tissue (offal) were analyzed for PCBs (Aroclors), dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture.
- A total of five whole-body fish tissue samples were proposed in the approved Site 4 SAP. However, in addition to the five whole-body fish tissue samples collected, one bottom-feeding fish with insufficient mass to analyze for dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture (the whole-body fish sampling parameters) was found within Upstream Pond during the characterization of the aquatic community. The CAX Partnering Team discussed this sample during the October 22, 2012, phone call and agreed to submit this additional tissue sample (increasing the fish tissue sample count to six) for analysis for dioxin-like PCBs, PCB homologues, and metals (the maximum extent of analyses allowable by the sample mass).
- As proposed in the approved Site 4 SAP, three earthworm tissue samples were to be collected from three areas adjacent to the streams west of Upstream Pond. Despite expanding the sampling area around each of these sampling areas, an insufficient volume of earthworms could be collected to generate three individual area samples for laboratory analysis. Therefore, the earthworm samples from all three areas adjacent to the streams west of Upstream Pond were composited together for analysis for dioxin-like PCBs, PCB homologues, and metals (the maximum extent of analyses allowable by the sample mass). The CAX Partnering Team and their associated technical support agreed to this approach during the October 22, 2012, phone call.

The deviations previously listed do not negatively impact the project quality objectives.

2.1.7 Groundwater Sampling

2.1.7.1. Monitoring Well Installation

Six shallow monitoring wells (CAS04-GW05 through CAS04-GW10) were installed within the Yorktown-Eastover aquifer to depths up to 24 feet bgs (**Figure 2-5**). Each monitoring well was installed in accordance with the SOP entitled *General Guidance for Monitoring Well Installation* (CH2M HILL, 2012a). The monitoring well construction details are summarized in **Appendix C**.

Parratt-Wolff, Inc., of Hillsborough, North Carolina, provided hollow-stem auger (HSA) well drilling and installation services using a 4.25-inch-inside-diameter (ID) HSA. During the lithologic logging of soil cores (collected using 4-foot-long acetate sleeves), soil descriptions, including grain size, color, moisture content, relative density, consistency, soil structure, mineralogy, and other relevant information such as possible evidence of contamination, were recorded. Soil boring logs are included in **Appendix C**.

New monitoring wells were constructed with flush-threaded, 2-inch-ID Schedule 40 polyvinyl chloride (PVC) casing and well screen (**Appendix C**). In accordance with the SOP entitled *Monitoring Well Installation* (CH2M HILL, 2012a), the well screens were 10 feet long with 0.010-inch slot sizes. A silica sand filter pack was placed around the annular space of the well screen from the bottom of the boring and well screen to a depth of approximately 2 feet above the top of the screen. A bentonite layer (approximately 2 to 3 feet) was placed at the top of the sand pack. After the bentonite was allowed to hydrate for at least 24 hours, a cement-bentonite grout was placed in the remaining annular space to the surface. All monitoring wells were completed with steel stick-up protective casings and surrounded by four protective bollards. A locking, watertight cap was placed on the top of each casing, and the well identification numbers were clearly marked on the well with etched well identification tags.

2.1.7.2. Monitoring Well Development

Prior to sampling, all monitoring wells were developed in order to restore the permeability of the aquifer material surrounding the well, which may have been reduced by the drilling operations, and to remove fine-grained

materials that may have entered the well during installation. Monitoring well development was performed after the grout used to construct the new monitoring wells was allowed to adequately set (at least 24 hours or more) to prevent grout contamination of the screened interval. Monitoring wells were developed using a submersible pump and a combination of surging and pumping throughout the well screen.

Between 55 and 76 gallons of water were evacuated from each well, with a total of 405 gallons of water purged during the entire monitoring well development event. During monitoring well development, in accordance with the SOP entitled *Installation of Shallow Monitoring Wells* (CH2M HILL, 2012a), water quality parameters (pH, ORP, temperature, conductivity, turbidity, and DO) were recorded approximately every 5 minutes using a YSI water-quality meter. The YSI instrument was calibrated daily, and calibration results were recorded in the field notebook.

Generally, development continued until at least three well volumes were removed and the water produced was free of turbidity, sand, and silt (to the maximum extent practicable). A YSI water-quality meter was used to determine when the turbidity was low (preferably less than 20 nephelometric turbidity units). If turbidity continued to decrease after the removal of three well volumes, development was continued until turbidity readings stabilized (that is, until turbidity readings were within 10 percent for three consecutive readings). In addition, development typically ended once three successive measurements of pH, specific conductivity, and temperature within 10 percent of each other were achieved.

2.1.7.3. Groundwater Elevation Measurement

A groundwater elevation survey was conducted at all six monitoring wells prior to sampling. **Table 2-4** summarizes the water-level measurements from each well. An electronic water-level meter was used to measure the depth to water from the marking on the top of casing to the nearest 0.01 foot.

2.1.7.4. Groundwater Sampling

Groundwater samples were collected from all monitoring wells in accordance with the SOP entitled *Low-Flow Groundwater Sampling from Monitoring Wells* (CH2M HILL, 2012a) in order to minimize drawdown and to obtain samples representative of groundwater conditions in the surrounding geologic formation. Prior to groundwater sample collection, monitoring wells were purged in order to remove any stagnant water that may have accumulated within the well. Groundwater samples were collected from monitoring wells using a peristaltic pump and disposable tubing. Groundwater quality parameters comprising pH, conductivity, turbidity, DO, temperature, and ORP were measured during the purging of each well using a YSI water-quality meter and a flow-through cell to prevent the purged groundwater from contacting the atmosphere during parameter measurement.

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

Groundwater samples were analyzed for organic constituents, metals, and natural attenuation parameters, comprising VOCs, PAHs, total and dissolved metals, nitrate, nitrite, sulfate, alkalinity, pH, methane, ethane, and ethene, and sulfide. Groundwater for the analytical samples was pumped through the tubing directly into the appropriate laboratory-provided bottleware, with the exception of samples for dissolved metals analysis. Groundwater collected for dissolved metals analysis was pumped through a 0.45-µm filter and then directly into the sample bottleware. After collection in sampling containers, and at the end of each day, the samples were packed on ice and shipped via overnight service to the laboratory for analysis in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a).

2.1.7.5. Hydraulic Conductivity Testing

Aquifer K_h at the site was evaluated using single-well K_h tests, commonly referred to as “slug tests.” Due to the limited area of influence achieved during a test, the slug test data provide a rough estimate of the hydrogeologic

parameters of the aquifer unit proximal to the individual monitoring wells. The slug tests were conducted in the following steps:

- **Static Water-Level Measurement**: The static (pretest) water level in the well was measured using an electronic water-level meter with a graduated tape.
- **Pressure Transducer Placement**: A pressure transducer was set 1 foot above the bottom of each well. The pressure transducer was secured to the well to minimize disturbance during testing. The pressure transducer was connected to a data logger programmed to collect water-level measurements every second for the duration of the test.
- **Falling Head Test**: A slug (consisting of a 5.3-foot-long, 1.5-inch-diameter cylinder made of solid plastic) was lowered until the base of the slug was near the top of the water, and then dropped into the water, causing displacement of water in the well, which was manifested by an almost instantaneous rise in the water level within the well. The water level in the well was monitored as it equilibrated by the pressure transducer and manual measurements until the water level within the well returned at least 90 percent of the way to the originally measured static water level.
- **Rising Head Test**: After the falling head test was completed, the slug was quickly removed from the well, causing an almost instantaneous drop in the water level. The water level in the well was monitored as it equilibrated by the pressure transducer and manual measurements until the water level returned at least 90 percent of the way to the originally measured static water level.

Tests were conducted in all permanent monitoring wells to provide data across the aquifers at the site and to generate estimates of the K_h of the aquifers.

2.1.7.6. Surveying

A Trimble Geo-XT GPS was used to record the horizontal coordinates of test pit, soil sample, and sediment sample locations.

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

2.2 Youth Pond

2.2.1 Pre-Investigation Activities

An initial reconnaissance survey was conducted prior to field sampling to characterize the basic physical characteristics of Youth Pond in order to select suitable reference sample locations from Cheatham Pond (the approved reference pond). Depth to water, water temperature, pH, conductivity, salinity, turbidity, DO, and ORP data were collected throughout Youth Pond (**Table 2-6**). In addition, habitat characteristics and a qualitative description of the sediment within Upstream Pond were recorded (**Appendix A**).

2.2.2 Surface Soil Sampling

Surface soil samples were collected from six upland locations outside of Site 4 where surface drainage is directed to Youth Pond (CAYP-SS01 through CAYP-SS06) in order to determine if the surface drainage features identified during the October 2011 site visit (**Figure 2-6**) are potential contributors of constituents detected in the Youth Pond surface water and sediment samples collected as part of the March 2000 Pond Study.

The surface soil sampling activities were conducted in accordance with the SOP entitled *Shallow Soil Sampling* (CH2M HILL, 2012b). Surface soil sample locations were agreed upon by the CAX Partnering Team prior to

mobilization, and were collected with a hand auger from a depth interval of 0 to 6 inches bgs in accordance with the approved Youth Pond SAP.

Surface soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, metals, TOC, pH, and grain size (**Table 2-1**). Directly following the collection of the soil core by the hand auger, VOC samples were prepared first by pushing an EnCore sampler directly into the soil core to fill the sampler with soil from the target interval. After the VOC samples were collected, the remainder of the collected soil was homogenized in a stainless steel bowl and then transferred to the appropriate laboratory-provided sample containers for all other sample analytes. After collection in sample containers, the samples were packed on ice and shipped each day via overnight service to the laboratory for analysis in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012b). Soil borings were monitored with a PID for organic vapors during sample collection. No PID readings above background were observed during sampling.

2.2.3 Dye Testing

Dye testing was conducted to confirm the location of the culvert that flows from Upstream Pond within Site 4, under D Street, and into Youth Pond. Red dye pellets were placed in the vicinity of two areas in Upstream Pond where culverts linking with Youth Pond were suspected. Field personnel then looked for the red dye to appear downstream in Youth Pond in order to identify the culvert location(s). Only one culvert between Upstream Pond and Youth Pond (as depicted on the figures included in this report) was identified.

2.2.4 Sediment Sampling

Surface sediment samples were collected at two locations outside of Site 4 and upgradient of Youth Pond (CAYP-SD14 and CAYP-SD15) in October 2012 in order to determine if the surface drainage features identified during the October 2011 site visit (**Figure 2-6**) are potential contributors of constituents detected in the Youth Pond surface water and sediment samples collected as part of the March 2000 Pond Study. In addition, co-located surface and subsurface sediment samples (CAYP-SD/SSD01 through CAYP-SD/SSD13), also co-located with six surface water sampling locations, were collected from 13 locations within Youth Pond in order to characterize the nature and extent of contamination and assess the potential risk to human health and ecological receptors (**Figure 2-7**). Preliminary sample locations were agreed upon by the CAX Partnering Team prior to mobilization; however, exact sample locations were field-determined based on observed site conditions (specifically, the locations of the culvert from Upstream Pond and the outlet to the York River).

All sediment sampling activities were conducted in accordance with the SOP entitled *Surface Water and Sediment Acquisition* (CH2M HILL, 2012b). Each sediment sample was collected with a hand auger (due to the shallow depth of surface water). Surface sediment samples were collected from 0 to 4 inches bss, while subsurface sediment samples were collected from a depth of 4 to 8 inches bss, in accordance with the approved Youth Pond SAP.

All sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, metals, pH, TOC, grain size, and AVS/SEM. Following sediment core collection, VOC and AVS/SEM samples were collected first by pushing the bottleware directly into the sediment core at the target interval. After the VOC and AVS/SEM samples were collected, the remainder of the sediment was homogenized in a stainless steel bowl and then transferred to the appropriate laboratory-provided sample containers for all other sample analytes. After collection, sediment samples were packed on ice and shipped via overnight service to the laboratory for analysis daily in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012b).

2.2.5 Surface Water Sampling

Surface water samples, co-located with six of the sediment samples, were collected at six locations (CAYP-SW01 through CAYP-SW06) within Youth Pond in order to characterize the nature and extent of contamination and assess the potential risk to human health and ecological receptors (**Figure 2-7**). Preliminary sample locations were agreed upon by the Partnering Team prior to mobilization; however, exact sample locations were field-determined based on observed site conditions (specifically, the locations of the culvert from Upstream Pond and the outlet to the York River).

All surface water sampling activities were conducted in accordance with the SOP entitled *Surface Water and Sediment Acquisition* (CH2M HILL, 2012b). Prior to surface water sample collection, water quality data were measured with a YSI water-quality meter. In areas where the depth of standing water was greater than 4 feet, water quality measurements were collected from the middle and bottom of the water column. Surface water quality measurements are presented in **Table 2-7**.

One surface water sample was collected at each location and analyzed for VOCs, SVOCs, pesticides, PCBs, total and dissolved metals, cyanide, and hardness. All samples were collected by submerging a clean amber glass bottle in the surface water with the mouth pointed upstream and the bottle tilted slightly downstream. Samples were then transferred from the amber bottle to appropriate laboratory-prepared bottleware. VOC samples were collected first by filling the sample containers so that no air bubbles remained in order to prevent volatilization of contaminants to any headspace. After the VOC samples were collected, the remaining sample analytes were transferred directly into the appropriate laboratory-provided bottleware, with the exception of samples for dissolved metals analysis. Surface water for dissolved metals analysis was pumped using a peristaltic pump through a 0.45-µm filter prior to transferring the sample into bottleware. After collection, surface water samples were packed on ice and shipped via overnight service to the laboratory for analysis daily in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012b).

2.2.6 Aquatic Community Characterization

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Youth Pond to determine the presence and type of aquatic community existing within the water body. The results of this survey were used to characterize the ecological receptors that are present in Youth Pond and to guide the collection of tissue samples. In addition, a semi-quantitative survey of benthic macroinvertebrates was conducted to characterize the type of benthic community that is present.

2.2.6.1. Fish and Aquatic Organisms

A qualitative survey of fish and amphibian species present at Youth Pond was conducted to determine the presence and type of aquatic community that exists within the pond.

A variety of methods was used to collect the fish and frog/tadpoles, including backpack electroshockers, gill nets, seines, minnow traps, dip nets and baited trot lines. The locations of all nets and traps were determined with a GPS unit. All trapped or collected fish and frogs/tadpoles were identified, weighed (to the nearest gram), and their total length measured to the nearest centimeter (**Table 2-3**). In addition, all fish were visually examined for abnormalities in terms of gross external morphology.

The results of this survey were used to guide the collection of tissue samples.

2.2.6.2. Benthic Invertebrates

At each of the 13 sediment sampling locations within Youth Pond (**Figure 2-7**), benthic invertebrates were collected for a semi-quantitative, reconnaissance-level evaluation of community characteristics (that is, number and type of taxa, relative abundance) in support of the BERA. The organisms were collected as described previously in Section 2.1.5.2.

2.2.7 Tissue Sampling

Based on the results of the initial site reconnaissance at Youth Pond (described in Section 2.2.1) and the aquatic community characterization activities (described in Section 2.2.6), three adult frog tissue and six fish tissue samples were collected to support the HHRA and/or BERA. The number and species of tissue samples were agreed to by the CAX Partnering Team (and associated technical support) in an October 22, 2012, phone call prior to submittal of samples to the laboratory.

Fish and frog tissue samples were collected during the aquatic community characterization activities (described in Section 2.2.6). All frog tissue samples and four whole-body fish tissue samples were analyzed for dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture. One composite fish tissue sample was divided into

a filet and offal sample, and analyzed for PCBs (Aroclors), dioxin-like PCBs, PCB homologues, metals, percent lipids, and percent moisture.

Following tissue sample collection, all samples were first wrapped in pre-rinsed aluminum foil (provided by the laboratory), placed in a food-grade Ziploc bag, labeled, and then placed within a second food-grade Ziploc bag. Tissue samples were frozen using dry ice and shipped via overnight service to the laboratory following the CAX Partnering Team phone call on October 22, 2012.

2.3 Reference Pond

2.3.1 Pre-Investigation Activities

Following the initial reconnaissance surveys of Site 4 and Youth Pond, a reconnaissance survey was conducted at Cheatham Pond to find specific areas that match, as closely as possible, the physical properties of Upstream Pond and Youth Pond. Depth to water, water temperature, pH, conductivity, salinity, turbidity, DO, and ORP data were collected (**Table 2-8**). In addition, habitat characteristics and a qualitative description of the sediment within Cheatham Pond were recorded (**Appendix A**).

2.3.2 Sediment Sampling

Co-located surface and subsurface sediment samples, also co-located with surface water sampling locations, were collected from eight locations within Cheatham Pond (CAREFSO04-SD/SSD01 through CAREFSO04-SD/SSD05 and CAYPREF-SD/SSD01 through CAREFYP-SD/SSD03) to provide background concentrations for naturally occurring and widely occurring anthropogenic constituents from a multitude of potential non-site-related sources, and to provide comparative data for biological surveys and toxicity testing (**Figure 2-8**). Sample locations were field-determined based on observed site conditions and their similarities to Upstream Pond and Youth Pond conditions.

All sediment sampling activities were conducted in accordance with the SOP entitled *Surface Water and Sediment Acquisition* (CH2M HILL, 2012a; 2012b). Each sediment sample was collected with a hand auger. Surface sediment samples were collected from 0 to 4 inches bss, while subsurface sediment samples were collected from a depth of 4 to 8 inches bss, in accordance with the approved Site 4 and Youth Pond SAPs.

All sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents (including nitroguanadine), metals, pH, TOC, grain size, and AVS/SEM. Following sediment core collection, VOC and AVS/SEM samples were collected first by pushing the bottleware directly into the sediment core at the target interval. After the VOC and AVS/SEM samples were collected, the remainder of the sediment was homogenized in a stainless steel bowl and then transferred to the appropriate laboratory-provided sample containers for all other sample analytes. After collection in sampling containers, the sediment samples were packed on ice and shipped via overnight service to the laboratory for analysis daily in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a; 2012b).

2.3.3 Surface Water Sampling

Surface water samples, co-located with the sediment sample locations, were collected at eight locations within Cheatham Pond (CAREFSO04-SW01 through CAREFSO04-SWD05 and CAYPREF-SW01 through CAREFYP-SW03) to provide background concentrations for naturally occurring and widely occurring anthropogenic constituents with a multitude of potential non-site-related sources, and to provide comparative data for biological surveys (**Figure 2-8**). Sample locations were field-determined based on observed site conditions and their similarities to Upstream Pond and Youth Pond conditions.

All surface water sampling activities were conducted in accordance with the SOP entitled *Surface Water and Sediment Acquisition* (CH2M HILL, 2012a; 2012b). Prior to surface water sample collection, water quality data were measured with a YSI water-quality meter. Surface water quality measurements are presented in **Table 2-9**.

One surface water sample was collected at each location and analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents (including nitroguanadine), total and dissolved metals, cyanide, and hardness. All samples were collected by submerging a clean amber glass bottle in the surface water with the mouth pointed upstream and the bottle tilted slightly downstream. Samples were then transferred from the amber bottle to appropriate

laboratory-prepared bottleware. VOC samples were prepared first by completely filling the sample containers so that no air bubbles remained in order to prevent volatilization of contaminants to any headspace. After the VOC samples were collected, the samples for the remaining analytes were transferred directly into the appropriate laboratory-provided bottleware, with the exception of samples for dissolved metals analysis. Surface water for dissolved metals analysis was pumped using a peristaltic pump through a 0.45-µm filter prior to transferring the sample into bottleware. After collection in sampling containers, surface water samples were packed on ice and shipped via overnight service to the laboratory for analysis daily in accordance with the SOP entitled *Sample Preservation* (CH2M HILL, 2012a; 2012b).

2.3.4 Aquatic Community Characterization

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Cheatham Pond to determine the presence and type of aquatic community existing within the water body. The results of this survey were used to characterize the ecological receptors that are present in Cheatham Pond and to guide the collection of tissue samples. In addition, a semi-quantitative survey of benthic macroinvertebrates was conducted to characterize the type of benthic community that is present.

2.3.4.1. Fish and Aquatic Organisms

A qualitative survey of fish and amphibian species present at Cheatham Pond was conducted to determine the presence and type of aquatic community that exists within the pond.

A variety of methods was used to collect the fish and frog/tadpoles, including backpack electroshockers, gill nets, seines, minnow traps, dip nets and baited trot lines. The locations of all nets and traps were determined with a GPS unit. All trapped or collected fish and frogs/tadpoles were identified, weighed (to the nearest gram), and their total length measured to the nearest centimeter (**Table 2-3**). In addition, all fish were visually examined for abnormalities in terms of gross external morphology.

The results of this survey were used to guide the collection of tissue samples.

2.3.4.2. Benthic Invertebrates

At each of the eight surface water/sediment sampling locations (**Figure 2-8**), benthic invertebrates were collected for a semi-quantitative, reconnaissance-level evaluation of community characteristics (that is, numbers and types of taxa, relative abundance) in support of the BERA. The organisms were collected as described previously in Section 2.1.5.2.

2.3.5 Tissue Sampling

Based on the results of the initial site reconnaissance at Cheatham Pond (described in Section 2.3.1) and the aquatic community characterization activities (described in Section 2.3.4), two adult frog tissue and six fish tissue samples were collected to support the HHRA and/or BERA. The numbers and species of tissue samples were agreed to by the CAX Partnering Team (and associated technical support) in an October 22, 2012, phone call prior to submittal of samples to the laboratory.

Fish and frog tissue samples were collected during the aquatic community characterization activities (described in Section 2.3.4). All frog tissue samples and four whole-body fish tissue samples were analyzed for dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture. One composite fish tissue sample was divided into one filet and one offal sample, and analyzed for PCBs (Aroclors), dioxin-like PCBs, PCB homologues, metals, percent lipids and percent moisture.

Following tissue sample collection, all samples were first wrapped in pre-rinsed aluminum foil (provided by the laboratory), placed in a food-grade Ziploc bag, labeled, and then placed within a second food-grade Ziploc bag. Tissue samples were frozen using dry ice and shipped via overnight service to the laboratory, following the CAX Partnering Team phone call on October 22, 2012.

2.4 Quality Assurance and Quality Control

Samples collected for this FI were analyzed using SW-846 Program methods with Level IV quality assurance (QA)/quality control (QC), as identified in the UFP-SAPs (CH2M HILL, 2012a; 2012b). For definitive data, samples were reported by the laboratories with the equivalent of USEPA Contract Laboratory Program Level IV QA/QC.

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

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

Several types of field QA/QC samples were collected and analyzed in accordance with the Site 4 and Youth Pond SAPs (CH2M HILL, 2012a; 2012b). They are defined as follows:

- **Equipment Rinsate Blank (decontaminated equipment):** Equipment blanks were collected at the frequency noted in Section 2.4 or Worksheet #12 of the UFP-SAP (one per medium per day of sampling). These samples were obtained by running laboratory-grade deionized (DI) water over or through sample collection equipment after the equipment was decontaminated. These samples were used to determine if decontamination procedures for reusable equipment were adequate.
- **Equipment Rinsate Blank (disposable equipment):** Equipment blanks were collected at the frequency noted in Worksheet #12 of the UFP-SAP (once per lot). These samples were obtained by running laboratory-grade DI water over or through sample collection equipment prior to the equipment's use. These samples were used to determine if disposable, one-time-use equipment was contaminant-free prior to use.
- **Duplicate Sample:** Duplicate samples were collected at the same time and under identical conditions as their respective associated sample at the frequency noted in Section 2.4 or Worksheet #12 of the UFP-SAP (one per 10 field samples of similar matrix). These samples were collected to evaluate the field and laboratory reproducibility of sample results, and are one way to evaluate field methodology.
- **Trip Blank:** Trip blanks were prepared at the laboratory, shipped with the sample containers, and stored onsite near the empty sample containers. Any time VOC samples were packed and shipped to the laboratory, a trip blank sample was included inside the shipping cooler. The trip blanks were analyzed for VOCs along with the other VOC samples. These samples were used to evaluate whether cross-contamination of VOCs between sampling containers may have occurred during shipping.

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

- **Matrix Spike (MS):** An aliquot of a matrix (that is, soil, surface sediment, subsurface sediment, surface water, groundwater, and so forth) was spiked with known quantities of analytes of interest and subjected to the entire analytical procedure. By measuring the recovery of these spiked quantities, the appropriateness of the method for the matrix was demonstrated.
- **Matrix Spike Duplicate (MSD):** These samples were collected as second aliquots of the same matrix as the MS to determine the precision of the method.

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

2.5 Decontamination Procedures

All decontamination activities were conducted in accordance with the SOPs entitled *Decontamination of Drilling Rigs and Equipment* and *Decontamination of Personnel and Equipment*, as applicable (CH2M HILL, 2012a; 2012b). Disposable sampling equipment and personal protective equipment, such as Masterflex tubing and nitrile gloves, were not decontaminated after use and instead were disposed as non-hazardous solid waste. After use,

disposable equipment was placed in plastic contractor bags and disposed in an onsite trash dumpster. Non-disposable sampling equipment, such as hand augers, were decontaminated prior to each use.

Reusable heavy equipment, such as drilling rods and augers, was decontaminated before and in between the collection of each sample using a high-pressure steam cleaner with potable-grade water. Pressure-washing was conducted at the temporary decontamination pad, which had been constructed prior to the start of drilling activities. The decontamination pad consisted of a raised wood frame lined with a high-density polyethylene tarp, which acted as a basin to collect fluids. These fluids were then pumped into approved 55-gallon drums to await characterization and disposal. All heavy equipment decontamination procedures were conducted in accordance with the SOP entitled *Decontamination of Drilling Rigs and Equipment* (CH2M HILL, 2012a; 2012b).

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

2.6 Investigation-derived Waste Management

Investigation-derived waste (IDW) generated during the Site 4 and Youth Pond RI included soil cuttings, well development groundwater, groundwater sampling purge-water, as well as decontamination rinse-water from all non-disposable sampling equipment and heavy equipment. The IDW was containerized in approved 55-gallon drums that were properly labeled and stored on secondary containment at ER Site 7, the approved IDW staging location. In total, nine drums of solid IDW and 12 drums of aqueous IDW were generated during the Site 4 and Youth Pond RI field activities.

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

All IDW management activities were conducted in accordance with the IDW Management Plan (Baker, 2005b). An analytical summary for the IDW samples is provided in **Table 2-10**. Laboratory analytical data for the IDW samples are presented in **Appendix E**. All IDW handling and disposal information is included in **Appendix F.**

2.7 Data Quality Evaluation

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

TABLE 2-1

Comprehensive Sample Summary Table

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID[1]	Investigation	Matrix	Sample Interval (bgs)	VOCs	SVOCs	PAHs	Pesticides	PCBs			Explosives	Metals	Hexavalent Chromium	AVS/SEM	TOC, pH, Grain Size	Hardness	Methane, Ethane, Ethene	Nitrate, Nitrite, Sulfate	Alkalinity	Ammonia, Sulfide	Toxicity	% Solids	% Lipids	Collection Method
								Aroclors	Dioxin-Like Congeners	Homologues														
SITE 4																								
CAS004-4HA01-00-1199	1999 Field Investigation	Surface Soil	0 - 0.5'	X	X		X	X			X	X												Hand Auger
CAS004-4HA02-00-1199				X	X		X	X			X	X												
CAS004-4HA02D-00-1199				X	X		X	X			X	X												
CAS004-4HA03-00-1199				X	X		X	X			X	X												
CAS004-4HA04-00-1199				X	X		X	X			X	X												
CAS004-4HA05-00-1199				X	X		X	X			X	X												
CAS004-4HA06-00-1199				X	X		X	X			X	X												
CAS04-SS01-1109	2009 SI Field Activities			X	X		X	X				X			X									
CAS04-SS02-1109				X	X		X	X				X			X									
CAS04-SS03-1109				X	X		X	X				X			X									
CAS04-SS04-1109				X	X		X	X				X			X									
CAS04-SS05-1109				X	X		X	X				X			X									
CAA03-SS01-1109				X	X		X	X				X			X									
CAA03-SS02-1109				X	X		X	X				X			X									
CAA03-SS03-1109				X	X		X	X				X			X									
CAA03-SS04-1109				X	X		X	X				X			X									
CAA03-SS05-1109				X	X		X	X				X			X									
CAA03-SS06-1109				X	X		X	X				X			X									
CAA03-SS07-1109				X	X		X	X				X			X									
CAA03-SS08-1109				X	X		X	X				X			X									
CAA03-SS08P-1109				X	X		X	X				X			X									
CAA03-SS09-1109				X	X		X	X				X			X									
CAA03-SS10-1109				X	X		X	X				X			X									
CAS04-SS06-1012	2012 RI Field Activities					X		X				X			X									
CAS04-SS07-1012						X		X				X			X									
CAS04-SS08-1012						X		X				X			X									
CAS04-SS09-1012						X		X				X			X									
CAS04-SS10-1012						X		X				X			X									
CAS04-SS11-1012						X		X				X			X									
CAS04-SS12-1012						X		X				X			X									
CAS04-SS12P-1012						X		X				X												
CAS04-SS13-1012						X		X				X			X									
CAS04-SS14-1012													X											
CAS04-SS14P-1012													X											
CAS04-SS15-1012													X											
CAS004-4-HA02-02-1199	1999 Field Investigation	Shallow Subsurface Soil	1-2'	X	X		X	X			X	X												
CAS004-4-HA03-02-1199				X	X		X	X			X	X												
CAS004-4-HA04-01-1199			0.5-1'	X	X		X	X			X	X												
CAS004-4-HA05-01-1199				X	X		X	X			X	X												
CAS004-4-HA06-02-1199				X	X		X	X			X	X												
CAS04-SB01-1109	2009 SI Field Activities		0.5 - 2'	X	X		X	X				X			X									
CAS04-SB02-1109				X	X		X	X				X			X									
CAS04-SB03-1109				X	X		X	X				X			X									
CAS04-SB04-1109				X	X		X	X				X			X									
CAS04-SB05-1109				X	X		X	X				X			X									
CAA03-SB01-1109	2009 SI Field Activities			X	X		X	X				X			X									
CAA03-SB02-1109A				X	X		X	X				X			X									
CAA03-SB03-1109A				X	X		X	X				X			X									
CAA03-SB04-1109A				X	X		X	X				X			X									
CAA03-SB05-1109A				X	X		X	X				X			X									
CAA03-SB06-1109				X	X		X	X				X			X									
CAA03-SB07-1109				X	X		X	X				X			X									
CAA03-SB08-1109				X	X		X	X				X			X									
CAA03-SB08P-1109				X	X		X	X				X			X									
CAA03-SB09-1109				X	X		X	X				X			X									
CAA03-SB10-1109				X	X		X	X				X			X									
CAS04-SB06-1012	2012 RI Field Activities					X		X				X			X									
CAS04-SB06P-1012						X		X				X												
CAS04-SB07-1012						X		X				X			X									
CAS04-SB15-1012													X											
CAS04-SB16-1012													X											

TABLE 2-1

Comprehensive Sample Summary Table

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID[1]	Investigation	Matrix	Sample Interval (bgs)	VOCs	SVOCs	PAHs	Pesticides	PCBs			Explosives	Metals	Hexavalent Chromium	AVS/SEM	TOC, pH, Grain Size	Hardness	Methane, Ethane, Ethene	Nitrate, Nitrite, Sulfate	Alkalinity	Ammonia, Sulfide	Toxicity	% Solids	% Lipids	Collection Method
								Aroclors	Dioxin-Like Congeners	Homologues														
CAA03-SB02-1109B	2009 SI Field Activities	Deep Subsurface Soil	15.5 - 16'	X	X		X	X				X			X									DPT
CAA03-SB03-1109B			15.5 - 16'	X	X		X	X				X			X									
CAA03-SB04-1109B			14.5 - 15'	X	X		X	X				X			X									
CAA03-SB05-1109B			15.1 - 15.6'	X	X		X	X				X			X									
CAS04-GW01-1009	2009 SI Field Activities	Groundwater	10 - 20'	X	X		X	X				X												Peristaltic Pump and Tubing
CAS04-GW02-1009			10 - 20'	X	X		X	X				X												
CAS04-GW03-1009			9 - 19'	X	X		X	X				X												
CAS04-GW04-1009			14 - 24'	X	X		X	X				X												
CAS04-GW04P-1009			14 - 24'	X	X		X	X				X												
CAS04-GW05-1212	2012 RI Field Activities		6 - 16'	X		X						X					X	X	X					
CAS04-GW05P-1212			6 - 16'	X		X						X												
CAS04-GW06-1212			10 - 20'	X		X						X					X	X	X					
CAS04-GW07-1212			6 - 16'	X		X						X					X	X	X					
CAS04-GW08-1212			7 - 17'	X		X						X					X	X	X					
CAS04-GW09-1212			14 - 24'	X		X						X					X	X	X					
CAS04-GW10-1212			14 - 24'	X		X						X					X	X	X					
CAA03-GW01-1109	2009 SI Field Activities		14 - 24'	X	X		X	X				X												
CAA03-GW02-1109			6 - 16'	X	X		X	X				X												
CAA03-GW03-1109			5 - 15'	X	X		X	X				X												
CAA03-GW04-1109			5 - 15'	X	X		X	X				X												
CAA03-GW05-1109			5 - 15'	X	X		X	X				X												
CAS04-SW01-1209	2009 SI Field Activities	Surface Water	At water surface	X	X		X	X				X				X								Clean Glass Amber Bottle
CAS04-SW02-1209				X	X		X	X				X				X								
CAS04-SW03-1209				X	X		X	X				X				X								
CAS04-SW04-1209				X	X		X	X				X				X								
CAS04-SW05-1209				X	X		X	X				X				X								
CAS04-SW06-1209				X	X		X	X				X				X								
CAS04-SW07-1209				X	X		X	X				X				X								
CAS04-SW07P-1209				X	X		X	X				X				X								
CAS04-SW08-1209				X	X		X	X				X				X								
CAS04-SW09-1209				X	X		X	X				X				X								
CAA03-SW01-1209				X	X		X	X				X				X								
CAA03-SW02-1209				X	X		X	X				X				X								
CAA03-SW03-1209				X	X		X	X				X				X								
CAA03-SW04-1209				X	X		X	X				X				X								
CAS004-4-SED01-00-1199	1999 Field Investigation	Surface Sediment	0 - 4"	X	X		X	X			X	X												Sediment Core Sampler /Hand Auger
CAS004-4-SD02-00-1199				X	X		X	X			X	X												
CAS004-4-SD03-00-1199				X	X		X	X			X	X												
CAS004-4-SD04-00-1199				X	X		X	X			X	X												
CAS004-4-SD04-00D-1199				X	X		X	X			X	X												
CAS04-SD01-1209A	2009 SI Field Activities			X	X		X	X				X		X	X									
CAS04-SD01P-1209A				X	X		X	X				X		X	X									
CAS04-SD02-1209A				X	X		X	X				X		X	X									
CAS04-SD03-1209A				X	X		X	X				X		X	X									
CAS04-SD05-1209A				X	X		X	X				X		X	X									
CAS04-SD06-1209A				X	X		X	X				X		X	X									
CAS04-SD07-1209A				X	X		X	X				X		X	X									
CAS04-SD07P-1209A				X	X		X	X				X		X	X									
CAS04-SD08-1209A				X	X		X	X				X		X	X									
CAS04-SD09-1209A				X	X		X	X				X		X	X									
CAS04-SD10-1012	2012 RI Field Activities					X		X				X		X	X									
CAS04-SD10P-1012						X		X				X												
CAS04-SD11-1012						X		X				X		X	X									
CAS04-SD12-1012						X		X				X		X	X									
CAS04-SD13-1012						X		X				X		X	X									
CAS04-SD14-1012						X		X				X		X	X									
CAS04-SD15-1012						X		X				X		X	X									
CAS04-SD16-1012						X		X				X		X	X									
CAS04-SD17-1012						X		X				X		X	X									
CAS04-SD18-1012						X		X				X		X	X					X	X			
CAS04-SD19-1012						X		X				X		X	X					X	X			
CAS04-SD20-1012						X		X				X		X	X					X	X			
CAS04-SD21-1012						X		X				X		X	X					X	X			
CAS04-SD22-1012						X		X				X		X	X					X	X			
CAS04-SD23-1012						X		X				X		X	X					X	X			

TABLE 2-1

Comprehensive Sample Summary Table

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID[1]	Investigation	Matrix	Sample Interval (bgs)	VOCs	SVOCs	PAHs	Pesticides	PCBs			Explosives	Metals	Hexavalent Chromium	AVS/SEM	TOC, pH, Grain Size	Hardness	Methane, Ethane, Ethene	Nitrate, Nitrite, Sulfate	Alkalinity	Ammonia, Sulfide	Toxicity	% Solids	% Lipids	Collection Method
								Aroclors	Dioxin-Like Congeners	Homologues														
CAS004-4-SED01-01-1199	1999 Field Investigation	Subsurface Sediment	4 - 8"	X	X		X	X			X	X												Sediment Core Sampler
CAS004-4-SD02-01-1199				X	X		X	X			X	X												
CAS004-4-SD03-01-1199				X	X		X	X			X	X												
CAS004-4-SD04-01-1199				X	X		X	X			X	X												
CAS04-SD01-1209B	2009 SI Field Activities			X	X		X	X				X		X	X									
CAS04-SD01P-1209B				X	X		X	X				X		X	X									
CAS04-SD02-1209B				X	X		X	X				X		X	X									
CAS04-SD03-1209B				X	X		X	X				X		X	X									
CAS04-SD04-1209B				X	X		X	X				X		X	X									
CAA03-SD01-1209B				X	X		X	X				X		X	X									
CAA03-SD02-1209B				X	X		X	X				X		X	X									
CAA03-SD03-1209B				X	X		X	X				X		X	X									
CAA03-SD04-1209B				X	X		X	X				X		X	X									
CAS04-SD05-1209B				X	X		X	X				X		X	X									Hand Auger
CAS04-SD06-1209B				X	X		X	X				X		X	X									
CAS04-SD07-1209B				X	X		X	X				X		X	X									
CAS04-SD07P-1209B				X	X		X	X				X		X	X									
CAS04-SD08-1209B				X	X		X	X				X		X	X									
CAS04-SD09-1209B				X	X		X	X				X		X	X									
CAS04-TS01-1012	2012 RI Field Activities	Earthworm Tissue	N/A						X	X												X		
CAS04-TS02-1012		Frog Tissue							X	X												X	X	
CAS04-TS03-1012									X	X												X	X	
CAS04-TS04-1012									X	X												X	X	
CAS04-TS05-1012									X	X												X	X	
CAS04-TS06-1012									X	X												X	X	
CAS04-TS07-WB-1012		Fish Tissue							X	X												X	X	
CAS04-TS08-WB-1012									X	X												X	X	
CAS04-TS09-WB-1012									X	X												X	X	
CAS04-TS10-WB-1012									X	X												X	X	
CAS04-TS11-WB-1012									X	X												X	X	
CAS04-TS12-WB-1012									X	X												X		
CAS04-TS13-F-1012								X	X	X												X	X	
CAS04-TS13-O-1012								X	X	X												X	X	
YOUTH POND																								
CAYP-SS01-1012	2012 RI Field Activities	Surface Soil	0 - 6"	X	X		X	X			X	X			X									Hand Auger
CAYP-SS02-1012				X	X		X	X			X	X			X									
CAYP-SS03-1012				X	X		X	X			X	X			X									
CAYP-SS03P-1012				X	X		X	X			X	X												
CAYP-SS04-1012				X	X		X	X			X	X			X									
CAYP-SS05-1012				X	X		X	X			X	X			X									
CAYP-SS06-1012				X	X		X	X			X	X			X									
CAYP-SW01-1012	2012 RI Field Activities	Surface Water	At water surface	X	X		X	X			X	X				X								Clean Glass Amber Bottle
CAYP-SW01P-1012				X	X		X	X			X	X												
CAYP-SW02-1012				X	X		X	X			X	X				X								
CAYP-SW03-1012				X	X		X	X			X	X				X								
CAYP-SW04-1012				X	X		X	X			X	X				X								
CAYP-SW05-1112				X	X		X	X			X	X				X								
CAYP-SW06-1112				X	X		X	X			X	X				X								
CAYP-SD01-1012	2012 RI Field Activities	Surface Sediment	0 - 4"	X	X		X	X			X	X		X	X									Sediment Core Sampler /Hand Auger
CAYP-SD02-1012				X	X		X	X			X	X		X	X									
CAYP-SD02P-1012				X	X		X	X			X	X												
CAYP-SD03-1012				X	X		X	X			X	X		X	X									
CAYP-SD04-1112				X	X		X	X			X	X		X	X									
CAYP-SD05-1112				X	X		X	X			X	X		X	X									
CAYP-SD06-1112				X	X		X	X			X	X		X	X									
CAYP-SD07-1012				X	X		X	X			X	X		X	X									
CAYP-SD08-1012				X	X		X	X			X	X		X	X									
CAYP-SD09-1012				X	X		X	X			X	X		X	X									
CAYP-SD10-1012				X	X		X	X			X	X		X	X									
CAYP-SD11-1012				X	X		X	X			X	X		X	X									
CAYP-SD12-1012				X	X		X	X			X	X		X	X									
CAYP-SD12P-1012				X	X		X	X			X	X												
CAYP-SD13-1012				X	X		X	X			X	X		X	X									
CAYP-SD14-1012				X	X		X	X			X	X		X	X									
CAYP-SD15-1012				X	X		X	X			X	X		X	X									

TABLE 2-1

Comprehensive Sample Summary Table

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID[1]	Investigation	Matrix	Sample Interval (bgs)	VOCs	SVOCs	PAHs	Pesticides	PCBs			Explosives	Metals	Hexavalent Chromium	AVS/SEM	TOC, pH, Grain Size	Hardness	Methane, Ethane, Ethene	Nitrate, Nitrite, Sulfate	Alkalinity	Ammonia, Sulfide	Toxicity	% Solids	% Lipids	Collection Method
								Aroclors	Dioxin-Like Congeners	Homologues														
CAYP-SSD01-1012	2012 RI Field Activities	Subsurface Sediment	4 - 8"	X	X		X	X			X	X		X	X									Sediment Core Sampler /Hand Auger
CAYP-SSD02-1012				X	X		X	X			X	X		X	X									
CAYP-SSD02P-1012				X	X		X	X			X	X												
CAYP-SSD03-1012				X	X		X	X			X	X		X	X									
CAYP-SSD04-1112				X	X		X	X			X	X		X	X									
CAYP-SSD05-1112				X	X		X	X			X	X		X	X									
CAYP-SSD06-1112				X	X		X	X			X	X		X	X									
CAYP-SSD07-1012				X	X		X	X			X	X		X	X									
CAYP-SSD08-1012				X	X		X	X			X	X		X	X									
CAYP-SSD09-1012				X	X		X	X			X	X		X	X									
CAYP-SSD10-1012				X	X		X	X			X	X		X	X									
CAYP-SSD11-1012				X	X		X	X			X	X		X	X									
CAYP-SSD12-1012				X	X		X	X			X	X		X	X									
CAYP-SSD13-1012				X	X		X	X			X	X		X	X									
CAYP-TS01-1012	2012 RI Field Activities	Frog Tissue	N/A						X	X												X	X	
CAYP-TS02-1012									X	X												X	X	
CAYP-TS03-1012									X	X												X	X	
CAYP-TS04-WB-1012		Fish Tissue							X	X												X	X	
CAYP-TS05-WB-1012									X	X												X	X	
CAYP-TS06-WB-1012									X	X												X	X	
CAYP-TS07-WB-1012									X	X												X	X	
CAYP-TS08-F-1012								X	X	X												X	X	
CAYP-TS08-O-1012								X	X	X												X	X	
CHEATHAM POND (REFERENCE POND)																								
CAREFS04-SW01-1012	2012 RI Field Activities	Surface Water	At water surface	X	X		X	X			X	X				X								Clean Glass Amber Bottle
CAREFS04-SW02-1012				X	X		X	X			X	X				X								
CAREF0S4-SW02P-1012				X	X		X	X			X	X												
CAREFS04-SW03-1012				X	X		X	X			X	X				X								
CAREFS04-SW04-1012				X	X		X	X			X	X				X								
CAREFS04-SW05-1012				X	X		X	X			X	X				X								
CAREFYP-SW01-1012				X	X		X	X			X	X				X								
CAREFYP-SW02-1012				X	X		X	X			X	X				X								
CAREFYP-SW02P-1012				X	X		X	X			X	X												
CAREFYP-SW03-1012				X	X		X	X			X	X				X								
CAREFS04-SD01-1012	2012 RI Field Activities	Surface Sediment	0 - 4"	X	X		X	X			X	X		X	X									Sediment Core Sampler /Hand Auger
CAREFS04-SD01P-1012				X	X		X	X			X	X												
CAREFS04-SD02-1012				X	X		X	X			X	X		X	X									
CAREFS04-SD03-1012				X	X		X	X			X	X		X	X									
CAREFS04-SD04-1012				X	X		X	X			X	X		X	X									
CAREFS04-SD05-1012				X	X		X	X			X	X		X	X									
CAREFYP-SD01-1012				X	X		X	X			X	X		X	X									
CAREFYP-SD02-1012				X	X		X	X			X	X		X	X									
CAREFYP-SD02P-1012				X	X		X	X			X	X												
CAREFYP-SD03-1012				X	X		X	X			X	X		X	X									
CAREFS04-SSD01-1012	2012 RI Field Activities	Subsurface Sediment	4 - 8"	X	X		X	X			X	X		X	X									Sediment Core Sampler /Hand Auger
CAREFS04-SSD01P-1012				X	X		X	X			X	X												
CAREFS04-SSD02-1012				X	X		X	X			X	X		X	X									
CAREFS04-SSD03-1012				X	X		X	X			X	X		X	X									
CAREFS04-SSD04-1012				X	X		X	X			X	X		X	X									
CAREFS04-SSD05-1012				X	X		X	X			X	X		X	X									
CAREFYP-SSD01-1012				X	X		X	X			X	X		X	X									
CAREFYP-SSD02-1012				X	X		X	X			X	X		X	X									
CAREFYP-SSD02P-1012				X	X		X	X			X	X												
CAREFYP-SSD03-1012				X	X		X	X			X	X		X	X									
CAREFS04-TS01-1012	2012 RI Field Activities	Frog Tissue	N/A						X	X												X	X	
CAREFS04-TS02-1012									X	X												X	X	
CAREFS04-TS03-WB-1012		Fish Tissue							X	X												X	X	
CAREFS04-TS04-WB-1012									X	X												X	X	
CAREFS04-TS05-WB-1012									X	X												X	X	
CAREFS04-TS06-WB-1012									X	X												X	X	
CAREFS04-TS07-F-1012								X	X	X												X	X	
CAREFS04-TS07-O-1012								X	X	X												X	X	
CAREFS04-TS08-F-1012								X	X	X												X	X	
CAREFS04-TS08-O-1012								X	X	X												X	X	

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

MS/MSD- Matrix Spike/Matrix Spike Duplicate Sample

TABLE 2-2

Site 4 Reconissance Survey Water Quality Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAS04-SD20	CAS04-SD21	CAS04-SD22	Transect- 1	Transect- 2	Transect- 3	Transect- 4	Transect- 5
Date	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012
Time	1310	1316	1322	1351	1402	1410	1414	1418
Depth (feet)	1.5	1.5	0.5	1.5	1.8	2.0	2.3	2.3
Temperature °C	18.93	18.95	19.18	19.05	18.91	18.76	18.71	18.68
Conductivity (ms/cm)	0.459	0.429	0.441	0.435	0.434	0.433	0.435	0.434
Salinity (PPT)	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21
pH	7.58	7.56	7.58	7.54	7.58	7.54	7.52	7.52
ORP (mV)	-43.90	5.00	46.20	-30.10	30.70	80.10	19.70	-31.40
Turbidity (NTU)	18.60	72.20	61.00	27.30	67.10	94.60	24.50	9.30
DO (mg/L)	2.70	5.60	6.51	5.04	5.17	4.08	3.86	3.84

TABLE 2-3

Fish Tissue Identification and Measurements

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
SITE 4									
CAS04-TS01-1012	whole body	*Lumbricus terrestris*	earthworm	--	--	--	**TOTALS**	--	**48**
CAS04-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	190	49			
CAS04-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	210	45			
CAS04-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	212	64			
							TOTALS	**3**	**158**
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	190	40			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	25			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	145	17			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	140	16			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	120	12			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	95	6			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	85	4			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	75	3			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	80	3			
CAS04-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	85	3			
							TOTALS	**10**	**129**
CAS04-TS04-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	220	59			
CAS04-TS04-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	200	48			
CAS04-TS04-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	145	19			
							TOTALS	**3**	**126**
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	175	32			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	140	19			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	135	13			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	130	12			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	155	16			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	95	4			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	100	7			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	110	8			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	95	7			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	95	4			
CAS04-TS05-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	85	3			
							TOTALS	**11**	**125**
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	65	4			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	4			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	4			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	72	5			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	72	5			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	3			

TABLE 2-3

Fish Tissue Identification and Measurements

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex

Williamsburg, Virginia

Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	63	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	40	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	43	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	2			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	65	5			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	40	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	40	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	40	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	40	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	65	4			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	60	4			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	45	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	50	2			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	2			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	45	2			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	45	3			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	45	2			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	30	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	30	1			
CAS04-TS06-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	tadpole	55	3			
							TOTALS	**37**	**101**
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	135	26			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	141	28			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	141	29			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	135	35			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	130	26			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	135	23			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	140	26			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	145	35			
CAS04-TS07-WB-1012	whole body	*Notemigonus crysoleucas*	golden shiner	medium	100	10			
							TOTALS	**9**	**238**
CAS04-TS08-WB-1012	whole body	*Gambusia holbrooki*	mosquitofish	medium	20-40	550			
							TOTALS	**1750**	**550**
CAS04-TS09-WB-1012	whole body	*Gambusia holbrooki*	mosquitofish	medium	20-40	200			
							TOTALS	**700**	**200**

TABLE 2-3

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Williamsburg, Virginia

Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	290	46			
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	270	36			
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	300	53			
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	300	45			
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	260	30			
CAS04-TS10-WB-1012	whole body	*Anguilla rostrata*	American eel	small	320	43			
							TOTALS	**6**	**253**
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	138	45			
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	151	63			
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	153	59			
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	135	43			
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	152	62			
CAS04-TS11-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	133	40			
							TOTALS	**6**	**312**
CAS04-TS12-WB-1012	whole body	*Ameirus nebulosus*	brown bullhead	small	135	25			
							TOTALS	**1**	**25**
CAS04-TS13-F-1012 & CAS04-TS13-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	322	465			
CAS04-TS13-F-1012 & CAS04-TS13-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	350	626			
CAS04-TS13-F-1012 & CAS04-TS13-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	360	799			
CAS04-TS13-F-1012 & CAS04-TS13-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	340	688			
CAS04-TS13-F-1012 & CAS04-TS13-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	368	695			
							TOTALS	**5**	**3273**
YOUTH POND									
CAYP-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	133	13			
CAYP-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	210	95			
							TOTALS	**2**	**108**
CAYP-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	190	48			
CAYP-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	175	33			
CAYP-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	170	35			
CAYP-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	150	21			
CAYP-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	90	5			
							TOTALS	**5**	**142**
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	28			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	140	16			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	140	14			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	24			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	145	18			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	145	19			

TABLE 2-3

Fish Tissue Identification and Measurements

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Cheatham Annex

Williamsburg, Virginia

Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	120	13			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	90	4			
CAYP-TS03-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	140	17			
							TOTALS	**9**	**153**
CAYP-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	142	53			
CAYP-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	142	52			
CAYP-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	163	78			
							TOTALS	**3**	**183**
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	184	75			
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	180	72			
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	190	85			
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	212	104			
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	198	88			
CAYP-TS05-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	165	46			
							TOTALS	**6**	**470**
CAYP-TS06-WB-1012	whole body	*Gambusia holbrooki*	mosquitofish	medium	20-40	155			
							TOTALS	**525**	**155**
CAYP-TS07-WB-1012	whole body	*Anguilla rostrata*	American eel	small	270	47			
CAYP-TS07-WB-1012	whole body	*Anguilla rostrata*	American eel	small	256	42			
CAYP-TS07-WB-1012	whole body	*Anguilla rostrata*	American eel	small	249	40			
CAYP-TS07-WB-1012	whole body	*Anguilla rostrata*	American eel	small	273	44			
							TOTALS	**4**	**173**
CAYP-TS08-F-1012 & CAYP-TS08-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	280	220			
CAYP-TS08-F-1012 & CAYP-TS08-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	270	223			
CAYP-TS08-F-1012 & CAYP-TS08-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	310	340			
							TOTALS	**3**	**783**
Cheatham Pond (Reference Pond)									
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	21			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	165	25			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	185	36			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	165	27			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	165	25			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	120	10			
CAS04REF-TS01-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	100	6			
							TOTALS	**7**	**150**
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	150	21			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	21			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	23			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	160	23			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	145	16			

TABLE 2-3

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Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	110	8			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	115	10			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	115	10			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	125	11			
CAS04REF-TS02-1012	whole body	*Lithobates catesbeinanus*	American bullfrog	adult	120	10			
							TOTALS	**10**	**153**
CAS04REF-TS03-WB-1012	whole body	*Anguilla rostrata*	American eel	small	220	22			
CAS04REF-TS03-WB-1012	whole body	*Anguilla rostrata*	American eel	small	230	28			
CAS04REF-TS03-WB-1012	whole body	*Anguilla rostrata*	American eel	small	260	45			
CAS04REF-TS03-WB-1012	whole body	*Anguilla rostrata*	American eel	small	240	39			
CAS04REF-TS03-WB-1012	whole body	*Anguilla rostrata*	American eel	small	200	11			
							TOTALS	**5**	**145**
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	10			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	19			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	15			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	105	20			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	9			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	9			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	13			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	16			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	90	12			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	13			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	15			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	15			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	9			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	90	12			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	10			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	105	20			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	9			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	11			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	11			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	17			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	90	14			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	7			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			

TABLE 2-3

Fish Tissue Identification and Measurements

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Williamsburg, Virginia

Sample ID	Sample Type	Species Name	Common Name	Cohort	Length (mm)	Weight (g)		# Specimens	Total Wt (g)
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	8			
CAS04REF-TS04-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	80	7			
							TOTALS	**33**	**397**
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	18			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	15			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	9			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	105	18			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	100	16			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	13			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	9			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	90	11			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	13			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	13			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	10			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	95	14			
CAS04REF-TS05-WB-1012	whole body	*Lepomis macrochirus*	bluegill	medium	85	8			
							TOTALS	**15**	**195**
CAS04REF-TS06-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	150	40			
CAS04REF-TS06-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	180	98			
CAS04REF-TS06-WB-1012	whole body	*Micropterus salmoides*	largemouth bass	medium	160	38			
							TOTALS	**3**	**176**
CAS04REF-TS07-F-1012 & CAS04REF-TS07-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	410	956			
CAS04REF-TS07-F-1012 & CAS04REF-TS07-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	370	761			
CAS04REF-TS07-F-1012 & CAS04REF-TS07-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	385	914			
							TOTALS	**3**	**2631**
CAS04REF-TS08-F-1012 & CAS04REF-TS08-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	270	213			
CAS04REF-TS08-F-1012 & CAS04REF-TS08-O-1012	fillet (HHRA) & offal (BERA)	*Micropterus salmoides*	largemouth bass	large	290	259			
							TOTALS	**2**	**472**

TABLE 2-4

Groundwater Elevations

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Well ID	Total Depth	Well Screen Interval	Ground Elevation	Top of Casing Elevation	December 13, 2012		
					Depth to Water	Elevation	
						(feet bgs)	(feet amsl)
MW-05	16'	6-16'	18.60	21.46	9.80	8.80	11.66
MW-06	20'	10-20'	20.99	23.98	12.57	8.42	11.41
MW-07	16'	6-16'	19.33	22.31	10.46	8.87	11.85
MW-08	17'	7-17'	13.38	16.68	6.55	6.83	10.13
MW-09	24'	14-24'	23.15	26.23	17.77	5.38	8.46
MW-10	24'	14-24'	23.53	26.32	17.50	6.03	8.82

Notes:

bgs - below ground surface

amsl - above mean sea level

MW-01 through MW-04 were temporary monitoring wells were installed and abandoned in 2008

TABLE 2-5

Groundwater Field Parameter Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Station ID	CAS04-GW05	CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID	CAS04-GW05-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Field Parameter						
Dissolved Oxygen (mg/L)	0.55	0.74	0.39	0.20	0.39	0.039
Chemets Dissolved Oxygen (mg/L)	0.8	NA	0.9	0.6	1.0	0.8
Oxidation Reduction Potential (mV)	198.8	-207.1	-12.8	-266.7	-248.3	231.4
pH	6.73	7.12	7.01	6.94	6.88	6.71
Specific Conductivity (mS/cm)	0.658	17.65	0.447	15.37	16.21	0.601
Temperature (°C)	15.28	15.9	15.88	15.94	16.59	16.16
Turbidity (NTU)	2.2	0	2.5	0	23.5	2.8
Ferrous Iron (mg/L)	0	NA	0	2.2	1.2	0

Notes:

C - Degrees centigrade

mg/L - Milligrams per liter

mS/cm - Milliseimens per centimeter

mV - Millivolts

NTU - Nephelometric turbidity unit

pct - Percent

NA - Not analyzed

TABLE 2-6

Youth Pond Reconnissance Survey Water Quality Data

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAYP-SD01	CAYP-SD02		CAYP-SD04		CAYP-SD05	CAYP-SD07		CAYP-SD08		CAYP-SD09	CAYP-SD10	CAYP-SD12	CAYP-SD13		CAYP-SD15
Date	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012	10/2/2012
Time	1330	1341	1341	1403	1403	1352	1336	1336	1407	1407	1412	1418	1355	1347	1347	1317
Depth (feet)	3.0	4.0	bottom	5.0	bottom	2.0	4.5	bottom	6.0	bottom	1.5	2.0	2.0	4.0	bottom	0.7
Temperature °C	20.75	20.52	20.51	20.56	20.48	21.01	20.42	20.49	20.66	20.58	21.43	21.26	20.14	20.48	20.46	21.35
Conductivity (ms/cm)	0.167	0.187	0.187	0.200	0.208	0.240	0.189	0.187	0.192	0.188	0.183	0.186	0.260	0.208	0.209	0.190
Salinity (PPT)	0.08	0.09	0.09	0.09	0.09	0.11	0.09	0.09	0.09	0.09	0.09	0.09	0.13	0.10	0.10	0.09
pH	6.96	7.16	7.15	7.2	7.18	7.27	7.04	7.06	7.19	7.18	7.08	7.09	7.14	7.06	7.08	7.62
ORP (mV)	-90.8	-67.6	-66.8	34.2	-38.9	-88.0	-80.6	-82.4	75.5	-73.3	56.9	59.5	116.4	-93.1	-95.5	-66.2
Turbidity (NTU)	0.2	4.6	4.1	16.8	12.3	20.5	22.2	20.1	18.6	12.1	33.9	28	0.3	25.9	12.3	37.5
DO (mg/L)	3.89	2.98	2.87	3.77	3.2	3.54	3.86	3.79	2.64	2.5	1.87	1.76	1.48	1.75	1.5	4.04

TABLE 2-7

Youth Pond Surface Water Quality Data

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAYP-SD01	CAYP-SD02	CAYP-SD03	CAYP-SD04		CAYP-SW05	CAYP-SW06
Date	10/11/2012	10/11/2012	10/11/2012	10/11/2012	10/11/2012	11/9/2012	11/9/2012
Time	1250	1330	1515	1508	1508	945	1310
Depth (feet)	0.5	4.0	0.5	0.5	2.5	1.0	1.5
Temperature °C	18.45	18.93	18.31	18.2	17.35	7.61	9.17
Conductivity (ms/cm)	0.213	0.213	0.232	0.237	0.238	0.183	0.466
Salinity (PPT)	0.10	0.10	0.11	0.11	0.11	NR	0.23
pH	6.52	6.78	6.97	6.87	6.72	6.41	7.45
ORP (mV)	20.9	7.7	11.5	21.0	-45.8	122.6	16.4
Turbidity (NTU)	9.4	6.4	4.9	7.9	16.4	2.6	1.3
DO (mg/L)	3.98	3.65	4.25	4.77	2.36	5.42	5.61

TABLE 2-8

Cheatham Pond Reconissance Survey Water Quality Data

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAREFSO4-SW01	CAREFSO4-SW02	CAREFSO4-SW03	CAREFSO4-SW04	CAREFSO4-SW05	CAREFYP-SW01	CAREFYP-SW02	CAREFYP-SW03
Date	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/3/2012
Depth (feet)	1.5	0.8	2.3	1.0	1.5	2.0	1.8	2.3
Temperature °C	23.05	22.08	22.78	23.3	23	21.86	22.02	22.21
Conductivity (ms/cm)	0.316	0.372	0.292	0.431	0.424	0.522	0.493	0.411
Salinity (PPT)	0.15	0.18	0.14	0.21	0.20	0.25	0.24	0.20
pH	6.98	6.89	6.85	7.45	7.35	7.53	7.21	7.38
ORP (mV)	-104.8	-142.1	-125.9	-179.8	-190.1	58.9	180.1	92.6
Turbidity (NTU)	45.5	114.3	5.2	103.4	68.8	25.7	20.4	31.3
DO (mg/L)	3.68	3.55	4.35	2.83	4.35	4.81	5.03	3.1

TABLE 2-9

Cheatham Pond Surface Water Quality Data

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAREFSO4-SW01	CAREFSO4-SW02	CAREFSO4-SW03	CAREFSO4-SW04	CAREFSO4-SW05	CAREFYP-SW01	CAREFYP-SW02	CAREFYP-SW03
Date	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/3/2012	10/4/2012	10/4/2012	10/4/2012
Time	1625	1536	1537	1308	1232	1445	1535	1450
Depth (feet)	1.5	3.0	2.0	0.5	1.0	2.0	0.5	1.0
Temperature °C	26.82	36.42	26.4	25.4	24.6	26.28	26.34	25.91
Conductivity (ms/cm)	0.235	0.259	0.284	0.434	0.364	0.468	0.452	0.870
Salinity (PPT)	0.11	0.12	0.13	0.21	0.17	0.22	0.22	0.42
pH	8.56	7.68	9.16	7.92	7.62	7.43	7.45	6.96
ORP (mV)	-92.2	-101.4	97.4	79.7	25.0	96.9	48.9	-105.4
Turbidity (NTU)	30.3	77.4	46.4	102.7	73.8	28.6	64.9	35
DO (mg/L)	12.66	8.8	11.42	7.87	6.1	6.64	7.52	4.76

TABLE 2-10

IDW Analytical Results Summary

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	IDW-11292012-AQ	IDW-11292012-SO
Sample Date	11/29/12	11/29/12
Chemical Name		
TCLP Volatile Organic Compounds (UG/L)		
No Detections		
TCLP Semivolatile Organic Compounds (UG/L)		
No Detections		
TCLP Pesticides/Polychlorinated Biphenyls (UG/L)		
No Detections		
TCLP Herbicides (UG/L)		
No Detections		
TCLP Metals (UG/L)		
Barium	386	283
Cadmium	0.38 J	2.8 J
Chromium	20 U	3.8 J
Mercury	0.02 J	0.04 J
Selenium	14.3 J	35 U
Reactivity (MG/KG)		
No Detections		
Corrosivity (PH)		
pH	7.4	7.5
Ignitability (DEG/C)		
No Detections		

Notes:

> - Flashpoint is at a temperature higher than the value shown

DEG/C - Degrees centigrade

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

MG/KG - Milligrams per kilogram

PH - pH units

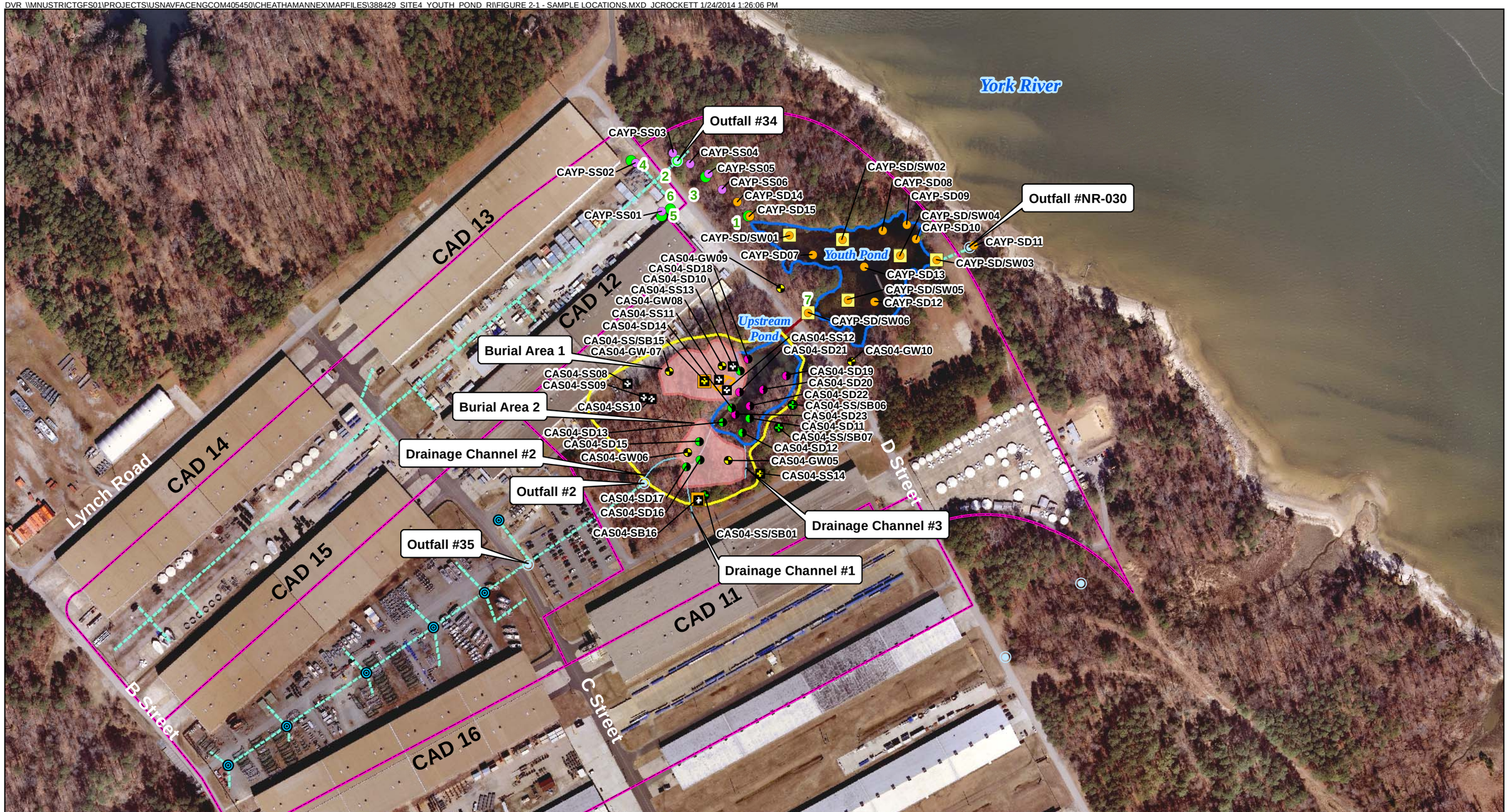
U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

UL - Analyte not detected, and did not meet DoD criteria in the corresponding Laboratory Control Sample (LCS) and/or Laboratory Control Sample Duplicate (LCSD)

Shading indicates detection

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-1 - SAMPLE LOCATIONS.MXD JCROCKETT 1/24/2014 1:26:06 PM



Legend

- Outfall
- Sediment Sample Location
- Sediment/Surface Water Sample Location
- Surface Soil Sample Location
- Groundwater Sample Location
- Surface Sediment Samples
- Sediment/Toxicity Samples
- Surface Soil Samples
- Surface/Subsurface Soil Samples
- Surface Soil Samples for Hexavalent/Total Chromium
- Subsurface Soil Samples for Total and Hexavalent Chromium Analysis
- Surface Feature Location
- Drop Inlet
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Drainage Area Boundaries
- Water Body
- Site 4 Boundary

Figure 2-1
Site 4 and Youth Pond RI Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

N W E S

0 250 Feet

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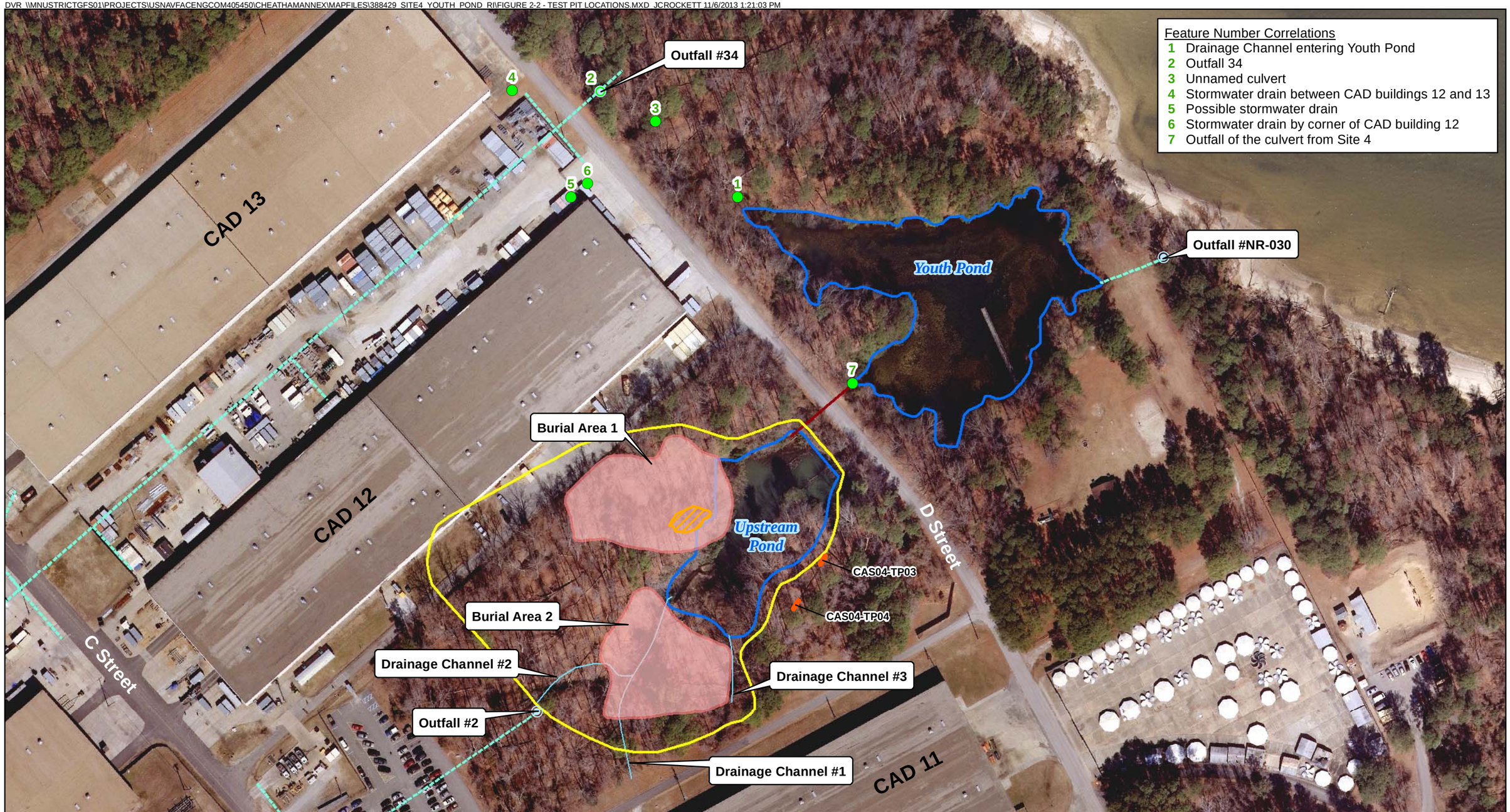
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-2 - TEST PIT LOCATIONS.MXD JCROCKETT 11/6/2013 1:21:03 PM



Legend

- Outfall
- Surface Feature Location
- Test Pit Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 130 Feet

Figure 2-2
Site 4 RI Test Pit Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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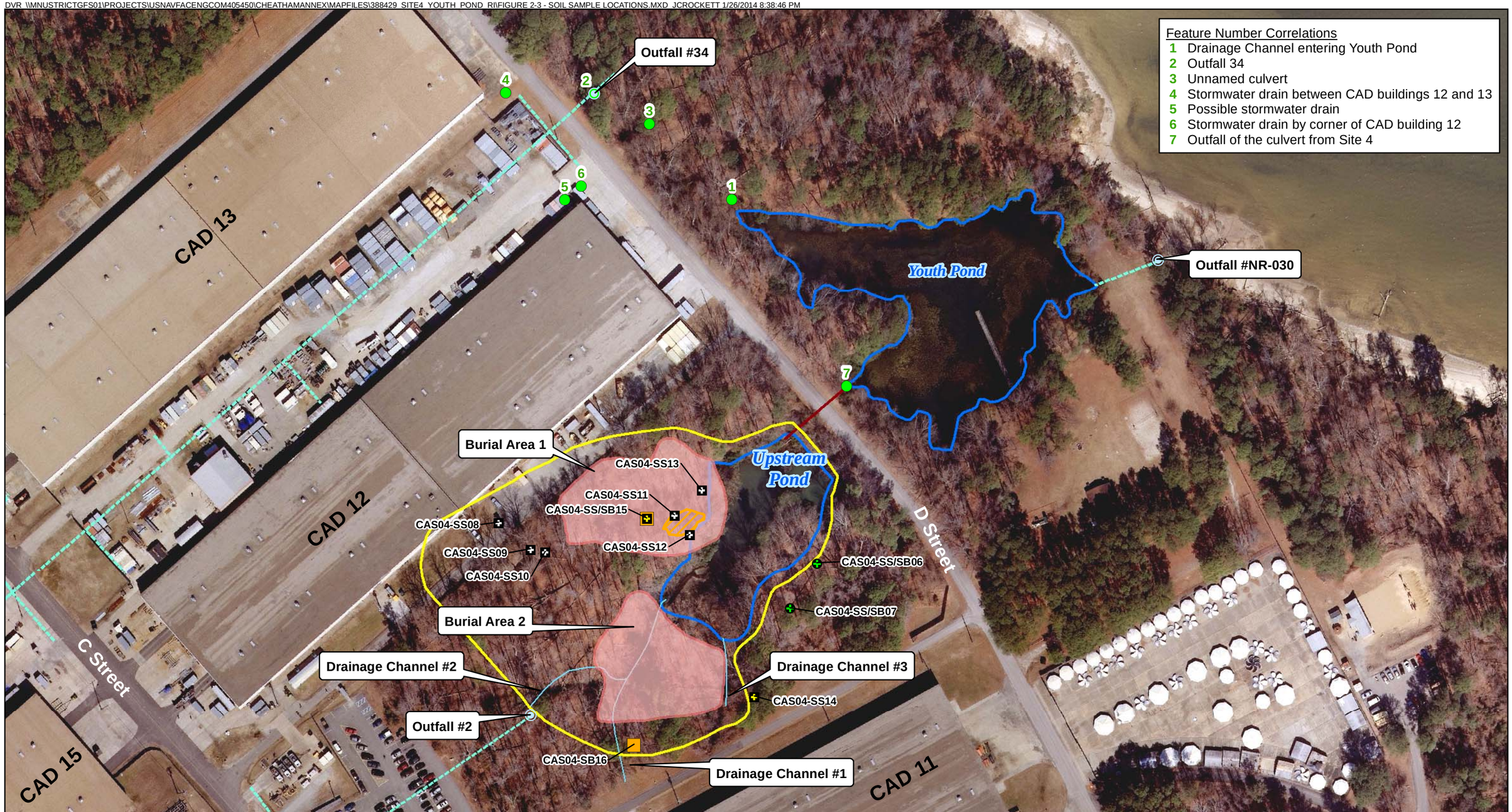
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-3 - SOIL SAMPLE LOCATIONS.MXD JCROCKETT 1/26/2014 8:38:46 PM



Legend

- Outfall
- Surface Soil Samples
- Surface/Subsurface Soil Samples
- Surface Soil Samples for Hexavalent/Total Chromium
- Subsurface Soil Samples for Total and Hexavalent Chromium Analysis
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 130 Feet

Figure 2-3
Site 4 RI Soil Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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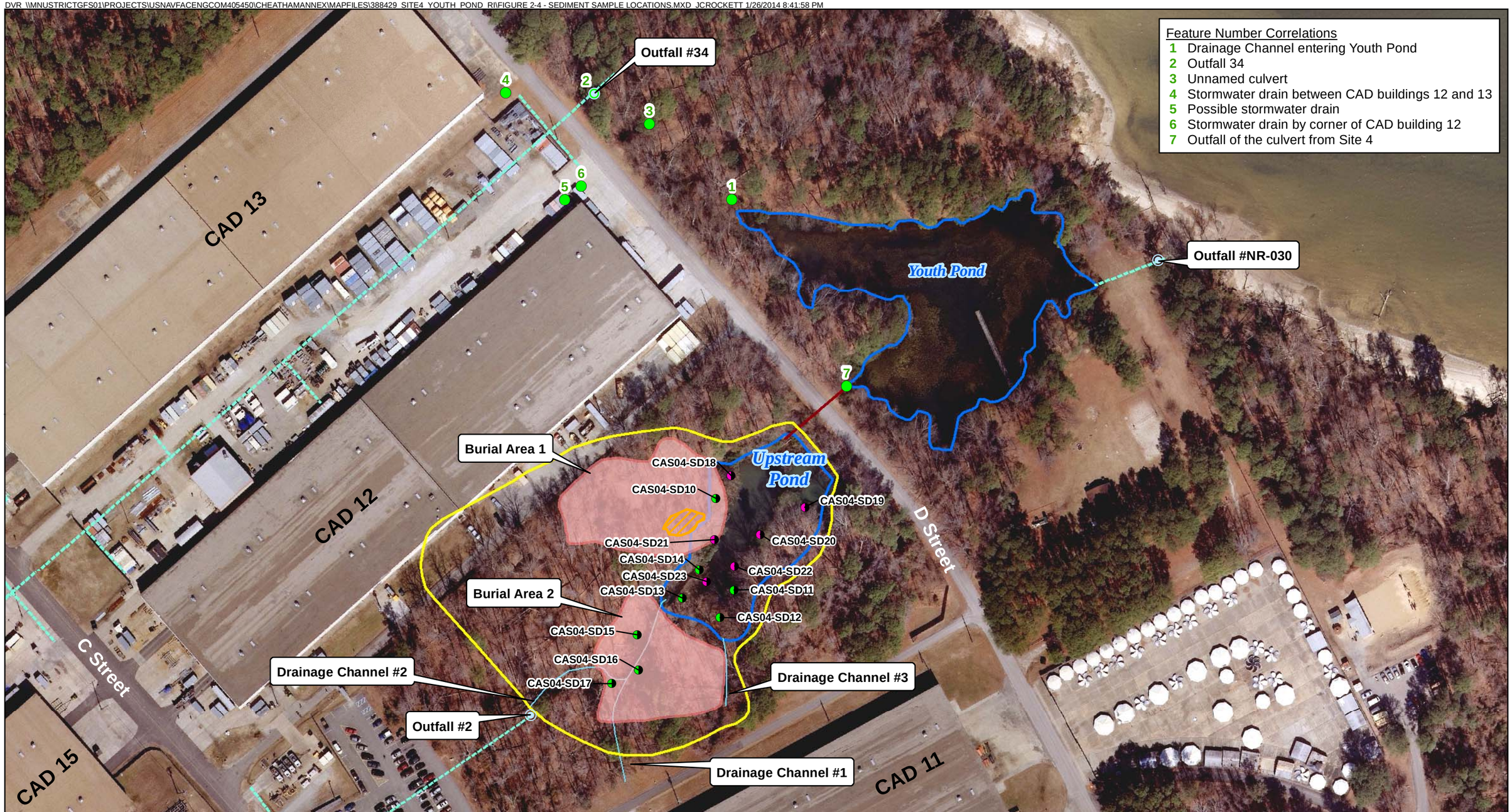
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-4 - SEDIMENT SAMPLE LOCATIONS.MXD JCROCKETT 1/26/2014 8:41:58 PM



Legend

- Outfall
- Surface Sediment Samples
- Sediment/Toxicity Samples
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 130 Feet

Figure 2-4
Site 4 and Youth Pond RI Sediment Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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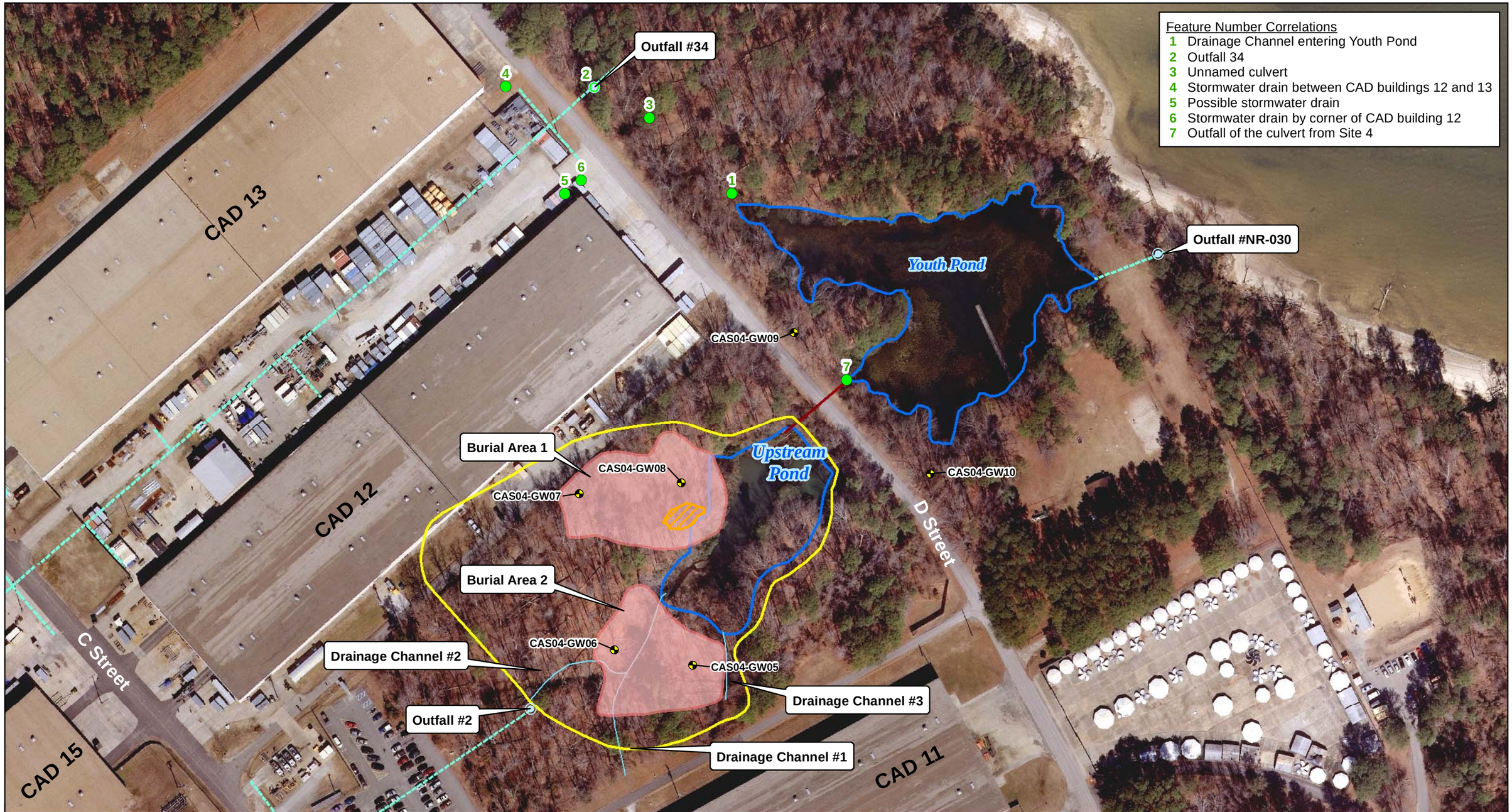

Legend

- Outfall
- Groundwater Sample Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N
W E
S

0 130
Feet

Figure 2-5
Site 4 and Youth Pond RI Groundwater Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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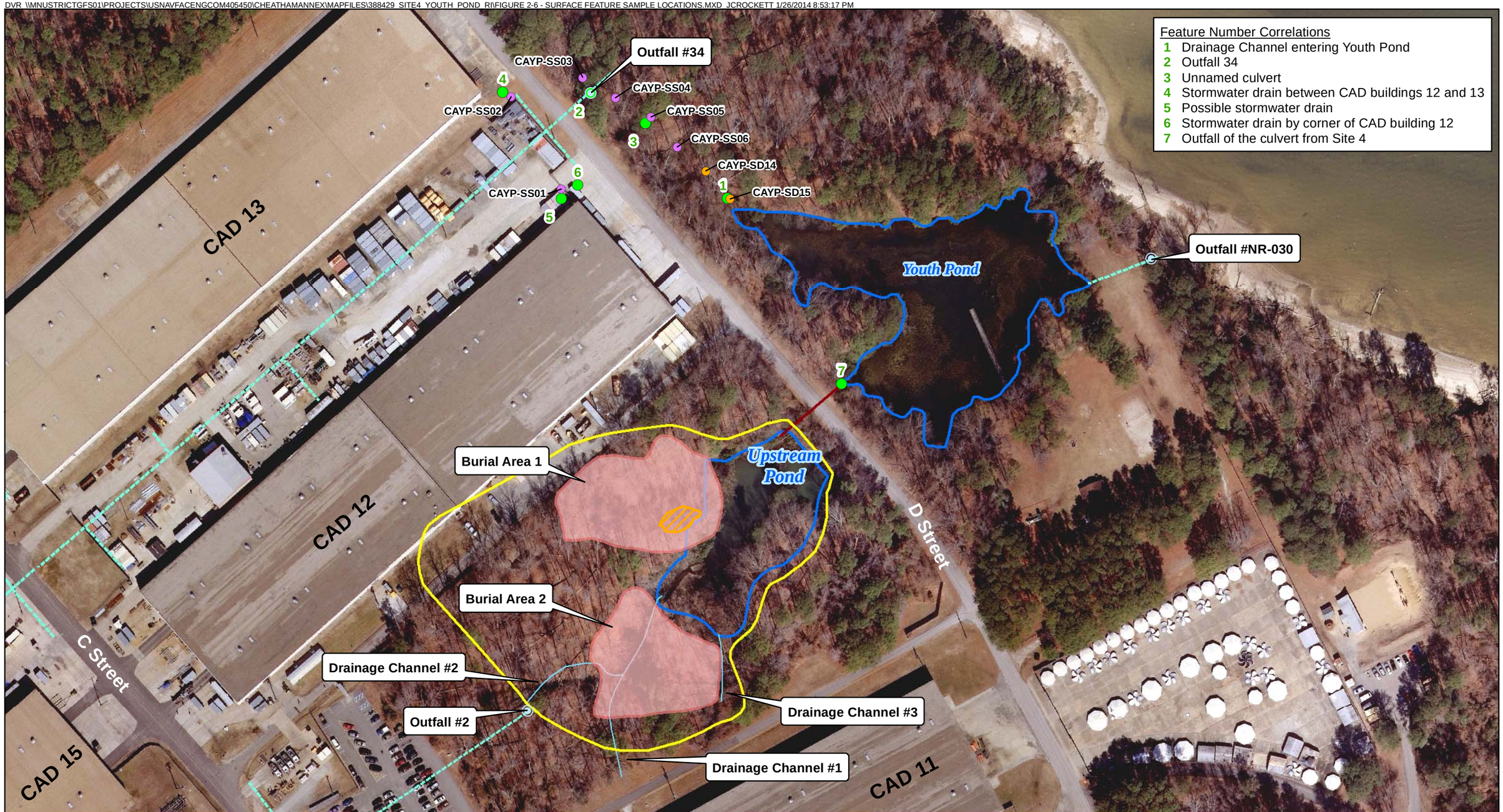
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-6 - SURFACE FEATURE SAMPLE LOCATIONS.MXD JCROCKETT 1/26/2014 8:53:17 PM



Legend

- Outfall
- Surface Feature Location
- Sediment Sample Location
- Surface Soil Sample Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 130 Feet

Figure 2-6
Site 4 and Youth Pond RI Surface Feature Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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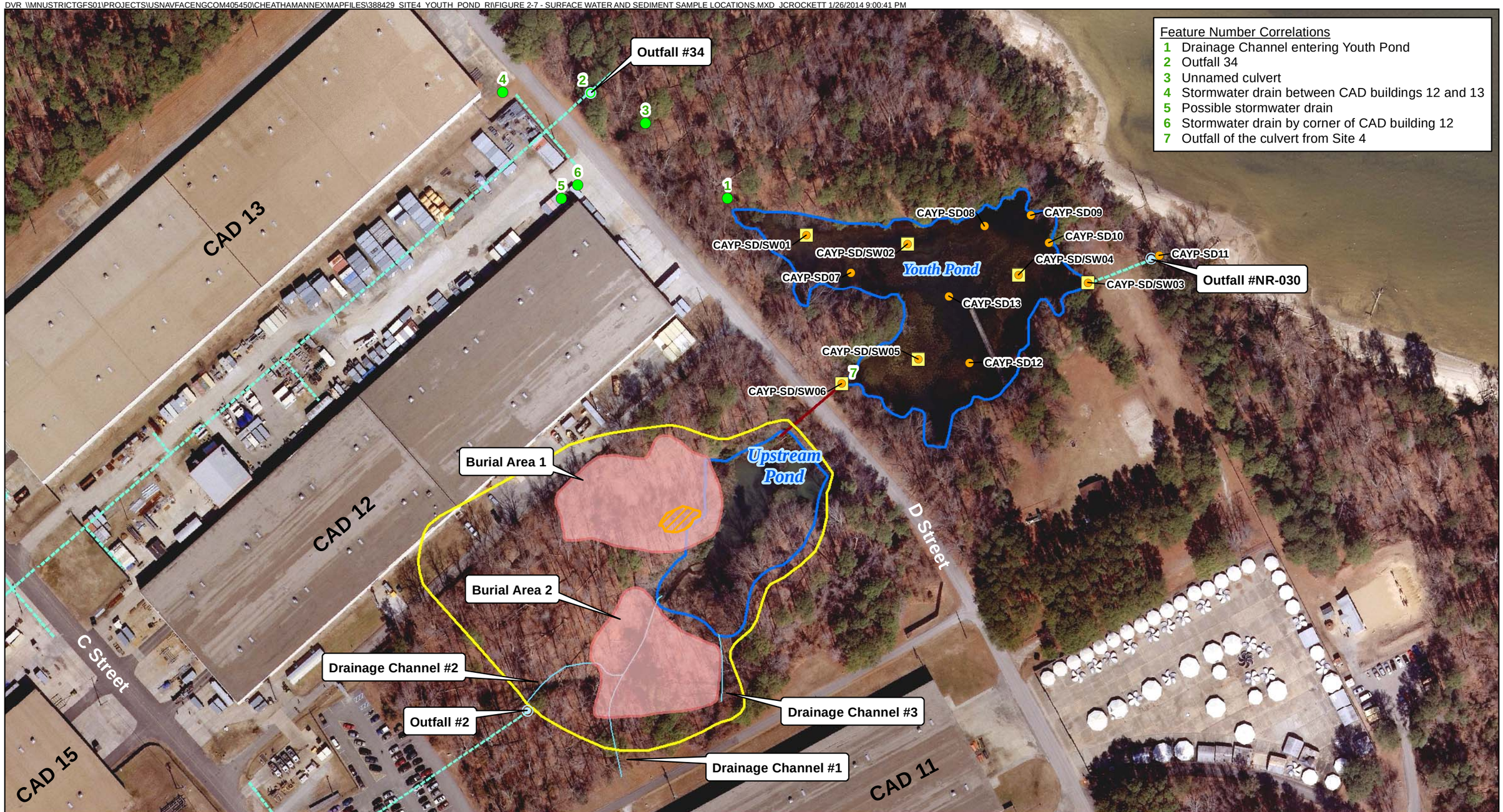
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 2-7 - SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS.MXD JCROCKETT 1/26/2014 9:00:41 PM



Legend

- Outfall
- Surface Feature Location
- Sediment Sample Location
- Sediment/Surface Water Sample Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N
W E
S

0 130
Feet

Figure 2-7
Youth Pond RI Sediment and Surface Water Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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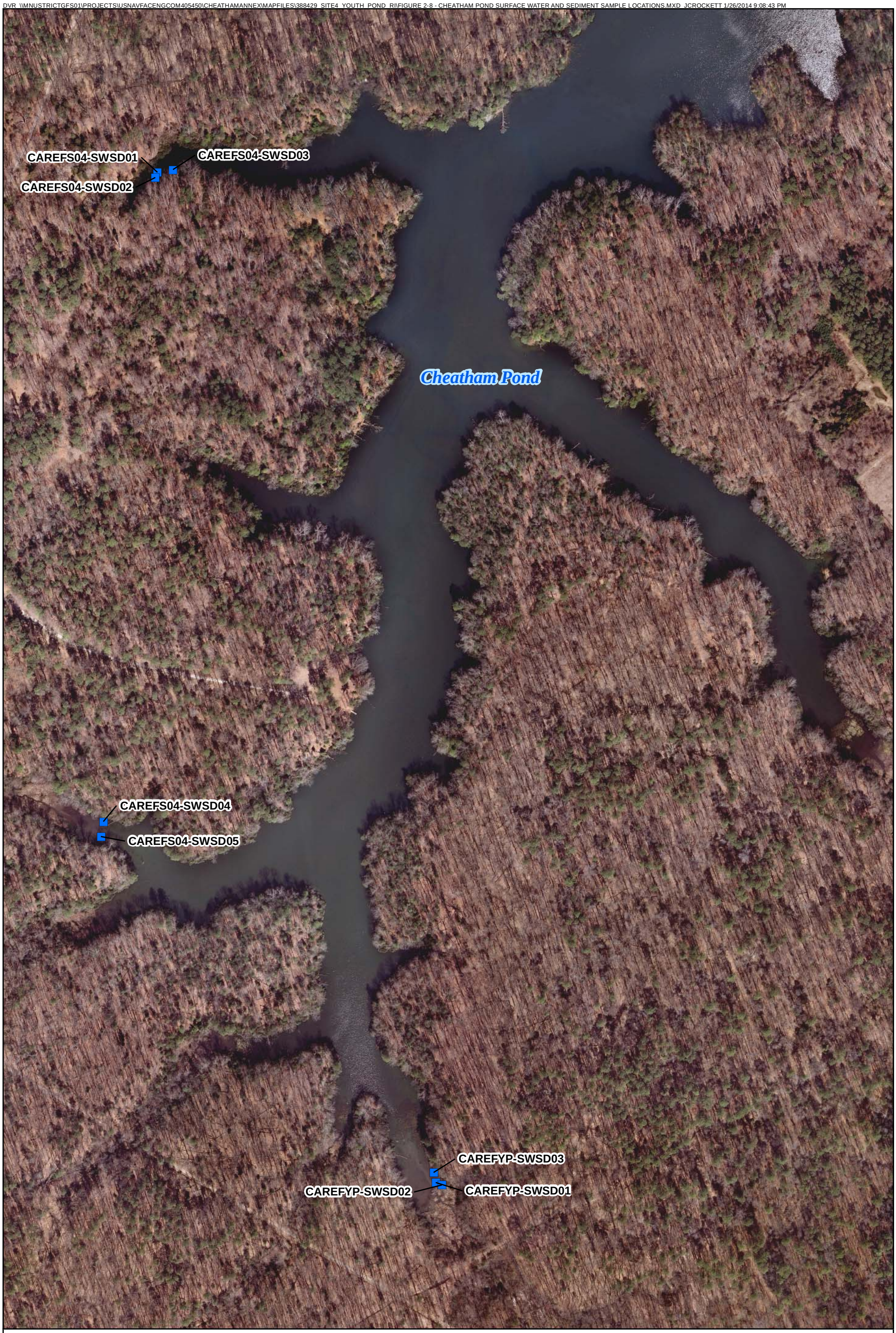

Legend

- Co-located Surface and Sediment Sample Location

N
W E
S

0 300
Feet

Figure 2-8
Cheatham Pond Sediment and Surface Water Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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SECTION 3

Physical Characteristics

This section presents an evaluation of the Site 4 and Youth Pond physical characteristics pertaining to the surface drainage features and conceptual hydrogeology of the site. The physical settings of CAX, Site 4, and Youth Pond, including meteorology, topography, land and groundwater use, hydrogeology, and ecological resources are summarized in this section. This information provides the basis for the hydrologic and hydrogeologic conceptual model of Site 4 and Youth Pond, which in turn is a foundational element of the overall CSM for these sites. A detailed hydrologic and hydrogeologic conceptual model is important to describe the primary mechanisms that control the fate and migration of contaminants in surface water and groundwater. The information concerning the physical characteristics also supports the HHRAs and ERAs.

3.1 Climate

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

Freezing temperatures occur intermittently from October through March. The average monthly temperatures in the area range from approximately 38.8 degrees Fahrenheit (°F) in January to 77.4°F in July (Baker, 2003).

Because of its location near the coastline, York County, where Williamsburg is located, is subject to easterly storms throughout late summer and early fall, which cause high tides and coastal flooding. Intense tropical hurricanes occasionally sweep the coast. Winter storms that move along the eastern seaboard are often associated with high winds and precipitation, occasionally in the form of snow, ice pellets, or rain; however, the snow is seldom prolonged or heavy. The average annual precipitation is approximately 44 inches, with the summer months being the wettest and the winter months being the driest (Baker, 2003).

Spring is a period of contrasting weather, particularly during March. Spring and autumn are periods of occasional frost. Summer is warm and humid with occasional showers and afternoon thunderstorms. Autumn is a season of comfortable temperatures (average temperature 60˚F to 81˚F) and generally pleasant weather (Baker, 2003).

Winds are highly variable in the area of CAX. Prevailing winds are usually from the south-southwest, but north-northeasterly winds are common in some months. Onshore winds predominate during the spring and summer (Baker, 2003).

3.2 Topography and Surface Drainage Features

The topography at CAX is characterized by gently rolling terrain dissected by ravines and stream valleys trending predominantly northeastward toward the York River. Ground elevations at CAX vary from sea level along the eastern boundary, which borders the York River, to a maximum elevation of approximately 50 feet above mean sea level on a few scattered hills in the western portion of the base. Valleys consisting of 40- to 60-foot ravines with steep slopes (slopes exceeding 1:1) occur along the major creeks draining CAX (Baker, 2003).

CAX is bordered on the west by Cheatham Pond, on the north by the mouth of Queen's Creek, on the east by the York River, and on the south by King Creek. In 1943, dams were constructed to create the 108-acre Cheatham Pond from a tributary of Queen's Creek, as well as the 43-acre Penniman Lake from a tributary of King Creek. Both creeks are tidally influenced; however, Cheatham Pond and Penniman Lake are not. Damming a portion of the Cub Creek watershed formed Jones Pond, a 69-acre freshwater, non-tidally influenced pond enclosed by several wooded ravines and located in the northwestern section of CAX. Numerous small creeks flow through wooded ravines throughout CAX and drain into tidal creeks that join the York River. In most areas, forests extend to the marsh and lake margins. The tributaries of CAX all drain into the York River (Baker, 2003).

Site 4 is heavily vegetated with shrubs and trees. In general, the topography of Site 4 slopes to the northeast towards D Street (**Figure 3-1**); however, locally the topography slopes towards Upstream Pond. The area immediately surrounding Youth Pond is vegetated with shrubs and trees. In general, the topography slopes downward to the northeast towards the York River; however, locally the topography slopes inward towards Upstream and Youth Ponds.

A comprehensive program to control surface water flow and stormwater discharges within the industrial areas at CAX has been established. Within the drainage area encompassing Site 4 and Youth Pond, surface water and stormwater are expected to either infiltrate into the ground or evaporate (in unpaved areas) or flow toward one of several drop inlets or toward unpaved areas (from paved areas) and eventually discharge to Youth Pond. Within the drainage area that includes Site 4, there are three regulated outfalls that discharge stormwater from upstream developed and industrialized areas, Outfall #35, Outfall #34, and Outfall #NR-030 (**Figure 1-3**). Outfall #35 receives stormwater discharges entirely originating from areas upstream and outside the Site 4 boundary, namely from the vicinities of CAD Buildings 12, 15, and 16, and discharges through Outfall #2 into Upstream Pond. When Upstream Pond is at full capacity, excess surface water from Upstream Pond flows through a culvert under D Street and into Youth Pond. Outfall #34 also receives stormwater discharges entirely derived from outside of the Site 4 boundary, including the vicinities of CAD Buildings 12, 13, 14, and 15, and discharges into Youth Pond.

When surface water in Youth Pond reaches a certain height, excess surface water flows into a flood control structure within the pond and discharges down a slope and into the York River through Outfall #NR-30. Outfall #NR-30 ultimately receives stormwater drainage from the vicinities of CAD Buildings 11, 12, 13, 14, 15, and 16, as well as Site 4. A large component of the stormwater flow that ultimately reaches Youth Pond is not potentially impacted by Site 4. Outfalls #35, #34, and #NR-30 are regulated under a Virginia Pollutant Discharge Elimination System (VPDES) stormwater permit.

3.3 Land Use

CAX is a secure military installation that occupies 2,300 acres. Site 4 is approximately 4 acres, and while located within the restricted CAD area, access is not restricted to CAX visitors (civilian employees and military personnel) since the gate along D Street near CAD Building 11 is not locked on a regular basis. Future land use at Site 4 is not expected to change and will likely continue as a wooded area within the industrial CAD area in the foreseeable future. Youth Pond is approximately 2.5 acres in size and is currently used by the Department of Defense (DoD) for recreational activities. The pond is not open to the general public. A catch-and-release fishing restriction was implemented for the pond in 2000, as a conservative measure until further study could be conducted, following identification of PCBs within pond sediment.

Six of the CAD buildings are located within the Site 4 and Youth Pond stormwater drainage areas (**Figure 3-2**). General descriptions of the uses of each building and the materials stored are included as follows:

- CAD 11 – This building is for general warehousing and storage. No other information is available.
- CAD 12 – This building is for general warehousing and storage. According to the CAX inventory, there are four aboveground storage tanks (ASTs) located outside of CAD 12: one 1,000-gallon kerosene AST, one 1,000-gallon diesel AST, one 600-gallon used-oil AST and one 1,000-gallon used-oil AST. In addition, other materials, including garbage, gasoline, cleaners, generators, vehicles, Conex boxes, paint, and miscellaneous wood and metal, are stored outside of CAD 12. Many of the materials are stored above the ground surface on pallets or wooden planks. Some of the wood planks appear to have been treated with wood tar or creosote (**Attachment 1**).
- CAD 13 – This building is for general warehousing and storage. Materials, including vehicles, equipment and miscellaneous metal, are stored outside of CAD 13.
- CAD 14 – This building is for general warehousing and storage. Materials, including vehicles, equipment and miscellaneous metal, are stored outside of CAD 14.

- CAD 15 – This building is for general warehousing and storage. Materials, including boats, marine equipment and miscellaneous metal, are stored outside of CAD 15.
- CAD 16 – This building is for general warehousing and storage. Materials, including boats, marine equipment, compressed gas cylinders on storage racks, and miscellaneous metal and wood, are stored outside of CAD 16.

3.4 Water Use

Historically, groundwater from the Yorktown-Eastover aquifer was the drinking water source for older individual homes within the vicinity of CAX and was used as a backup water supply for CAX itself. However, groundwater at CAX is not a current or anticipated future source of drinking water at CAX, as drinking water is supplied to CAX by the City of Newport News Waterworks. In addition, drinking water is publically available, through the City of Newport News Waterworks, to all domestic homes located within the vicinity of CAX. The Commonwealth of Virginia does not employ groundwater use classifications; therefore, groundwater at CAX is considered to be of potential beneficial use. There are no fresh surface water bodies within the vicinity of Site 4 or Youth Pond that could feasibly be used as a potable water supply.

3.5 Hydrogeology

3.5.1 Geology

CAX is located in the Atlantic Coastal Plain Physiographic Province, which is underlain by multiple layers of unconsolidated sediment of Quaternary, Tertiary, and Cretaceous ages (**Figure 3-3**). The granite rock formations of the Appalachian Mountains to the west were eroded over millennia and sediment was transported from the mountains by rivers and streams to the coast, building up layers of sediment that fanned out onto the Atlantic continental shelf. Successive sea level rises deposited fluvial estuarine and marine sediment further, building the Coastal Plain. Widely fluctuating sea levels sculpted the Coastal Plain into river terraces of different elevations bounded by scarp features that resulted from shoreline erosion. The Coastal Plain in the vicinity of CAX includes four terraces: Lackey Plain, Croaker Flat, Huntington Flat, and Grafton Plain (from highest to lowest), and three scarps: Kingsmill, Lee Hall, and Camp Peary. As shown on **Figure 3-4**, CAX is located within the Lackey Plain and Croaker Flat terraces, separated by the Camp Peary scarp located along the York River (Brockman et al., 1997).

A total of 10 geologic formations have been identified (Brockman et al., 1997) beneath CAX. The uppermost geologic formations consists of alluvial, colluvial, and marsh deposits composed of silt, sand, and pebbles with some clay. In terms of the overlying soils, Site 4 and Youth Pond are located within Soil Association Group 2, one of the four soil association groups identified at CAX during a 1985 soil survey report for CAX prepared by the Soil Conservation Service. Soils in Soil Association Group 2, the Dogue, Pamunkey, and Uchee Association (**Figure 3-5**), were formed on river terraces and are deep, well- to poorly drained soils with clayey and loamy subsoils (Baker, 2003). A more detailed description of the soils within Soil Association Group 2 can be found in the 2003 CAX Background Investigation report (Baker, 2003). Two simplified hydrogeologic cross-sections of Site 4, oriented to facilitate correlation among the monitoring wells (**Figure 3-6**), are shown on **Figure 3-7** and **Figure 3-8**. Soil boring logs are provided in **Appendix C**.

The uppermost subsurface geology in the area of Site 4 consists of the Pleistocene (Quaternary) Shirley formation and the Pliocene (Tertiary) Yorktown formation (Mixon et al., 1989). The Shirley formation is relatively thin, only occurs within topographically higher areas located adjacent to the site, and consists of sand, gravel, silt, clay, and trace amounts of organic material. The uppermost portion of the Yorktown formation (Yorktown confining unit) consists of shell hash, clayey or sandy shell hash, very-fine to medium-grained sand, or shelly clay. The lower portion of the Yorktown formation (Yorktown-Eastover aquifer) consists of very-fine to fine-grained sand, silt, or sandy clay. Soil boring data from both the SI (CH2M HILL, 2011a) and the RI indicate that the subsurface lithology at Site 4 consists (in descending order) primarily of dark colored silty sand and topsoil followed by yellow colored fine- to medium-grained silty sand, with shell gravel at the bottom of the borings.

3.5.2 Hydrostratigraphy

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

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

Beneath Site 4, the Camp Peary Scarp truncates the York County Shallow Aquifer System; therefore, the Columbia aquifer, Cornwallis Cave Confining Unit, and Cornwallis Cave aquifer are not present at this site. In addition, the Yorktown confining unit is not present. The first encountered groundwater occurs within the silt, fine- to coarse-grained sand, and shell hash of the Yorktown-Eastover aquifer. The aquifer is unconfined beneath the site (as evident by the absence of the Yorktown confining unit) and is recharged by the infiltration of precipitation. The Yorktown-Eastover aquifer is underlain by the approximately 100- to 200-foot-thick Eastover-Calvert confining unit. Due to the thickness and low permeability of this confining unit, it is unlikely that deeper aquifers have been impacted by historical releases at CAX, and they have consequently not been investigated.

3.5.3 Aquifer Properties

Aquifer K_h ("slug") testing was performed at each of the six new Site 4 monitoring wells in December 2012. The K_h values were calculated using both falling- and rising-head test data. The slug test data were analyzed using the Hvorslev Method (Hvorslev, 1951) for unconfined aquifers and the Bouwer and Rice Method (Bouwer and Rice, 1976) for confined aquifers. The K_h values were reported for both rising- and falling-head methods when the static water-level occurred within the riser pipe portion of the monitoring well (that is, above the screen interval). **Table 3-1** summarizes the results of the testing. The slug test data analyses were performed utilizing AQTESOLV software; the data plots are provided in **Appendix H**.

The K_h values in the Yorktown-Eastover aquifer were estimated to be between 0.671 and 5.62 foot per day (ft/day). These values fall within or near the reported range of 0.004 to 3 ft/day for this aquifer (Brockman, et. al., 1997).

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

3.5.4 Groundwater Flow

The first encountered groundwater at Site 4 is within the Yorktown-Eastover aquifer, and ranged in depth during the RI from 5.38 feet bgs (CAS04-GW09) to 8.80 feet bgs (CAS04-GW05) (**Table 2-4**). Groundwater elevations are not expected to be impacted by the tide cycles and groundwater flows generally northeast towards the York River. The average hydraulic gradient along the flow path is 0.005 feet per foot (**Figure 3-9**).

Based on the average calculated K_h value of 2.27 ft/day within the Yorktown-Eastover aquifer (**Section 3.4.3; Table 3-1**) an assumed effective porosity of 0.3, and the average horizontal hydraulic gradient calculated from the groundwater contour map (0.005 feet per foot), the average groundwater velocity towards the York River is estimated to be 0.038 ft/day.

3.6 Ecological Resources

Terrestrial flora at CAX consists predominantly of woodland species (Baker, 2005a). The following three types of forest are present:

- Pine stands composed primarily of loblolly and Virginia pines
- Mixed pine and hardwood stands
- Hardwood stands

Elevated areas are the predominant locations of pine stands, while hardwood stands are found on slopes and in ravines. Native tree species found at CAX include beech, black cherry, red maple, sweet gum, various pines, white ash, and white oak. The woodland's understory is composed of various seedling trees and vine species, such as Virginia creeper, briars, and honeysuckle. Ferns are found in many moist, shaded areas. Ornamental trees and shrubs have been planted in the improved areas and along major roadways. None of the plant species that occur at CAX are listed on the federal or Commonwealth endangered species lists (Baker, 2005a).

Small, undeveloped tracts of land at CAX support a variety of indigenous wildlife species. Whitetail deer, beaver, skunk, bobcat, red and gray fox, squirrel, raccoon, opossum, and rabbit are present. Game birds, such as wild turkey, quail, duck, and pheasant, are also resident. Songbirds common to the eastern Virginia area are in abundance at CAX, along with a raptor population consisting of small hawks, owls, and osprey. Carrion-feeding birds such as crows and turkey vultures are also common. The southern bald eagle (federally and state protected) is known to nest nearby at WPNSTA Yorktown. Suitable habitat exists for roosting and perching at CAX, but only occasional sightings of eagles have been made there (Baker, 2005a).

Wetlands are mainly found along principal tributaries to the York River and along the York River shoreline at CAX. The following four major marsh types exist along these margins:

- Saltmarsh cordgrass communities
- Big cordgrass communities
- Cattail communities
- Brackish water mixed communities

Freshwater wetlands are also present within the interior, non-tidal areas of the installation. Salinities in the York River estuary bordering CAX can be characterized as mesohaline (from 15 to 20 parts per thousand), and can fluctuate depending on seasonal impacts, runoff, and rainfall. Of the 295 fish species known from the Chesapeake Bay, only 32 are year-round residents. Nursery areas, foraging areas, and spawning ground attract the remaining species from the Atlantic Ocean and freshwater tributaries each year. In the York River, resident fish include hogchoker, weakfish, and oyster toadfish. Spot and croaker are common in nursery and foraging areas in the summer and numerous anadromous and catadromous fish use the area during migration, including the alewife, American eel, American shad, blueback herring, striped bass, and white perch. Commercially and recreationally important species from the York River include American shad, bay anchovy, blue crab, bluefish, croaker, spot, striped bass, summer flounder, and weakfish. The York River in the vicinity of CAX is a designated crab pot fishery from March through November of each year; immediately north of CAX is a spawning and nursery ground for blue crabs. Several species of endangered sea turtles (namely the green, hawksbill, leatherback, loggerhead, and Kemp's Ridley) are known to feed in the Chesapeake Bay and occasionally forage in the York River, including the vicinity of CAX, during the summer.

The York River is designated as Essential Fish Habitat for three species of fish managed by the Mid-Atlantic Fishery Management Council—summer flounder, bluefish, and butterfish. Though both bluefish and butterfish use the more open, pelagic waters characteristic of the river, juvenile summer flounder often use unvegetated, nearshore sandy bottoms and salt marsh creeks as nursery areas. Other species likely to use salt marsh creeks include anchovies, blue crabs, juveniles of migratory species, hard- and soft-shell clams, killifish, minnows, mummichogs, oysters, silversides, and weakfish.

No known federally or state-listed endangered or threatened species are currently using CAX habitats. Suitable habitat exists at CAX for both the red-cockaded woodpecker (federally endangered) and the bald eagle (formerly federally threatened and still protected by the Bald and Golden Eagle Protection Act and state threatened/endangered). Bordering the CAX property is the York River, which provides seasonal habitat for federally and state endangered Kemp's Ridley sea turtles and federally threatened loggerhead sea turtles. The shoreline along the York River may also provide habitat for federally threatened piping plovers. Rare resources and communities identified at CAX in the Virginia Department of Conservation and Recreation (VDCR) Natural Heritage Program database and the CAX Natural Heritage Inventory include a significant great blue heron colony, low salt marsh and salt scrub habitats, coastal plain depression ponds, non-riverine wet hardwood forests, and coastal plain calcareous seepage swamps (Baker, 2005a).

TABLE 3-1

Slug Test Results

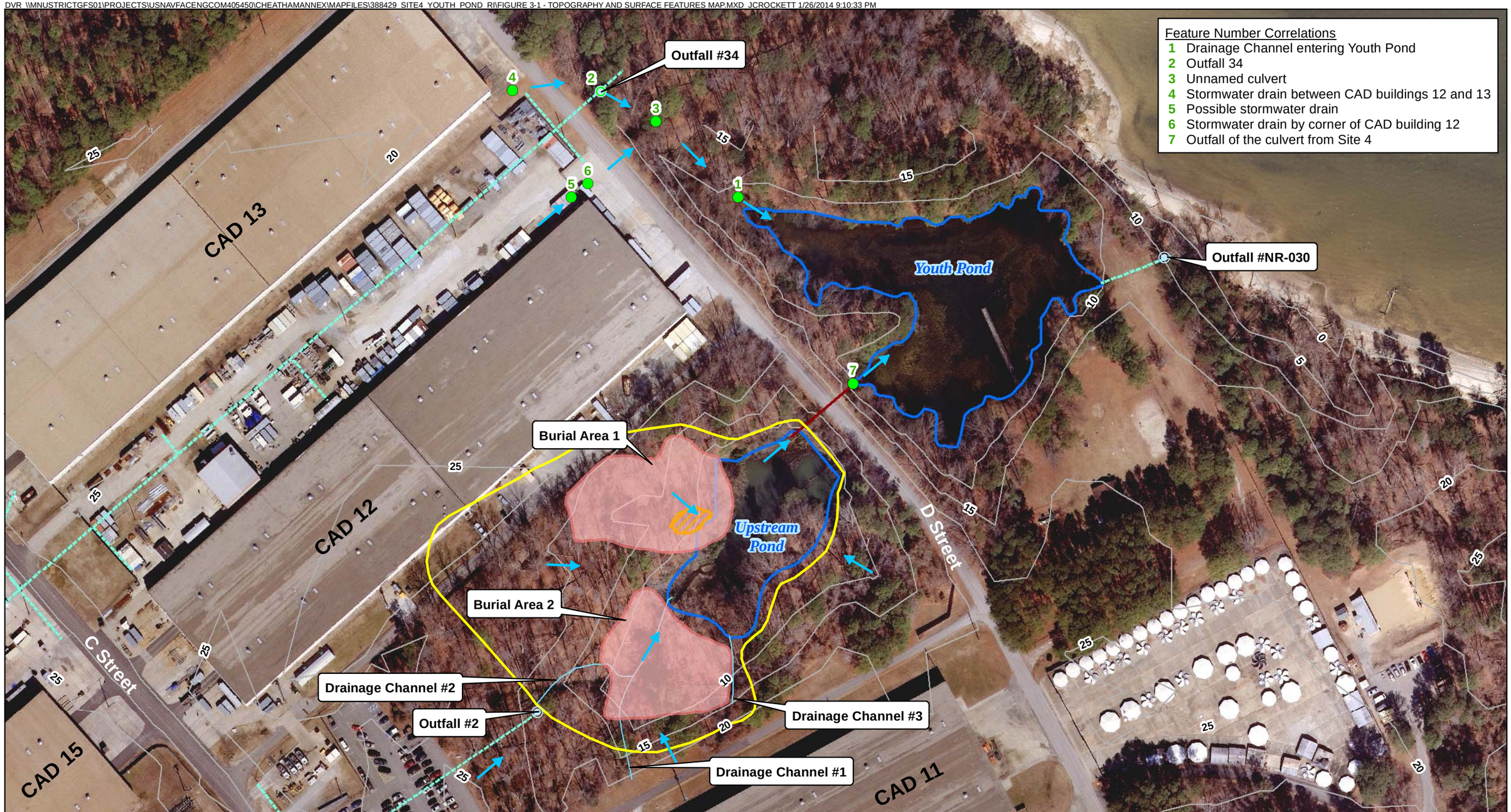
Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Well ID	Test Type	Hvorslev		Bouwer-Rice	
		K (ft/s)	K (ft/day)	K (ft/s)	K (ft/day)
MW05	FH1	2.40E-05	2.07	1.76E-05	1.52
	FH2	1.91E-05	1.65	1.91E-05	1.65
	RH1	2.20E-05	1.90	1.85E-05	1.60
	RH2	1.97E-05	1.70	1.60E-05	1.38
MW06	FH1	3.73E-05	3.22	2.77E-05	2.40
	FH2	1.83E-05	1.58	1.31E-05	1.13
	RH1	1.89E-05	1.63	1.43E-05	1.23
	RH2	1.07E-05	0.93	7.96E-06	0.69
MW07	FH1	3.71E-05	3.21	2.45E-05	2.12
	FH2	3.75E-05	3.24	2.24E-05	1.94
	RH1	5.12E-05	4.42	3.63E-05	3.14
	RH2	4.97E-05	4.29	3.77E-05	3.26
MW08	FH1	3.59E-05	3.10	2.72E-05	2.35
	FH2	2.11E-05	1.82	1.61E-05	1.39
	FH3	1.84E-05	1.59	1.39E-05	1.20
	RH1	1.33E-05	1.15	8.21E-06	0.71
	RH2	2.33E-05	2.01	1.52E-05	1.32
	RH3	2.48E-05	2.14	1.75E-05	1.52
MW09	FH1	2.96E-05	2.56	1.93E-05	1.67
	FH2	1.19E-05	1.03	7.76E-06	0.67
	RH1	6.51E-05	5.62	4.61E-05	3.98
	RH2	6.15E-05	5.31	4.67E-05	4.03
MW10	FH1	1.58E-05	1.37	1.07E-05	0.93
	FH2	1.77E-05	1.52	1.19E-05	1.03
	RH1	5.60E-05	4.84	3.99E-05	3.44
	RH2	5.15E-05	4.45	3.98E-05	3.44

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 3-1 - TOPOGRAPHY AND SURFACE FEATURES MAP.MXD JCROCKETT 1/26/2014 9:10:33 PM



Legend

- Outfall
- Surface Feature Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Runoff Flow Direction
- Elevation Contour (5 ft interval)
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

N W E S

0 130 Feet

Figure 3-1
Site 4 and Youth Pond Topography and Surface Drainage Features Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

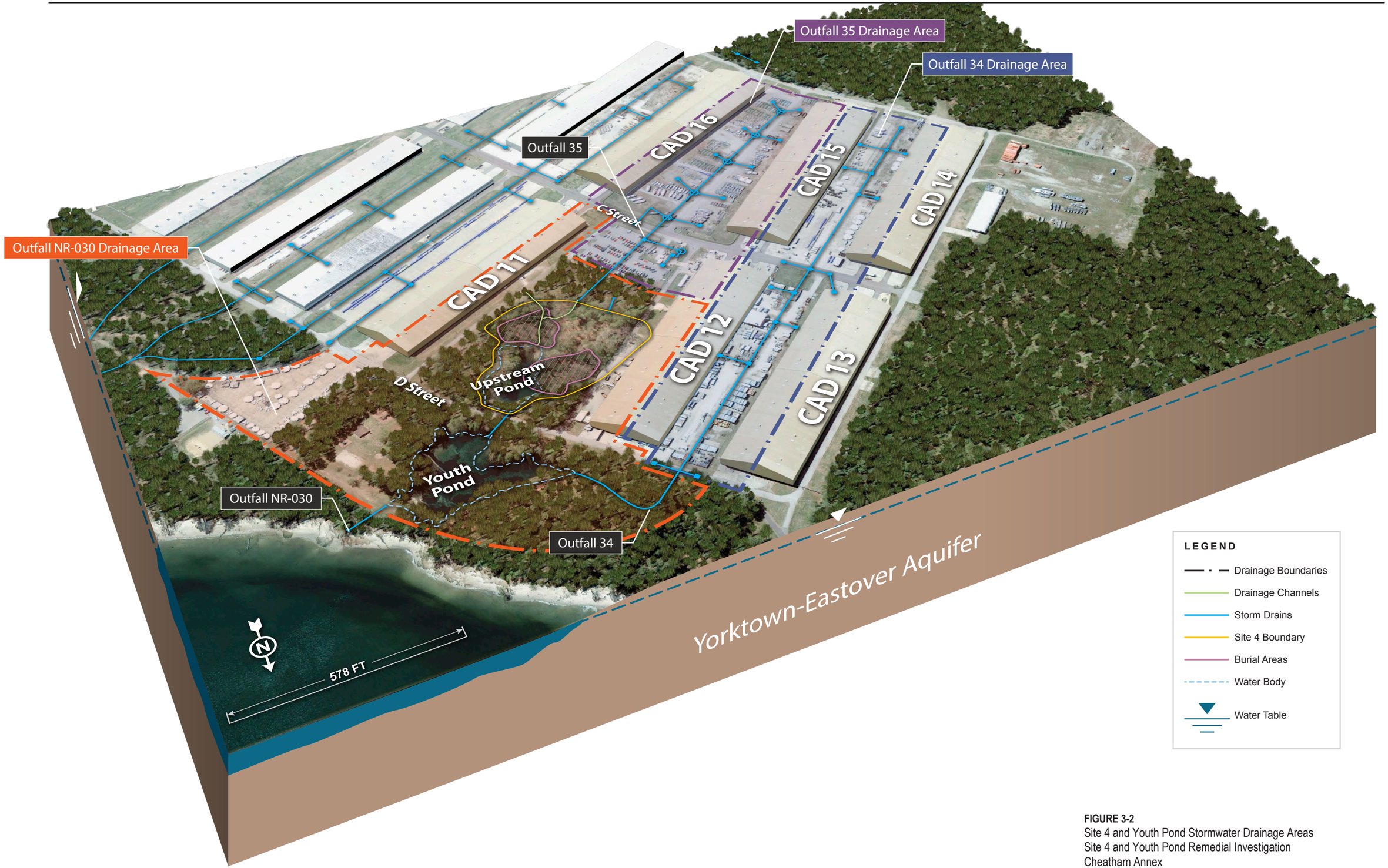
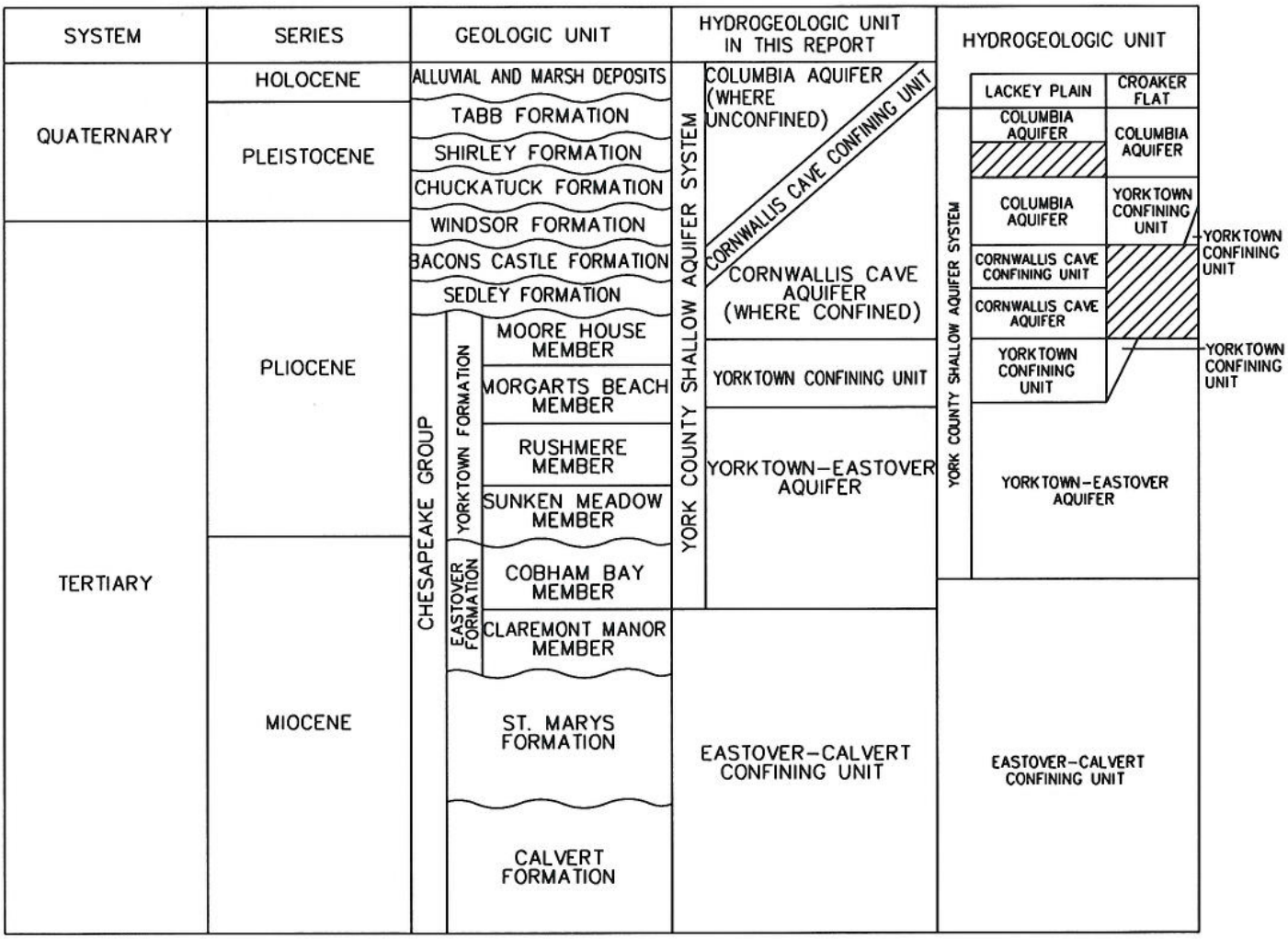


FIGURE 3-2
Site 4 and Youth Pond Stormwater Drainage Areas
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

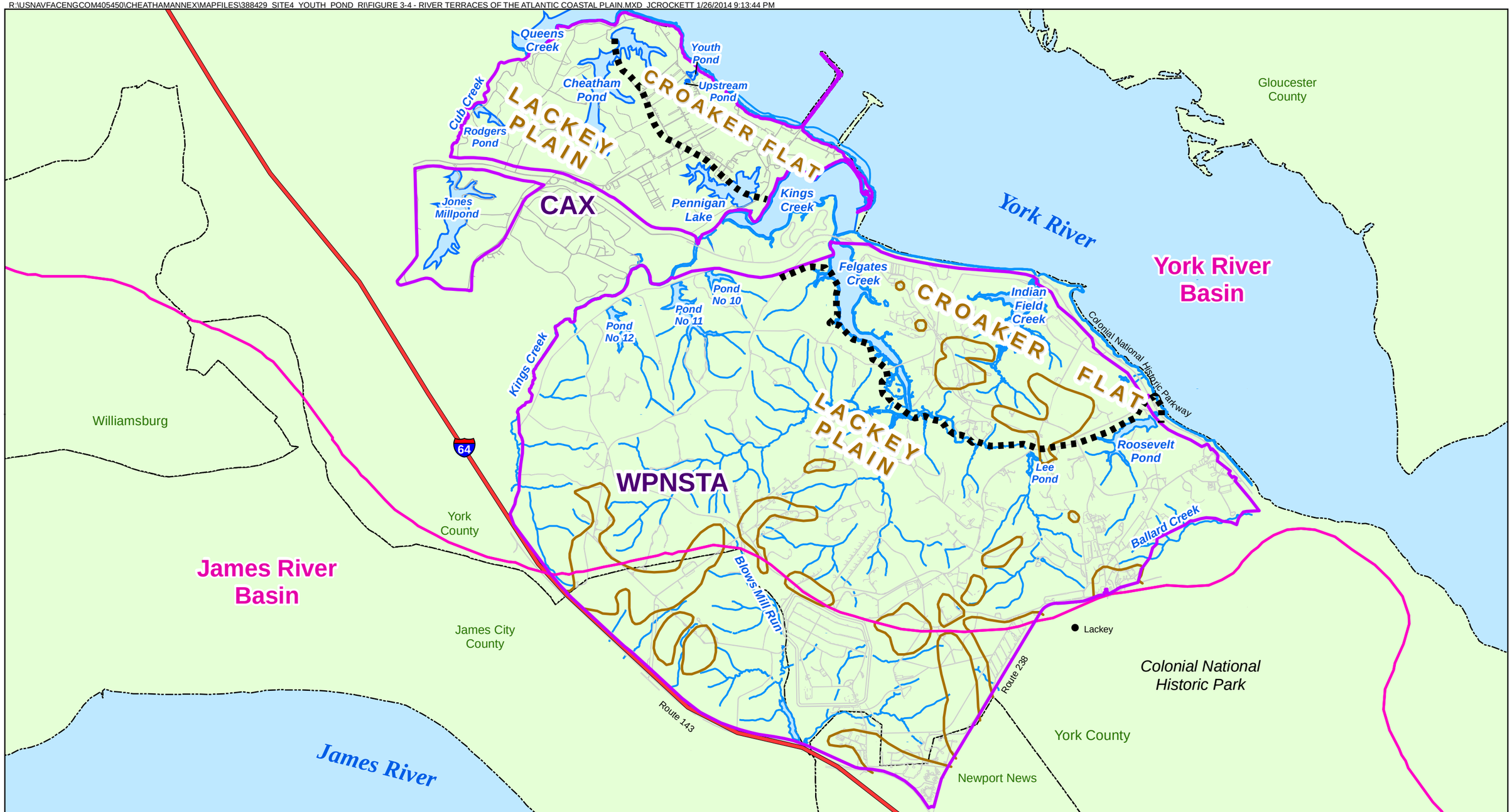
CH2MHILL.



Source: Brockman, ET AL 1997 GEOHYDROLOGY OF THE SHALLOW AQUIFER SYSTEM, NAVAL WEAPONS STATION YORKTOWN, YORKTOWN, VIRGINIA

Figure 3-3
Hydrogeologic Units in York County/Williamsburg
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 3-4 - RIVER TERRACES OF THE ATLANTIC COASTAL PLAIN.MXD JCROCKETT 1/26/2014 9:13:44 PM



Legend

- Activity Boundaries
- Camp Peary Scarp
- Watershed Boundaries
- Interstate 64
- Approximate Boundary of Columbia Aquifer, February 3, 1997
- Roads
- Shoreline and Water Bodies
- City / County Boundaries

N

0 4,000 8,000 Feet

Figure 3-4
River Terraces of the Atlantic Coastal Plain
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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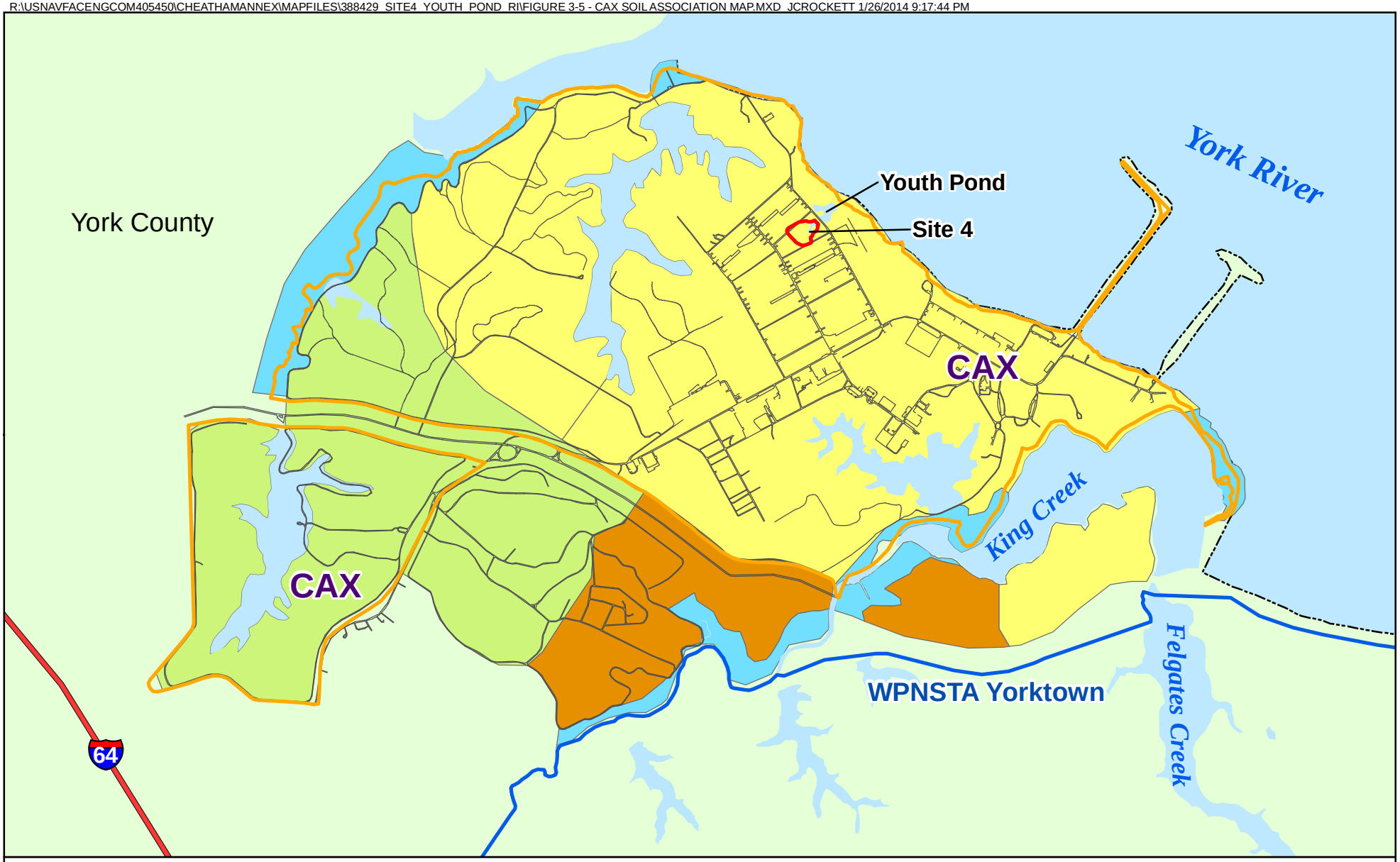
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 3-5 - CAX SOIL ASSOCIATION MAP.MXD JCROCKETT 1/26/2014 9:17:44 PM



Legend

Cheatham Annex Soil Associations

- Bohicket, Johnson, and Axis (1)
- Dogue, Pamunkey, and Uchee (2)
- Slagle, Emporia, and Craven-Uchee Complex (3)
- Emporia, Emporia Complex, Kempsville, and Craven-Uchee Complex (4)
- CAX Boundary
- WPNSTA Yorktown Boundary

N W E S

0 1,250 2,500 Feet

Figure 3-5
General Soil Association Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-16 - GW SAMPLES.MXD JMONTI 11/6/2014 10:03:51 AM

Legend

- Groundwater Sample
- Outfall
- Hydrogeologic Lines
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 100 Feet

Figure 3-6
Location of Hydrogeologic Crosss-Section Lines
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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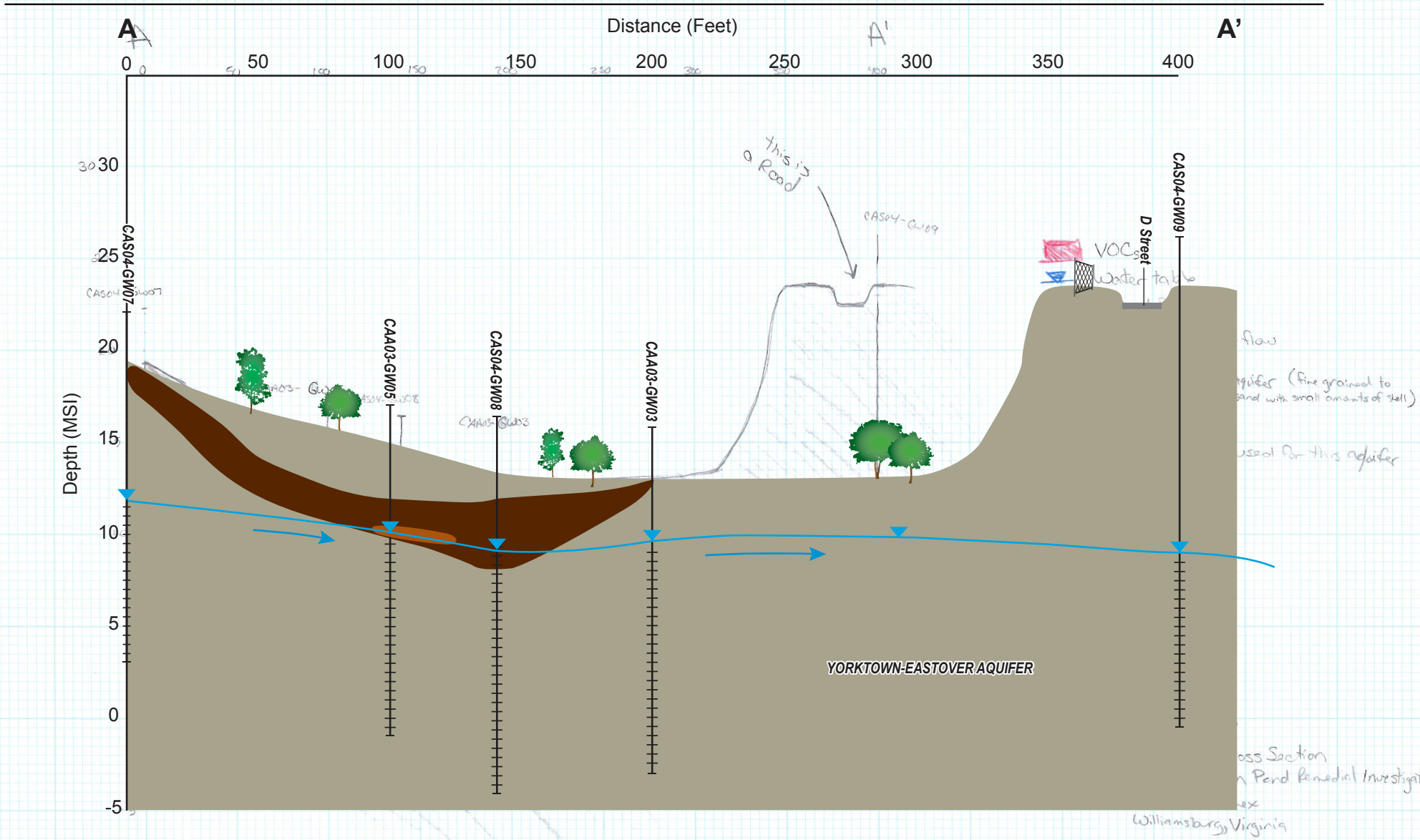

LEGEND

- VOCs
- Water Table
- Buried Debris
- General Groundwater Flow
- Yorktown-Eastover Aquifer (fine grained to medium grained sand with small amounts of clay and shell)

FIGURE 3-7
A-A' Cross Section
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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number and FileName.

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CH2MHILL.

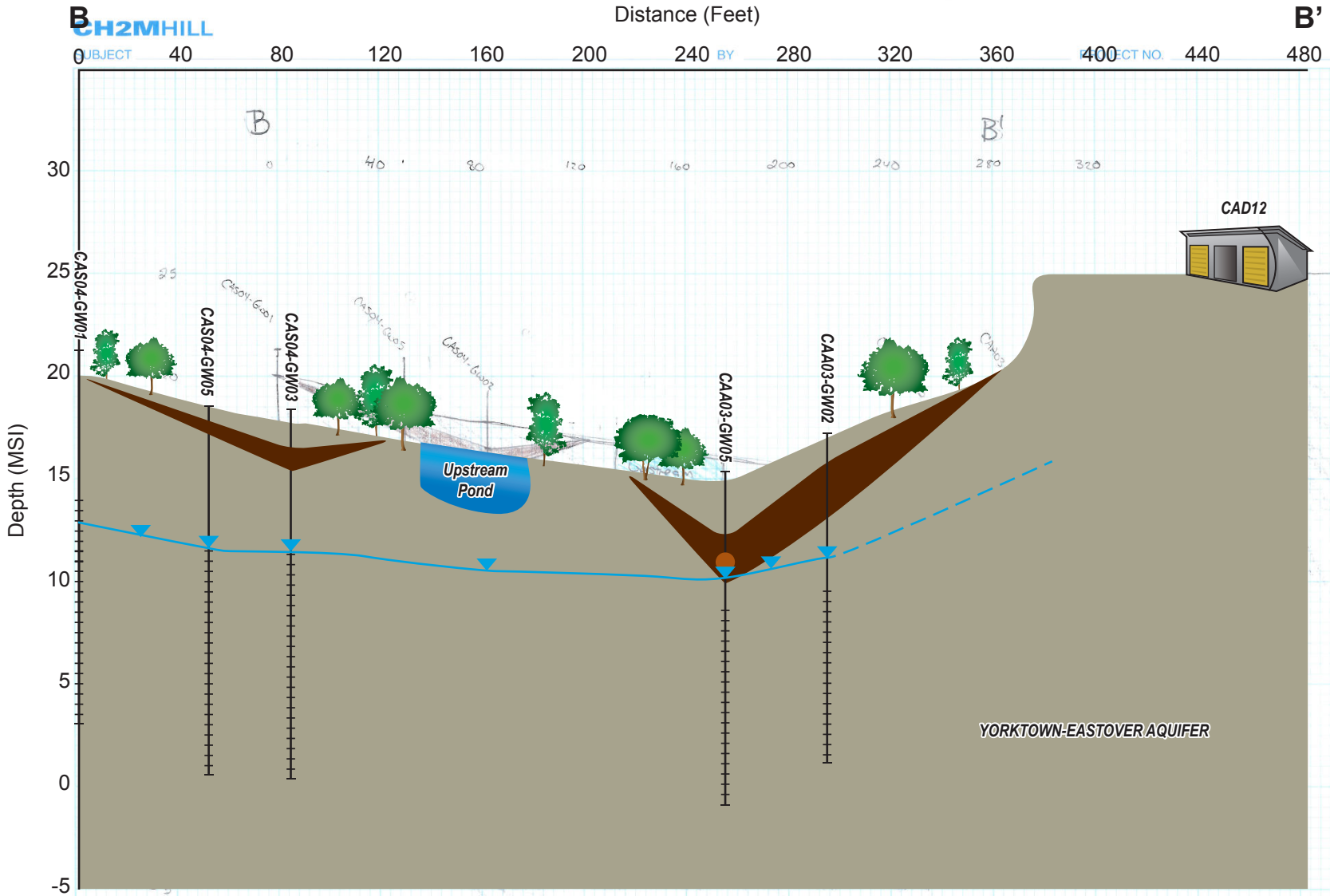
1/8" air from baseline to rule

X=Business Group,
LOC=Office Location

AA=Designer Initials
BB=Date example: 10.01.11

0.6" Bottom Margin

0.75” Top Margin



.7” Left Margin

LEGEND

- VOCs
- Water Table
- Buried Debris
- Yorktown-Eastover Aquifer (fine grained to medium grained sand with small amounts of clay and shell)

FIGURE 3-8
B-B’ Cross Section
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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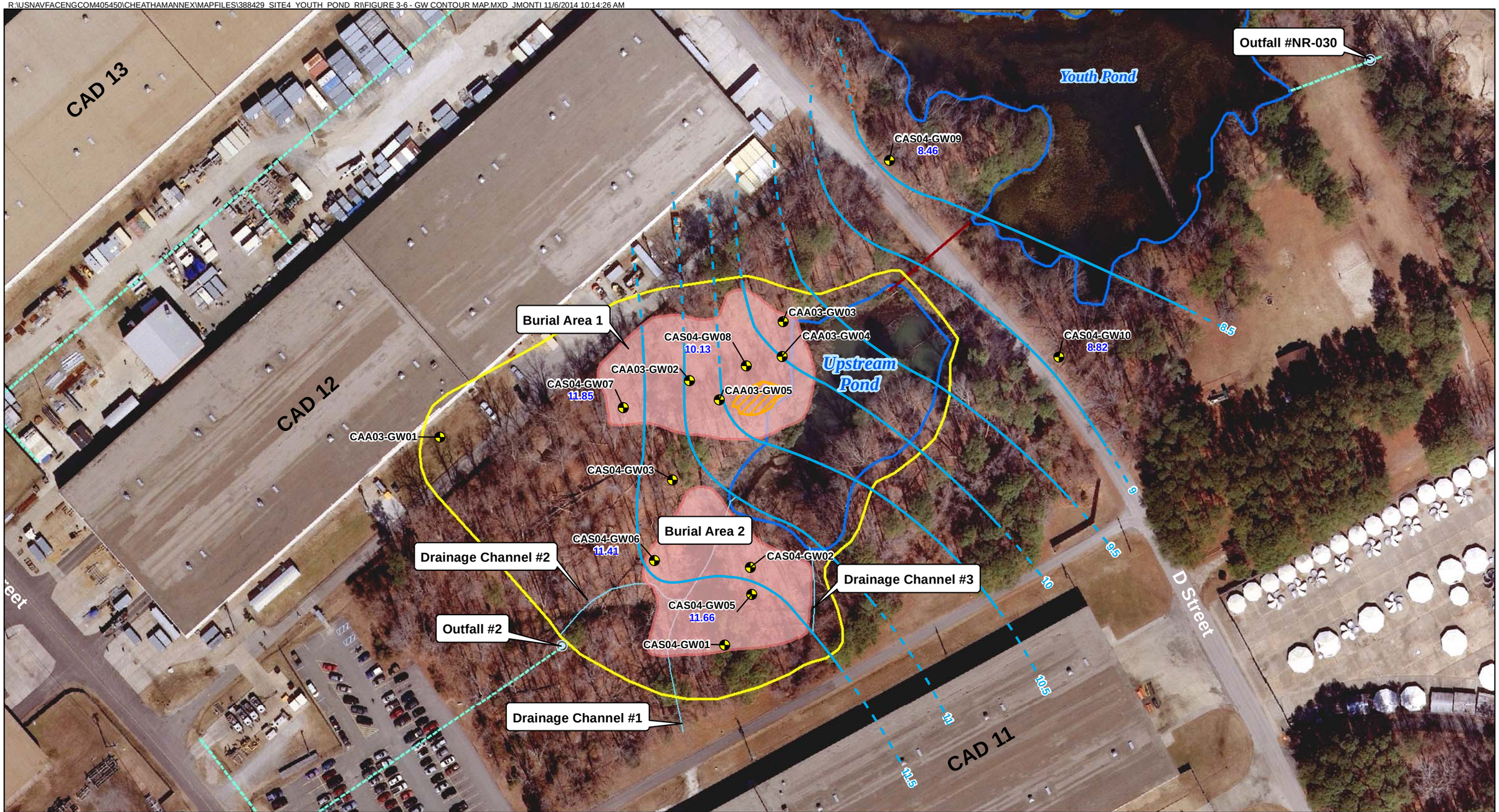
JETT TBD SectionB-B_Site4_YouthPond_rev04.pdf MeJ 11-8-14

X=Business Group, LOC=Office Location
AA=Designer Initials
BB=Date example: 10.01.11
0.6” Bottom Margin

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 3-6 - GW CONTOUR MAP.MXD JMONTI 11/6/2014 10:14:26 AM



Legend

- Groundwater Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Shallow Groundwater Contours (dashed where inferred)
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary
- 11.66 - Groundwater Elevation

N
W E
S

0 100 Feet

Figure 3-9
Shallow Groundwater Contour Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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SECTION 4

Nature and Extent of Contamination

This section presents an evaluation of the nature and extent of contamination within soil, sediment, surface water and groundwater at Site 4, and within sediment and surface water at Youth Pond, as well as soil in adjacent drainage features. Environmental samples were collected to characterize the vertical and horizontal extents of contamination in order to determine whether remedial action is warranted at Site 4 and Youth Pond.

Environmental sample results used in this evaluation were collected during the 1999 FI (Baker, 2001a), the 2001 Test Trench Evaluation (Baker 2002), the 2009 SI (CH2M HILL, 2011a), and this RI. In total, 42 test pit soil samples, six test hole soil samples, 38 surface soil samples, 24 shallow subsurface soil samples, four deep subsurface soil samples, 14 groundwater samples, 19 surface water samples, 46 surface sediment samples, 31 subsurface sediment samples, and 23 animal tissue samples were collected from Site 4 and Youth Pond and the results used for this evaluation (**Table 2-1**).

A fundamental understanding of the CSM (including the nature and extent of contamination) at Site 4 and Youth Pond can facilitate effective decision-making for mitigation of risks generated by site-related contamination. The nature and extent of contamination provide critical information to the evaluation of contaminant fate and transport, help identify the potential exposure pathways for risk, and aid in the evaluation and selection of remedial alternatives, if appropriate.

In the initial step of this evaluation, site-specific data were compared to conservative screening values outlined as follows (CH2M HILL, 2012a; 2012b):

- Soil – USEPA adjusted residential soil Regional Screening Levels (RSLs)[2] (USEPA, 2013), site-specific literature-based ecological screening values (ESVs) for plants and soil invertebrates (if soil is within the first 2 feet of the ground surface)
- Groundwater – USEPA adjusted tap water RSLs[2] (USEPA, 2013)and the federal maximum contaminant levels (MCLs)
- Sediment – USEPA adjusted residential soil RSLs[2] (USEPA, 2013)multiplied by 10 (to adjust the soil RSL to sediment), USEPA Region III BTAG freshwater sediment screening values, and site-specific, literature-based freshwater ESVs
- Surface Water – USEPA adjusted tap water RSLs[2] (USEPA, 2013)multiplied by 10 (to account for direct human health exposure to surface water as a result of fishing), USEPA Region III BTAG freshwater screening values, and site-specific, literature-based freshwater ESVs

If exceedances of the soil or groundwater criteria were identified, these data were compared to the soil or groundwater background 95 percent upper tolerance limits (UTLs) as an initial screening to determine if the detected concentrations were consistent with the base background concentrations. If exceedances of the surface water and sediment criteria were identified, these data were compared to the surface water and sediment 95 percent UTLs based on reference pond sampling results (calculated as part of this investigation in the same manner as the base background soil and groundwater 95 percent UTLs) as an initial screening to determine if the detected concentrations were consistent with conditions in the selected reference pond.

If the data exceeded the background 95 percent UTLs, additional evaluation was conducted to consider whether the results are consistent with background conditions or if the concentrations are likely attributable to a site-related release. However, independent of any comparison of data to background conditions, <u>all</u> data were

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

included in evaluations of whether or not any results pose potential risks to human health or ecological receptors (presented in **Sections 5** and **6**).

Laboratory analytical results used in this evaluation for Site 4 and Youth Pond are summarized by medium and analyte class in **Tables 4-1** through **4-3** and **Tables 4-5** through **4-9**. Laboratory analytical reports are included in **Appendix I**.

4.1 Reference Sample Evaluation

Surface water, surface sediment (0 to 4 inches), and subsurface sediment (4 to 8 inches) samples were collected from portions of Cheatham Pond in October 2012 to develop a reference data set for use in the RI. The reference data were used to provide background comparison concentrations for naturally occurring and widely occurring anthropogenic constituents from a multitude of non-CERCLA-regulated sources and to provide comparative data for biological surveys and toxicity testing.

Based on a reconnaissance survey conducted in Cheatham Pond, five locations were selected to match habitat conditions at Site 4 (Upstream Pond) and three locations were selected to match habitat conditions at Youth Pond. In addition, five locations were also selected to match habitat conditions at Penniman Lake since field activities for Penniman Lake were conducted at the same time as those for Site 4 and Youth Pond.

Based on a review of the preliminary (unvalidated) data, the CAX Partnering Team discussed the results of the Cheatham Pond samples on October 25, 2012, and agreed not to use the results for the three reference sample locations that matched Youth Pond habitat conditions due to elevated concentrations of PCBs and metals in sediment. Thus, the five samples collected from the habitats matching Site 4 were combined with the five samples collected from the habitats matching Penniman Lake to develop surface water and sediment background 95 percent UTLs.

The methodology used to develop background 95 percent UTLs for surface water and sediment followed the same methodology used to derive the base background 95 percent UTLs for soil and groundwater (CH2M HILL, 2011b). Further discussion of the surface water and sediment 95 percent UTLs is included in **Section 6**.

4.2 Site 4

Environmental samples used in the evaluation of Site 4 were collected during the FI, the Test Trench Evaluation, the SI, and this RI. In total, results from 42 test pit soil samples, six test hole soil samples, 31 surface soil samples, 24 shallow subsurface soil samples, four deep subsurface soil samples, 14 groundwater samples, 31 surface sediment samples, 17 subsurface sediment samples, 13 surface water samples and 13 animal tissue samples (**Table 2-1**) were included in the evaluation as follows.

4.2.1 Surface and Buried Debris

Surface and buried debris within the Site 4 study area is the only known potential source of CERCLA-regulated contamination at Site 4. In total, 42 test pits and six test holes (**Figure 4-1**) were excavated during the Test Trench Evaluation, the SI, and this RI to delineate the horizontal and vertical extent of buried debris within two burial areas within the Site 4 study area.

At Burial Area 1, buried debris, including asphalt, bricks, concrete, metal, construction and wood debris, automotive parts, tarpaper, shingles, and a 55-gallon drum, was encountered between the ground surface and depths greater than 8 feet bgs. Additional buried debris could exist at depths greater than 8 feet bgs; however, due to the depth of groundwater encountered in test pits located closest to Upstream Pond, the vertical depth limits of debris at Burial Area 1 could not be confirmed. At Burial Area 2, buried debris, including medical supplies, metal, and construction/fill debris, was encountered between the ground surface and 7.5 feet bgs. Medical supplies have also been seen along the banks of the drainage channel upgradient of Upstream Pond.

With the exception of the vertical depth of debris next to Upstream Pond, the results of the test-pitting activities indicate that the extent of buried debris at Site 4 has been delineated and in some areas is in direct contact with either the groundwater or surface water/sediment within Upstream Pond (**Figure 4-1**). Debris is not expected to

be encountered at depths much greater than 8 feet bgs next to Upstream Pond, because it is unlikely debris was buried significantly below the water table. Due to the generally sandy nature of the soil in the site area, excavations below the water table would likely cave in and remain shallow. Therefore, no further test pitting is warranted.

4.2.2 Soil

A total of 31 surface soil samples (**Table 4-1**), 24 shallow subsurface soil samples (**Table 4-2**), and four deep subsurface soil samples (**Table 4-2**) were collected from three sub-areas of Site 4 during the FI, the SI, and this RI and the results evaluated to determine the nature and extent of site-related contamination (**Figure 4-2**):

- Site 4, East – outside of the two burial areas, east of Upstream Pond, where no buried debris has been found and where no known or suspected historical activities occurred that would have resulted in a CERCLA release
- Site 4, South – within the vicinity of Burial Area 2, south of Upstream Pond, where buried debris was encountered during historical field activities
- Site 4, Northwest – within the vicinity of Burial Area 1, northwest of Upstream Pond, where buried debris was encountered during historical field activities

During the FI and the SI, soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, total metals, and cyanide. Based on the results of the FI and SI, soil samples collected during this RI were analyzed only for those constituent groups determined to be potentially site-related based on earlier results (PAHs, PCBs, and total metals).

4.2.2.1. Site 4, East

Two surface soil (CAS04-SS06 and CAS04-SS07) and two subsurface soil (CAS04-SB06 and CAS04-SB07) samples were collected to characterize the nature and extent of potential contamination (PAHs, PCBs, and metals) within the eastern portion of Site 4 and to assess the potential risk associated with this medium.

Organic Constituents.

Only one PAH, benzo(a)pyrene, was detected in surface and subsurface soil within the eastern portion of Site 4 at a concentration exceeding the residential adjusted RSL (**Figure 4-3**); the benzo(a)pyrene concentration, however, did not exceed the ESV. The benzo(a)pyrene exceedance of the residential RSL (15 micrograms per kilogram [µg/kg]) was detected in surface soil sample CAS04-SS06 at an estimated concentration of 20 µg/kg. While PAHs have been detected in other areas of Site 4, because this sub-area does not contain any known buried debris and was not the location of any known historical activities that would result in a CERCLA-regulated release, it is possible that this benzo(a)pyrene detection is attributable to widespread anthropogenic conditions unrelated to site activities. This sub-area is also physically isolated from Burial Areas 1 and 2 by topography, and it is not likely that soil contamination was transported to this sub-area from the Burial Areas. PAHs are ubiquitous in urban environments, as they occur naturally in coal and petroleum products and are formed by the incomplete combustion of organic matter, including wood and fossil fuels (Mahler et al., 2012). PAH sources in urban environments include atmospheric emissions from industrial facilities such as power plants, automobile exhaust, tire particles, and asphalt.

No PCBs or other potential site-related organic constituents were detected in surface or subsurface soil samples within the eastern portion of Site 4 above their respective screening criteria.

Total Metals. Seven metals in surface soil and six metals in subsurface soil (**Figure 4-3**) were detected within the eastern portion of Site 4 at concentrations exceeding their respective adjusted residential RSL and/or ESV.

- In surface soil, aluminum, arsenic, chromium, iron, selenium, and vanadium concentrations exceeded the residential adjusted RSL or ESV in at least one sample. In addition, these detected concentrations above the RSL or ESV also exceeded their respective base background 95 percent UTL.
  - The maximum detected concentrations of aluminum (19,600 milligrams per kilogram [mg/kg]), arsenic (7.2 mg/kg), iron (20,300 mg/kg), and selenium (0.59 J mg/kg) in surface soil only slightly exceeded their

respective base background 95 percent UTLs (12,200 mg/kg, 6.36 mg/kg, 19,900 mg/kg, and 0.51 mg/kg, respectively). The detected aluminum, arsenic, iron and selenium concentrations are likely attributable to background conditions.

  - Cobalt was also detected in surface soil above the residential adjusted RSL (2.3 mg/kg), but not the ESV; however, the maximum cobalt concentration (2.7 mg/kg) was well below the base background 95 percent UTL (9.93 mg/kg) and is likely attributable to background conditions.

- In subsurface soil, aluminum, arsenic, chromium, and vanadium concentrations exceeded the residential adjusted RSL or ESV in at least one sample. In addition, these detected concentrations also exceeded their respective base background 95 percent UTL.
  - While arsenic concentrations in subsurface soil were detected above the adjusted residential RSL (0.61 mg/kg) (but not the ESV), the maximum arsenic concentration (8.9 mg/kg) only slightly exceeded the base background 95 percent UTL (5.54 mg/kg) and is likely attributable to background conditions.
  - Cobalt and iron were also detected in subsurface soil above either their respective residential adjusted RSL or ESV value; however, the maximum cobalt and iron concentrations (4 mg/kg and 28,900 mg/kg) did not exceed their respective base background 95 percent UTL (5.18 mg/kg and 32,000 mg/kg) and are likely attributable to background conditions.

4.2.2.2. Site 4, South

Nine surface soil (CAS004-4HA01-01 through CAS004-4HA05-01 and CAS04-SS01 through CAS04-SS04) and eight subsurface soil (CAS004-4HA02-02 through CAS004-4HA05-02 and CAS04-SB01 through CAS04-SB04) samples were collected to characterize the nature and extent of contamination within the vicinity of Burial Area 2 (Site 4, South) and to assess potential risk associated with this medium. These soil samples were classified as soil (as opposed to sediment) due to the lack of standing water above the sample location at the time they were collected. Sediment samples were also collected in the vicinity of several of these samples within Drainage Channels #1, #2, and #3 (see Section 4.2.4.1) where standing water was present at time of sampling. However, some areas, particularly near the confluence of Drainage Channels #1 and #2, while typically dry, are likely to be submerged during heavy rain events.

In addition, one surface soil (CAS04-SS14) and one subsurface soil (CAS04-SB16) sample were collected in this area and analyzed only for total and hexavalent chromium to determine the valency of chromium in site soil (to assist in completing the HHRA).

Organic Constituents. Five SVOCs (primarily PAHs), six pesticides, and two PCBs in surface soil (**Figure 4-4**) and four SVOCs (primarily PAHs), four pesticides, and two PCBs in subsurface soil (**Figure 4-5**) were detected within the southern portion of Site 4 at concentrations exceeding their respective adjusted residential RSL and/or ESV.

- In surface soil, the highest SVOC and PCB concentrations were detected in the immediate vicinity of Drainage Channel #1, near the confluence of Drainage Channel #1 and Drainage Channel #2, upgradient of Upstream Pond (**Figure 4-6** and **Figure 4-7**). The confluence of the two drainage channels is a floodplain area that, while typically dry, is likely to be under water during heavy rain events. While the drainage channels flow through Burial Area 2, they direct stormwater from the paved area north of CAD Building 11 (Drainage Channel #1) and from Outfalls #35 and #2 (Drainage Channel #2) onto Site 4. Therefore, the elevated concentrations could be attributable to non-CERCLA-related contaminant sources unrelated to Site 4 as well as buried debris within the Site 4 boundary. With respect to PCBs, which were only detected within the drainage channels, there appears to be a strong likelihood of an offsite source of contamination. The evidence suggests that the PCBs may have been transported to and deposited within site drainage channel floodplain areas via stormwater runoff from the upstream developed and industrialized areas to the west and southwest, such as through Outfalls #35 and #2.

- Similarly, in subsurface soil, the highest SVOC and PCB concentrations were detected in the immediate vicinity of Drainage Channel #1, near the confluence of Drainage Channel #1 and Drainage Channel #2, upgradient of

Upstream Pond (**Figure 4-8** and **Figure 4-9**). However, the detected concentrations are significantly lower than those concentrations detected in surface soil.

- Pesticides were also detected in surface and subsurface soil near the confluence of Drainage Channe #1 and Drainage Channel #2, upgradient of Upstream Pond. Pesticides were not known to be disposed of at Site 4; therefore, the low detected concentrations are likely attributable to contaminant transport via stormwater from normal pesticide use at DoD facilities to control pests and weeds, and not from the disposal of pesticides. The legal application of pesticides is not a CERCLA-regulated release.

Total Metals. Twelve total metals in surface soil (**Figure 4-4**) and 11 total metals in subsurface soil (**Figure 4-5**) were detected within the southern portion of Site 4 at concentrations exceeding their respective adjusted residential RSL and/or ESV.

- In surface soil, aluminum, arsenic, chromium, copper, iron, lead, mercury, selenium, vanadium, and zinc concentrations exceeded the residential adjusted RSL or ESV in at least one sample. These detected concentrations also exceeded their respective base background 95 percent UTL in at least one sample location.
  - While arsenic concentrations in surface soil were detected above the adjusted residential RSL (0.61 mg/kg) (but not the ESV) in one out of nine samples, the maximum arsenic concentration (6.4 mg/kg) only slightly exceeds the base background 95 percent UTL (6.36 mg/kg) and, therefore, is likely attributable to background conditions.
  - Aluminum, copper, iron, lead, selenium, and vanadium concentrations exceeding the 95 percent UTLs were only detected in one out of the nine surface soil samples. Chromium and zinc concentrations exceeding the 95 percent UTLs were only detected in two out of nine surface soil samples. Mercury concentrations exceeding the 95 percent UTLs were only detected in three out of nine surface soil samples.
  - Cobalt and manganese were also detected at concentrations above their respective residential adjusted RSL or ESV in several surface soil samples at maximum concentrations of 4.6J mg/kg and 233 mg/kg, respectively. However, these concentrations do not exceed their respective base background 95 percent UTL (9.93 mg/kg and 324 mg/kg) and, therefore, are likely attributable to background conditions.
- In subsurface soil, aluminum, arsenic, chromium, mercury, selenium, thallium, vanadium, and zinc concentrations exceeded the residential adjusted RSL or ESV in at least one sample. In addition, these detected concentrations also exceeded their respective base background 95 percent UTL in at least one sample location.
  - While arsenic concentrations in subsurface soil were detected above the adjusted residential RSL (0.61 mg/kg) (but not the ESV) in one out of nine samples, the maximum arsenic concentration (6.9 mg/kg) only slightly exceeds the base background 95 percent UTL (5.54 mg/kg) and, therefore, is likely attributable to background conditions.
  - Chromium, selenium, and thallium concentrations exceeding the 95 percent UTLs were only detected in one out of the nine subsurface soil samples. Aluminum, vanadium and zinc concentrations exceeding the 95 percent UTLs were only detected in two out of nine subsurface soil samples. Mercury concentrations exceeding the 95 percent UTLs were only detected in three out of nine subsurface soil samples.
  - Cobalt and iron were also detected at concentrations above their respective residential adjusted RSL or ESV at maximum concentrations of 4.3J mg/kg and 31,600 mg/kg, respectively. However, these concentrations do not exceed their respective base background 95 percent UTL (5.18 mg/kg and 32,000 mg/kg) and, therefore, are likely attributable to background conditions.

4.2.2.3. Site 4, Northwest

Eighteen surface soil (CAA03-SS01 through CAA03-SS10, CAS004-4HA06-00, CAS04-SS05, CAS04-SS08 through CAS04-SS13), 12 shallow subsurface soil (CAA03-SB01, CAA03-SB02[a] through CAA03-SB05[b], CAA03-SB06

through CAA03-SB10, CAS004-4HA06-02, and CAS04-SB05), and four deep subsurface soil (CAA03-SB02[b] through CAA03-SB05[b]) samples were collected to characterize the nature and extent of contamination within the vicinity of Burial Area 1 (Site 4, Northwest) and to assess potential risk associated with this medium. In addition, one surface soil sample (CAS04-SS15) and one subsurface soil sample (CAS04-SB15) were collected in this area and analyzed only for total and hexavalent chromium to determine the valency of chromium in soil to assist in completing the HHRA.

Organic Constituents. Twelve SVOCs (primarily PAHs) and six pesticides in surface soil (**Figure 4-10**) and six SVOCs (primarily PAHs) and three pesticides in subsurface soil (**Figure 4-11**) were detected within the northwestern portion of Site 4 at concentrations exceeding their respective adjusted residential RSL and/or ESV. No PCBs were detected above the screening criteria in the northwestern portion of Site 4 in the vicinity of Burial Area 1.

- In surface soil, the highest concentrations of SVOCs/PAHs exceeding their respective screening criteria were found approximately 100 feet upgradient and entirely outside of Burial Area 1 (CAA03-SS06), in grassy areas immediately adjacent to the south side of CAD Building 12 (**Figure 4-12**). There is no known historic disposal or operational activities at this location that would have resulted in a CERCLA-regulated release. In addition, this sample was collected from a drainage swale that receives stormwater runoff from the adjacent road and parking areas, as well as stormwater drainage from the CAD Building 12 rooftop (**Attachment 1**), which suggests that the SVOCs/PAHs detected in this sample are likely the result of non-CERCLA-regulated impacts. In the co-located subsurface soil sample (**Figures 4-13**), these SVOC concentrations are significantly reduced (if detected at all).
- In surface soil, the highest pesticide concentrations exceeding their respective screening criteria are also located in the immediate vicinity of CAD Building 12 (CAA03-SS06), approximately 100 feet upgradient of Burial Area 1. In the co-located subsurface soil sample, the detected pesticide concentrations do not exceed any screening criteria. The nature and location of these soil sample results, as well as the likelihood that pesticides were not disposed at Site 4, suggests that the elevated concentrations in the surface soil at this location are likely the result of normal pesticide use at DoD facilities to control pests and weeds in the vicinity of CAD Building 12.
- Although not the highest SVOC concentrations detected in surface and subsurface soil, several SVOCs (primarily PAHs) were detected at concentrations exceeding their respective residential adjusted RSL throughout Burial Area 1 (**Figures 4-12** and **Figure 4-13**). The highest PAH concentrations within Burial Area 1 were detected within the surface debris pile in surface soil sample CAS004-4HA06. However, with the exception of the results from sample CAS004-4HA06, the detected PAH concentrations in the remaining surface soil samples within Burial Area 1 are consistent with the detected concentrations of PAHs in samples collected within the wooded area outside of Burial Area 1 to the southwest. Similar to the SVOC concentrations detected outside Burial Area 1, in the co-located shallow subsurface soil sample, the SVOC concentrations are reduced.
- Deep subsurface soil samples were collected from 15 feet bgs and below the water table (which is located approximately 5 feet bgs), and contained SVOCs that were detected in their co-located surface soil and shallow subsurface soil samples (**Figure 4-11**). However, saturated soil samples collected below the water table are more reflective of groundwater conditions.

Total Metals. Fourteen total metals in surface soil (**Figure 4-14**) and eight total metals in subsurface soil (**Figure 4-15**) were detected within the northwestern portion of Site 4 at concentrations exceeding their respective adjusted residential RSL and/or ESV.

- In surface soil, aluminum, arsenic, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc concentrations exceeded the residential adjusted RSLs or ESVs in at least one sample. In addition, these constituent concentrations also exceeded the base background 95 percent UTLs in at least one sample.

  - Cobalt, copper, lead, manganese, mercury, selenium, and vanadium concentrations exceeded the 95 percent UTLs in only 1 out of 17 surface soil samples.
  - Chromium was the most detected inorganic constituent, found at concentrations above the residential adjusted RSL and/or ESV and the base background 95 percent UTL (six out of 17 detections above the UTL), followed by iron and zinc (three out of 17 detections above the UTL), and aluminum and arsenic (two out of 17 detections above the UTL). The highest concentrations of these metals were detected in the immediate vicinity of the surface debris pile located within Burial Area 1.
- In shallow subsurface soil, aluminum, arsenic, chromium, manganese, vanadium, and zinc concentrations exceeded the residential adjusted RSLs or ESVs in at least one sample. In addition, these detected concentrations also exceeded their respective base background 95 percent UTL in at least one sample location.
  - Manganese and zinc concentrations exceeding the UTLs were only detected in one out of the 12 subsurface soil samples. Chromium concentrations exceeding the UTL were only detected in 2 out of 12 subsurface soil samples. Arsenic and vanadium concentrations exceeding the UTL were only detected in three out of nine subsurface soil samples. Aluminum was detected the most at concentrations above the UTL (four out of 12 subsurface soil samples). Metals concentrations above the UTL were detected in subsurface soil samples inside and outside of Burial Area 1.
  - Iron was also detected at concentrations exceeding the residential adjusted RSL or ESV in several surface soil samples, at a maximum concentration of 31,300 mg/kg. However, this concentration does not exceed the base background 95 percent UTL (32,000 mg/kg) and, therefore, is likely attributable to background conditions.
- In deep subsurface soil, collected from generally 15 feet bgs and below the water table (which is located approximately 5 feet bgs), aluminum, arsenic, chromium, cobalt, manganese, and vanadium concentrations exceeded the residential adjusted RSLs or ESVs in at least one sample. These metals only exceeded the base background 95 percent UTLs in one out the three deep subsurface soil samples, CAA03-SB02, within Burial Area 1.

4.2.3 Groundwater

A total of 15 groundwater samples (CAA03-GW01 through CAA03-GW05 and CAS04-GW01, CAS04-GW02, CAS04-GW03, and CAS04-GW05 through CAS04-GW010) were collected from Site 4 (**Table 4-3**) during the SI and the RI to characterize the nature and extent of contamination and to assess the potential risk associated with this medium (**Figure 4-16**). Groundwater samples collected during the SI were collected from temporary monitoring wells and were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, and total/dissolved metals. Following the collection of these groundwater samples, the temporary monitoring wells were abandoned. Groundwater samples collected during the RI were collected from permanent monitoring wells and analyzed for potentially site-related contaminants based on earlier results (VOCs, SVOCs [PAHs only], and total/dissolved metals) and monitored natural attenuation parameters (alkalinity, nitrate, nitrite, sulfate, sulfide, ethane, ethene, and methane).

A summary of the results of the natural attenuation parameters and a discussion of the nature and extent of contamination are presented as follows. A discussion of the significance of each natural attenuation parameter and more details regarding aquifer geochemical conditions within groundwater are presented in **Section 7.**

4.2.3.1. General Groundwater Geochemistry

Measurements of DO, ORP, pH, temperature, conductivity, and turbidity were collected at each monitoring well following purging and immediately prior to sampling (**Table 4-4**). The DO readings collected during purging activities, which provide an indication of the potential for aerobic or anaerobic biodegradation, ranged between 0.20 milligram per liter (mg/L) and 2.91 mg/L, and were slightly higher during the 2009 SI groundwater sampling activities. Temperature readings ranged between 15.28 degrees Celsius (°C) and 19.48°C, and were generally higher during the 2009 SI groundwater sample collection. The ORP values, which indicate the potential for redox

conditions in groundwater, ranged between -266.7 millivolts (mV) and 231 mV, and pH values were generally neutral, ranging between 6.73 and 7.45. Conductivity values, which provide an indication of the concentration of total dissolved solids within groundwater, ranged between 0.400 milliSiemen per centimeter (mS/cm) and 17.650 mS/cm, which are indicative of freshwater conditions. Further details regarding groundwater geochemistry and its applicability to contaminant fate and transport are discussed in **Section 7.2**.

4.2.3.2. Organic Constituents

Six VOCs, 11 SVOCs, and one pesticide were detected at concentrations exceeding either the adjusted Tap Water RSLs or federal MCLs (**Figure 4-17**). No other organic constituents were detected at concentrations exceeding their respective adjusted Tap Water RSL or federal MCL.

- While VOCs were not detected in soil samples collected throughout Site 4, several VOCs were detected in three groundwater samples collected in 2009 (CAA03-GW03, CAA03-GW05, CAS04-GW03) above the adjusted tap water RSLs and/or MCLs. Different VOCs were detected at each location. The greatest number of VOCs (benzene, ethylbenzene, and xylenes) and the highest relative VOC concentrations were found immediately downgradient of the location where a perforated 55-gallon drum was encountered during test-pitting activities in 2009 (CAA03-TP24; PID readings of 1.7 were recorded during test pit excavation) (CH2M HILL, 2011a). Therefore, the elevated VOC concentrations could be attributable to a release from the 55-gallon drum uncovered during test-pitting activities or represent an impact from other debris in the vicinity. Overall, the VOC detections were sporadic, and there is no discernible VOC plume. Each VOC was only detected in one monitoring well. None of these VOCs were detected in the surface water or sediment samples collected from Upstream Pond.
- SVOCs were detected in groundwater at concentrations exceeding their respective screening criteria only beneath Burial Area 1. In general, the SVOCs detected in groundwater were the same SVOCs detected in surface and subsurface soil in this area; therefore, the detected SVOC concentrations may be attributable from SVOCs leaching from soil into the groundwater. The highest concentration of naphthalene detected in groundwater (560 micrograms per liter [µg/L]) was found in the sample collected immediately downgradient of the 55-gallon drum location previously cited, in which petroleum-related VOCs were also detected.
- The one pesticide detected above the adjusted tap water RSL (no MCL has been established), dieldrin, was detected in one groundwater sample (CAA03-GW04) during the 2009 groundwater sampling event. The detection appears to be an isolated detection due to the absence of dieldrin in the upgradient and downgradient groundwater samples, and the absence of dieldrin in the Upstream Pond surface water and sediment adjacent to where CAA03-GW04 was collected.

4.2.3.3. Metals

Twelve total metals and five dissolved metals were detected at concentrations exceeding either the adjusted Tap Water RSL or federal MCL (**Figure 4-18**).

- While total aluminum, antimony, barium, lead, mercury, thallium, and vanadium were detected at concentrations exceeding either the adjusted RSL or MCL, these detected concentrations likely represent elevated suspended solids within the sample since these metals were not detected at concentrations exceeding the screening criteria within the corresponding dissolved metals sample.
- Total chromium concentrations exceeded the adjusted tap water RSL (0.031 µg/L) in all groundwater samples, with a maximum concentration of 44.5 µg/L (CAA03-GW03); however, this detection does not exceed the MCL (100 µg/L) and dissolved chromium concentrations do not exceed either the MCL or the base background 95 percent UTL (6.04 µg/L). Therefore, the total chromium concentrations likely represent elevated suspended solids within the groundwater sample.
- While total cobalt concentrations exceeded the adjusted tap water RSL (0.47 µg/L) in several groundwater samples, with a maximum concentration of 5.1 µg/L (CAA03-GW03), this concentration does not exceed the base background 95 percent UTL (20.6 µg/L). Dissolved cobalt concentrations exceeded the adjusted tap water RSL in several groundwater samples, with a maximum concentration of 1.1J µg/L (CAA3-GW01). While

there is no base background 95 percent UTL for dissolved cobalt these concentrations are likely attributable to background since the total cobalt concentrations did not exceed the base background 95 percent UTL.

- Maximum total arsenic, iron, and manganese concentrations (53.8 µg/L, 39,000 µg/L, and 642 µg/L, respectively) exceeded their respective adjusted tap water RSLs (0.045 µg/L, 1,100 µg/L, and 32 µg/L) and respective base background 95 percent UTLs (2.28 µg/L, 894 µg/L, and 57.9 µg/L) in several groundwater samples. In addition, these metals were also detected above their respective adjusted tap water RSLs and base background 95 percent UTLs (1.37 µg/L, 275 µg/L, and 49.5 µg/L) in the dissolved fraction. Arsenic, iron, and manganese groundwater concentrations are typically elevated in the shallow coastal plain of southeast Virginia due to the aquifer composition and geochemical conditions; however, elevated arsenic, iron and manganese concentrations were also detected in soil samples collected within Burial Area 1 at concentrations above the base background 95 percent UTLs.

4.2.4 Sediment

A total of 31 surface sediment (**Table 4-5**) and 17 subsurface sediment samples (**Table 4-6**) were collected from two areas of Site 4 during the FI, the SI, and the RI to determine the nature and extent of contamination (**Figure 4-19**). During the FI and SI, sediment samples were analyzed for VOCs, SVOCs, PAHs, pesticides, PCBs, total metals, and cyanide. In addition, during the SI, sediment samples were also analyzed for TOC, pH, and grain size. During the RI, all sediment samples were analyzed for those constituent groups determined to be potentially site-related (SVOCs [PAHs only], PCBs, and total metals), pH, TOC, AVS/SEM, and grain size. In addition, toxicity testing and ammonia and sulfide analyses were conducted on six RI sediment samples in support of the BERA (**Section 6**).

4.2.4.1. Site 4, Drainage Channels

Eight surface sediment (CAS04-SD05[a] through CAS04-SD09[a] and CAS04-SD15 through CAS04-SD17) and five subsurface sediment (CAS04-SD05[b] through CAS04-SD09[b]) samples were collected to characterize the nature and extent of contamination within the drainage channels southwest of Upstream Pond and to assess the potential human health and ecological risks associated with this medium. There are three drainage channels southwest of Upstream Pond (Drainage Channels #1, #2, and #3), each of which receives stormwater during precipitation events, a significant portion of which originates outside of Site 4 from paved surfaces in developed and industrialized areas to the west and south. Drainage Channel #1 originates near the paved road north of CAD Building 11 before entering Site 4 and Burial Area 2. Drainage Channel #2 originates just west of Site 4 near Outfall #2, which discharges stormwater captured from a large industrial area west of Site 4, including the discharge of Outfall #35. Drainage Channels #1 and #2 converge within Burial Area #2 inside Site 4 before terminating at Upstream Pond. Drainage Channel #3 also originates near the paved road north of CAD Building 11 (east of Drainage Channel #1) before entering Site 4 and skirting the eastern edge of Burial Area #2 as it continues to Upstream Pond.

These samples were classified as sediment (as opposed to soil) due to the presence of standing water above the sample collection point at the time they were collected. As discussed in Section 4.2.2.2, several soil samples were also collected within these same drainage channels at locations that are typically dry, but are likely submerged during heavy storm events. The drainage channels include floodplain areas that may contain more or less water depending on the amount of rainfall and stormwater runoff from the paved areas north of CAD Building 11 (Drainage Channel #1) and from Outfall #35 (Drainage Channel #2).

Organic Constituents. Eleven SVOCs (primarily PAHs), five pesticides, and two PCBs were detected in surface sediment (**Figure 4-20**), and five SVOCs (primarily PAHs), five pesticides, and two PCBs were detected in subsurface sediment (**Figure 4-21**) collected within the drainage channels southwest of Upstream Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

- In surface and subsurface sediment, the pesticide 4,4-dichlorodiphenyldichloroethylene (DDE) was detected in samples at concentrations above the BTAG Region III screening value/ESV (3.16 µg/kg), at maximum concentrations of 13J µg/kg and 5 µg/kg, respectively. However, these concentrations do not exceed the reference pond calculated sediment 95 percent UTLs (44.1 µg/kg [surface] and 14 µg/L [subsurface]) and are likely attributable to normal pesticide use at DoD facilities to control pests and weeds rather than the disposal

of pesticides at Site 4. Other pesticides, while detected above calculated sediment 95 percent UTLs, are also likely to be attributable to normal pesticide use at DoD facilities since pesticides were not known to have been disposed at Site 4, and soil sampling results did not provide evidence of significant pesticide contamination indicative of a CERCLA-regulated release. The legal application of pesticides for their intended use is not a CERCLA-regulated release.

- In surface and subsurface sediment, the highest number of detected SVOC and PCB concentrations exceeding their respective screening criteria (and above calculated reference pond sediment 95 percent UTLs) are located within Drainage Channel #1, near the confluence of Drainage Channel #1 and Drainage Channel #2, upgradient of Upstream Pond. As previously indicated, while the drainage channels flow through Burial Area 2, they direct stormwater from the paved roadway area north of CAD Building 11 (Drainage Channel #1) and from the large developed and industrialized area draining to Outfalls #35 and #2 (Drainage Channel #2) before entering Site 4. Therefore, the detected SVOC and PCB concentrations in the drainage channel sediment samples could be attributable to non-CERCLA-regulated contaminant sources unrelated to Site 4, to an unknown upstream CERCLA release unrelated to Site 4, or to impacts from buried debris within the Site 4 boundary. The locations of elevated concentrations of organic compounds in drainage channel sediment samples are generally consistent with the locations of the highest number of detected SVOC and PCB concentrations in surface soil samples from the same area (**Figures 4-6** through **Figure 4-8**).

Total Metals. Six total metals in surface sediment (**Figure 4-22**) and seven total metals in subsurface sediment (**Figure 4-21**) were detected within the drainage channels southwest of Upstream Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

- In surface sediment, cadmium, copper, and zinc concentrations exceeded residential adjusted RSLs (adjusted for sediment), BTAG Region III screening values, and/or ESVs in at least one sample. These detected concentrations also exceeded their respective reference pond 95 percent UTLs in at least one sample location.
  - Copper and zinc concentrations exceeding the UTLs were only detected in one out of eight surface sediment samples, and cadmium concentrations exceeding the UTL were detected in three out of eight surface sediment samples. All three of the samples where cadmium, copper and zinc concentrations were detected (above the conservative screening criteria and the UTLs) were collected during the RI (co-located with earthworm tissue samples) within the flood plain of Drainage Channels #1 and #2.
  - Arsenic and chromium were also detected in several samples at concentrations above their respective BTAG Region III screening values/ESVs (9.8 mg/kg and 43.4 mg/kg, respectively) at maximum concentrations of 10.4 mg/kg and 27.2 mg/kg, respectively. In addition, barium was detected in two samples at concentrations above the ESV (20 mg/kg; no BTAG Region III screening value exists) at a maximum concentration of 68.4J mg/kg. However, these concentrations do not exceed the reference pond calculated sediment 95 percent UTLs (108 mg/kg [arsenic], 52.0 mg/kg [chromium], and 75.0 mg/kg [barium]) and are likely attributable to background conditions.
- In subsurface sediment, aluminum, cadmium, chromium, and vanadium concentrations exceeded residential adjusted RSLs (adjusted for sediment), BTAG Region III screening values, and/or ESVs in at least one sample. These detected concentrations also exceeded their respective reference pond 95 percent UTLs in one sediment sample location (CAS04-SD07). This sample was collected within Drainage Channel #2, near the confluence of Drainage Channel #1 and Drainage Channel #2, upgradient of Upstream Pond.
  - Arsenic and iron were also detected in several samples at concentrations above BTAG Region III screening values/ESVs (9.8 mg/kg and 20,000 mg/kg, respectively) at maximum concentrations of 13.2 mg/kg and 28,200 mg/kg, respectively. In addition, barium was also detected in two samples at concentrations above the ESV (20 mg/kg; no BTAG Region III screening value exists) at a maximum concentration of 68.4J mg/kg. However, these concentrations do not exceed the reference pond calculated sediment 95 percent UTLs (51.1 mg/kg [arsenic], 43,800 mg/kg [iron], and 98.1 mg/kg [barium]) and are likely attributable to background conditions.

4.2.4.2. Site 4, Upstream Pond

A total of 23 surface sediment samples (CAA03-SD01[a] through CAA03-SD04[a], CAS004-4SD01[a] through CAS004-4SD04[a], CAS04-SD01[a] through CAS04-SD04[a], CAS04-SD10 through CAS04-SD14, and CAS04-SD18 through CAS04-SD23) and 12 subsurface sediment samples (CAA03-SD01[b] through CAA03-AD04[b], CAS004-4SD01[b] through CAS004-4SD04[b], and CAS04-SD01[b] through CAS04-SD04[b]) were collected to characterize the nature and extent of contamination within Upstream Pond and to assess potential human health and ecological risk associated with this medium.

Organic Constituents. Eighteen SVOCs (primarily PAHs), 13 pesticides, and two PCBs in surface sediment (**Figure 4-23**) and 13 SVOCs (primarily PAHs), 13 pesticides, and two PCBs in subsurface sediment (**Figure 4-24**) were detected within Upstream Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

- SVOCs, PCBs, and pesticides were detected in surface sediment at concentrations exceeding their respective screening criteria (and the calculated reference pond sediment 95 percent UTLs) throughout Upstream Pond.
  - The highest SVOC concentrations in surface sediment were detected near where the site drainage channels direct water into Upstream Pond, northeast of the surface debris pile within Burial Area 1, and in the northeastern corner of Upstream Pond (**Figure 4-25**). The elevated SVOC concentrations in Upstream Pond may result from impacts from either Site 4 debris, non-CERCLA-regulated stormwater discharge from outside of Site 4, or a combination of both.
  - The highest PCB concentrations in surface sediment were detected near where the site drainage channels direct stormwater into Upstream Pond and northeast of the surface debris pile within Burial Area 1 (**Figure 4-26**). Since the PCBs detected in surface sediment samples were only detected upstream in Site 4 drainage channels, there is a strong possibility that the elevated PCB concentrations in Upstream Pond sediment are the result of non-site-related contaminants transported in stormwater from the developed and industrialized areas to the west and south (such as via Outfalls #35 and #2).
- SVOCs, PCBs, and pesticides were detected in subsurface sediment at concentrations exceeding their respective screening criteria (and the calculated reference pond sediment 95 percent UTLs) throughout Upstream Pond.
  - In subsurface sediment, the highest SVOC concentrations were also detected near where the site drainage channels direct stormwater into Upstream Pond (**Figure 4-27**); however, the subsurface sediment SVOC concentrations are significantly lower than those concentrations detected in the surface sediment.
  - In subsurface sediment, the highest PCB concentrations were also detected near where the site drainage channels direct stormwater into Upstream Pond (**Figure 4-28**); however, the subsurface sediment PCB concentrations are significantly lower than those concentrations detected in the surface sediment. It should be noted that Aroclor-1254, detected in a single subsurface sediment sample, was not found in any other media sample collected from the site.
- Pesticides were also detected in surface and subsurface sediment near where the site drainage channels direct stormwater into Upstream Pond, northeast of the surface debris pile within Burial Area 1, and in the northeastern corner of Upstream Pond. However, pesticides were not known to be disposed at Site 4 and soil sampling results did not provide evidence of significant pesticide contamination indicative of a CERCLA-regulated release. Therefore, the low detected concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and not from the disposal of pesticides. The legal application of pesticides for their intended use is not a CERCLA-regulated release.

Total Metals. Fourteen total metals in surface sediment (**Figure 4-29**) and 12 total metals in subsurface sediment (**Figure 4-30**) were detected within Upstream Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

- In surface sediment, aluminum, antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium, and zinc concentrations exceeded residential adjusted RSLs (adjusted for sediment), BTAG Region III screening values, or ESVs in at least one sample. In addition, these detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample.
  - Aluminum, antimony, arsenic, chromium, iron, mercury, silver, and vanadium concentrations exceeding the UTLs were only detected in 1 out of 23 surface sediment samples, while the most-detected constituents above the UTL were cadmium (14 out of 23 samples), copper (13 out of 23 samples), lead (11 out of 23 samples), and zinc (15 out of 23 samples).
  - Iron was also detected in several samples at concentrations above the BTAG Region III screening value/ESV (20,000 mg/kg), with a maximum concentration of 44,000 mg/kg. However, this concentration does not exceed the reference pond calculated sediment 95 percent UTL (45,600 mg/kg) and is likely attributable to background conditions.
  - The highest number of screening criteria and reference pond 95 percent UTL exceedances (aluminum, barium cadmium, chromium, copper, iron, lead, nickel, vanadium, and zinc) was found in surface sediment sample CAS04-SD10, northeast of the surface and buried debris within Burial Area 1.
- In subsurface sediment, aluminum, barium, cadmium, chromium copper, lead, nickel, silver, vanadium, and zinc concentrations exceeded residential adjusted RSLs (adjusted for sediment), BTAG Region III screening values, or ESVs in at least one sample. In addition, these detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample.
  - Aluminum, barium, copper, lead, nickel, and silver concentrations exceeding the UTLs were only detected in one out of 12 subsurface sediment samples. Chromium, vanadium, and zinc concentrations exceeding the UTL were only detected in two out of 12 subsurface sediment samples. Cadmium concentrations exceeding the UTL were only detected in three out of 12 subsurface sediment samples.
  - In subsurface sediment, arsenic and iron were detected in several samples at concentrations above BTAG Region III screening values/ESVs (9.8 mg/kg and 20,000 mg/kg, respectively) at maximum concentrations of 14.6 mg/kg and 34,000 mg/kg, respectively. However, these concentrations do not exceed the reference pond calculated sediment 95 percent UTLs (51.1 mg/kg and 43,800 mg/kg, respectively) and are likely attributable to background conditions.
  - The highest number of screening criteria and reference pond 95 percent UTL exceedances (cadmium, chromium, copper, lead, nickel, silver, and zinc) were detected in subsurface sediment sample CAS04-SD03, near where the site drainage channels direct stormwater into Upstream Pond.

4.2.5 Surface Water

In total, 13 surface water samples (**Table 4-7**) were collected from two areas of Site 4 during the SI to characterize the nature and extent of contamination (VOCs, SVOCs, pesticides, PCBs, explosives constituents, and metals) and to assess the potential human health and ecological risks associated with this medium (**Figure 4-31**). The two areas include the three drainage channels that direct stormwater into Upstream Pond (Drainage Channels #1, #2, and #3) and Upstream Pond itself. Since the results of the 2009 SI indicated that the nature and extent of surface water contamination had been defined, no additional surface water samples were collected during the RI.

4.2.5.1. Drainage Channels

Five surface water samples (CAS04-SW05 through CAS04-SW09) were collected to characterize the nature and extent of contamination within the drainage channels southwest of Upstream Pond and to assess the potential human health and ecological risks associated with this medium.

Organic Constituents. Two SVOCs (fluoranthene and pyrene) were detected at concentrations exceeding either ESVs or BTAG screening criteria (**Figure 4-32**). No other organic constituents were detected at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

As indicated earlier, due to the upstream areas where stormwater found at the sampling locations originates, these SVOC concentrations may be the result of impacts from either Site 4 debris, stormwater bringing contaminants from non-CERCLA-regulated sources from upstream paved areas into Site 4, or a combination of both.

Metals. Six total metals (aluminum, arsenic, barium, iron, manganese, and selenium) and four dissolved metals (arsenic, barium, iron, and manganese) were detected at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV (**Figure 4-32**).

- Total selenium was detected in three samples at concentrations above the BTAG Region III screening value (1 µg/L; there were no exceedances of the ESV), with a maximum concentration of 1.3J µg/L. In addition, dissolved barium was detected in all five samples at concentrations above the ESV (4 µg/L; no BTAG Region III screening value exists), with a maximum concentration of 25.4 µg/L. However, these concentrations do not exceed the reference pond calculated surface water 95 percent UTLs (2.50 µg/L and 27.7 µg/L, respectively) and are likely attributable to background conditions.
- Total aluminum, arsenic, barium, iron, and manganese and dissolved arsenic, iron, and manganese concentrations exceeded residential adjusted RSLs (adjusted for surface water), BTAG Region III screening values, or ESVs in at least one sample. In addition, these detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample. Total and dissolved arsenic, iron, and manganese concentrations exceeding UTLs were only detected in one out of five surface sediment samples.
- The highest number of screening criteria and reference pond 95 percent UTL exceedances (total aluminum, arsenic, barium, iron, and manganese and dissolved arsenic, iron, and manganese) were detected in surface water sample CAS04-SW09, in Drainage Channel #3 east of Burial Area 2. None of these constituents were detected above reference pond 95 percent UTLs in the surface and subsurface sediment samples co-located with this surface water sample.

4.2.5.2. Upstream Pond

Eight surface water samples (CAA03-SW01 through CAA03-SW04 and CAS04-SW01 through CAS04-SW04) were collected to characterize the nature and extent of contamination within Upstream Pond and to assess the potential human health and ecological risks associated with this medium.

Organic Constituents. Three SVOCs (benzo[a]pyrene, fluoranthene, and pyrene) were detected at concentrations exceeding either adjusted RSLs, ESVs, or BTAG Region III screening criteria (**Figure 4-33**). These SVOC concentrations were detected near where the site drainage channels direct stormwater into Upstream Pond and in the northeastern most corner of Upstream Pond, which is consistent with the locations of the highest SVOC detections in Upstream Pond surface and subsurface sediment samples.

As indicated earlier, due to the upstream areas where stormwater entering Upstream Pond originates, these SVOC concentrations may be the result of impacts from either Site 4 debris, stormwater bringing contaminants from non-CERCLA-regulated sources from upstream paved areas into Site 4, or a combination of both.

No other organic constituents were detected at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

Metals. Seven total metals (aluminum, arsenic, barium, cadmium, copper, iron, and manganese) and one dissolved inorganic constituent (barium) were detected at concentrations exceeding either adjusted RSLs, ESVs, or BTAG Region III screening criteria (**Figure 4-33**).

- Total manganese was detected in one sample at a concentration above the BTAG Region III screening value/ESV (120 µg/L), at a concentration of 142 µg/L. In addition, dissolved barium was detected in all five samples at concentrations above the ESV (4 µg/L; no BTAG Region III screening value exists), with a maximum

concentration of 25.5 µg/L. However, these concentrations do not exceed the reference pond calculated surface water 95 percent UTLs (161 µg/L and 27.7 µg/L, respectively) and are likely attributable to background conditions.

- Total aluminum, arsenic, barium, cadmium, copper, and iron concentrations exceeded residential adjusted RSLs (adjusted for surface water), BTAG Region III screening values, or ESVs in at least one sample. In addition, these detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample. Total arsenic, barium, cadmium, copper and iron concentrations exceeding UTLs were only detected in one out of eight surface water samples.
- The highest number of screening criteria and reference pond 95 percent UTL exceedances (total aluminum, arsenic, barium cadmium, copper and iron) were detected in subsurface sediment sample CAS04-SW03 near where the site drainage channels direct stormwater into Upstream Pond.

4.2.6 Animal Tissue

In total, one earthworm tissue, five frog tissue (four adult and one juvenile), and seven fish tissue samples (**Table 4-8**) were collected to support the HHRA and/or BERA.

4.2.6.1. Earthworm Tissue

One earthworm tissue sample (CAS04-TS01) was collected by compositing earthworms within a 3-foot by 3-foot area surrounding surface soil samples CAS04-SD15 through CAS04-SD17 (**Figure 4-19**), adjacent to the streams west of Upstream Pond. Further evaluation of the results of this sample is included in **Section 6;** however, PCBs and metals were detected in the sample.

4.2.6.2. Frog Tissue

Five frog tissue samples (CAS04-TS02 through CAS04-TS06) were collected from within the Site 4 study area (adult) and within Upstream Pond (juvenile). Each tissue sample was composed of several individuals in order to have sufficient mass for lab analyses. Further evaluation of the results of this sample is included in **Section 6**; however, PCBs and metals were detected in the samples.

4.2.6.3. Fish Tissue

Seven fish tissue samples (CAS04-TS07-WB through CAS04-TS012-WB and CAS04-TS13-WB/O) were collected from within Upstream Pond. Each tissue sample was composed of several individuals in order to have sufficient mass for lab analyses. Further evaluation of the results of this sample is included in **Sections 5** and **6**; however, PCBs and metals were detected in the samples.

4.3 Youth Pond

Environmental samples for the evaluation of Youth Pond were collected during the recent RI. These included 8 samples to characterize surface drainage features (six soil and two sediment samples), 13 Youth Pond and York River Drainage Channel surface sediment samples, 13 Youth Pond and York River Drainage Channel subsurface sediment samples, six Youth Pond surface water samples and nine Youth Pond animal tissue samples (**Table 2-1**).

Stormwater from the surrounding area primarily enters Youth Pond from either overflow out of Upstream Pond (from the drainage culvert that flows under D Street) or from a surface drainage feature (drainage channel) that runs parallel to D Street from Outfall #34 (**Figure 1-2**). The stormwater directed to Upstream Pond originates from the paved area north of CAD Building 11 (Drainage Channels #1 and #3) and from the developed and industrialized area to the west of Site 4 that drains to Outfall #35 (via Drainage Channel #2). Outfall #35 receives stormwater discharges from impervious surfaces outside the Site 4 boundary, from the vicinities of CAD Buildings 12, 15, and 16. The stormwater runoff from the surface drainage feature parallel to D Street originates from several stormwater drains in the vicinities of CAD Buildings 12, 13, 14, and 15. Stormwater from these drains flows to Outfall #34 (which is regulated under a state stormwater permit), which ultimately discharges to Youth Pond through a culvert and the surface drainage feature that connects Outfall #34 and Youth Pond.

4.3.1 Surface Drainage Features

In total, six surface soil (CAYP-SS01 through CAYP-SS06) and two surface sediment (CAYP-SD14 and CAYP-SD15) samples (**Table 4-9**) were collected, from the surface drainage features identified during the October 2011 site visit as potential contributors to contamination in Youth Pond, to assess the potential human health and ecological risks associated with these media (**Figure 4-34**). During the RI, surface drainage feature samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, metals, TOC, pH, and grain size. In addition, the two sediment samples were analyzed for AVS/SEM.

4.3.1.1. Organic Constituents

Fifteen SVOCs (primarily PAHs) and one pesticide were detected within the surface drainage features leading to Youth Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV (**Figure 4-35**).

- The highest SVOC concentrations were detected in samples (CAYP-SS01 and CAYPSS05) from two separate surface drainage features, the first near the stormwater drain by the corner of CAD Building 12 and the second within the culvert between Outfall 34 and Youth Pond. The detected SVOCs are primarily PAHs, which are known to be ubiquitous in stormwater runoff from urban areas that drain asphalt-paved roadway and parking lot surfaces as well as building rooftops. It should also be noted that the Conex boxes stored outside CAD Building 12 are resting on wood planks, some of which appear to have been treated with a wood preservative such as creosote (**Attachment 1**). Therefore, it is likely that the SVOC concentrations detected in the surface drainage feature samples are a result of impacts from stormwater runoff from the upstream industrialized area rather than from a CERCLA-regulated source.
- The pesticide 4,4-dichlorodiphenyltrichloroethane (DDT) was detected in one surface drainage feature sample (CAYP-SS05), within the culvert between Outfall 34 and Youth Pond. There are no records or evidence of pesticide disposal in this area and no other pesticides were detected at concentrations exceeding the screening criteria; therefore, the low detected concentrations are likely attributable to normal pesticide use to control pests and weeds.

4.3.1.2. Metals

Thirteen metals were detected within the surface drainage features leading to Youth Pond at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV (**Figure 4-35**).

- Aluminum, barium, chromium, cobalt, iron, and manganese were detected at concentrations above their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV, at maximum concentrations of 11,000 mg/kg, 41.2 mg/kg, 17.8 mg/kg, 2.82 mg/kg, 19,400 mg/kg, and 217 mg/kg, respectively. However, these concentrations do not exceed base background 95 percent UTLs (12,200 mg/kg, 53.9 mg/kg, 18.2 mg/kg, 9.93 mg/kg, 19,900 mg/kg, and 324 mg/kg, respectively), indicating they are likely attributable to background conditions.
- Arsenic, cadmium, hexavalent chromium, copper, lead, selenium, and zinc concentrations exceeded their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV in at least one sample. In addition, these detected concentrations also exceeded their respective base background 95 percent UTL in at least one sample. Arsenic, cadmium, hexavalent chromium, copper, lead, and selenium concentrations above the UTLs were only detected in one out of eight samples, while zinc concentrations above the UTL were detected in four out of eight samples.
- While arsenic concentrations were detected above the residential RSL (0.61 mg/kg), but not the BTAG Region III screening value or ESV, in one out of eight samples, the maximum arsenic concentration (7.69 mg/kg) only slightly exceeds the base background 95 percent UTL (6.36 mg/kg) and is likely attributable to background conditions.
- While selenium concentrations were detected above the ESV (0.52 mg/kg), but not the adjusted residential RSL or BTAG Region III screening value, in one out of eight samples, the maximum selenium concentration

(0.663 mg/kg) only slightly exceeds the base background 95 percent UTL (0.51 mg/kg) and is likely attributable to background conditions.

4.3.2 Sediment

A total of 13 co-located surface sediment (**Table 4-5**) and subsurface sediment (**Table 4-6**) sample sets were collected during the RI from within Youth Pond (12 co-located sample sets) and from the drainage channel leading from Youth Pond to the York River (one co-located sample set) to characterize the nature and extent of contamination and evaluate human health and ecological risks (**Figure 4-36**). Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents, and metals.

4.3.2.1. Youth Pond

Twelve surface sediment (CAYP-SD01 through CAYP-SD10, CAYP-SD12, and CAYP-SD13) and subsurface sediment (CAYP-SSD01 through CAYP-SSD10, CAYP-SSD12, and CAYP-SSD13) sample sets were collected to characterize the nature and extent of contamination within Youth Pond and to assess the potential environmental risks associated with this medium.

Organic Constituents. Nine SVOCs (primarily PAHs), three pesticides, and one PCB in surface sediment (**Figure 4-37**) and four SVOCs, two pesticides, and one PCB in subsurface sediment (**Figure 4-38**) were detected at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV in at least one sample.

- The highest SVOC concentrations were detected in the middle of Youth Pond (CAYP-SD13), near where the surface drainage features direct stormwater into Youth Pond (CAYP-SD 01) (**Figures 4-39** and **4-40**). In general, the concentrations are significantly less than the highest concentrations detected within Upstream Pond and in some of the samples within the surface drainage features leading to Upstream and Youth Ponds.
- Some of the lowest SVOC concentrations detected within Youth Pond were at the outfall of the culvert that connects Site 4 and Upstream Pond to Youth Pond (CAYP-SD/SSD06) and at the inlet of the flood control structure that discharges surface water from Youth Pond into the York River (CAPY-SD/SSD03). At these sampling locations, plus one other (CAPY-SD/SSD08), the PCB Aroclor-1260 was detected above a screening criterion in surface and/or subsurface sediment. However, the detected PCB concentrations in these samples are significantly less than the highest concentrations detected within Upstream Pond.
- Pesticides were also detected in surface and/or subsurface sediment above their respective screening criteria in three co-located sample sets (CAYP-SD/SSD04, CAYP-SD/SSD05, and CAYP-SD/SSD08). Since there are no records or evidence of pesticide disposal to Youth Pond or the surface drainage features leading to Youth Pond and Site 4, the detected pesticide concentrations are likely attributable to normal pesticide use to control pests and weeds.

Metals. Thirteen total metals in surface sediment (**Figure 4-37**) and 10 total metals in subsurface sediment (**Figure 4-38**) were detected at concentrations exceeding their respective adjusted residential RSL, BTAG Region III screening value, and/or ESV.

- In surface sediment, chromium and iron were detected in at least one sample at concentrations above their respective BTAG Region III screening value/ESV (43.4 mg/kg and 20,000 mg/kg), at maximum concentrations of 25.7 mg/kg and 44,200 mg/kg, respectively. In addition, thallium was detected in several surface sediment samples (there is no BTAG Region III screening value/ESV for this metal) at a maximum concentration of 1.86 mg/kg. However, these metals do not exceed their respective reference pond calculated surface sediment 95 percent UTLs (52.0 mg/kg [chromium], 45,600 mg/kg [iron], and 6.50 mg/kg [thallium]) and are likely attributable to background conditions.
- In surface sediment, antimony, arsenic, barium, cadmium, copper, cyanide, lead, mercury, selenium, and zinc concentrations exceeded the residential adjusted RSLs, the BTAG Region III screening values, or ESVs in at least one sample. These detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample. Antimony, copper, and mercury concentrations exceeding the UTLs were only

detected in one out of 12 surface sediment samples and arsenic, cadmium, cyanide, and selenium was only detected at concentrations exceeding the UTLs in two out of 12 surface sediment samples. Barium and zinc were the most detected constituents, detected in six out of 12 surface sediment samples at concentrations above the UTLs. In addition, the surface sediment samples with the greatest number of total metals exceedances were collected from the middle of the pond (CAYP-SD05 and CAYP-SD13).

- In subsurface sediment, iron was detected in at least one sample at concentrations above the BTAG Region III screening value/ESV (20,000 mg/kg), at a maximum concentration of 36,300 mg/kg. However, this concentration does not exceed the reference pond calculated 95 percent UTL (43,800 mg/kg) and is likely attributable to background conditions.
- In subsurface sediment, arsenic, barium, cadmium, chromium, cyanide, lead, mercury, thallium, and zinc concentrations exceeded the residential adjusted RSLs, the BTAG Region III screening values, or ESVs in at least one sample. These detected concentrations also exceeded their respective reference pond 95 percent UTL in at least one sample. Cadmium, chromium, cyanide, lead, mercury, and thallium concentrations exceeding the UTLs were only detected in one out of 12 surface sediment samples and arsenic and zinc were only detected at concentrations exceeding the UTLs in two out of 12 surface sediment samples. In addition, the subsurface sediment samples with the greatest number of total metals exceedances were collected from the middle of the pond (CAYP-SDD05 and CAYP-SDS13), which is consistent with the surface sediment findings.

4.3.2.2. York River Drainage Channel

One co-located surface and subsurface sediment sample set (CAYP-SD/SSD11) was collected to characterize contamination within the drainage channel leading from Youth Pond to the York River and to assess the potential human health and ecological risks associated with this medium. While these samples were collected from an apparent depositional area within the drainage channel, this location could be impacted by contaminants transported by York River tidal cycles or by storm surges such that the samples have the potential to contain contaminants from offsite sources.

Organic Constituents

Fifteen SVOCs were detected (**Figure 4-41**) at concentrations exceeding adjusted residential RSLs, BTAG Region III screening criteria, and/or ESVs. Of the 15 SVOCs detected, only 8 were detected in sediment samples within Youth Pond, suggesting that the detected concentrations may be at least partially attributable to offsite contamination in the York River. The detected SVOCs are primarily PAHs that are known to be ubiquitous in stormwater runoff from urban areas.

Metals

One metal in surface sediment and two metals in subsurface sediment (**Figure 4-41**) were detected at concentrations exceeding adjusted residential RSLs, BTAG Region III screening criteria, and/or ESVs.

- In surface and subsurface sediment, chromium was detected above the adjusted residential RSL (2.9 mg/kg – same RSL for both media) at concentrations of 7.44 mg/kg and 9.39 m/kg, respectively. However, these concentrations do not exceed the reference pond calculated surface and subsurface sediment 95 percent UTLs (52.0 mg/kg and 25.8 mg/kg, respectively) and are likely attributable to background conditions.
- In surface sediment, lead was detected above the BTAG Region III screening value/ESV (35.8 mg/kg) at a concentration of 181 mg/kg. While this concentration exceeds the reference pond 95 percent UTL, it is at least three times higher than lead concentrations detected in sediment within Youth Pond; therefore, it may be attributable to offsite contamination in the York River.

4.3.3 Surface Water

Six surface water samples (**Table 4-7**) from Youth Pond were collected to characterize the nature and extent of contamination and to assess the potential human health and ecological risks associated with this medium (**Figure 4-42**). Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, explosives constituents and metals.

TABLE 4-1

Surface Soil Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Site 4, Northwest									Site 4, Northwest			Site 4, Northwest		
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SO08	CAS04-SO09	CAS04-SO10
Sample ID				CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012
Sample Date				11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	10/23/12	10/23/12	10/23/12
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name																		
Volatile Organic Compounds (µg/kg)																		
2-Butanone	--	--	2,800,000	25 UJ	29 UJ	32 UJ	28 UJ	25 UJ	29 UJ	25 UJ	31 UJ	34 UJ	24 J	22 J	12.1 UL	NA	NA	NA
Acetone	--	--	6,100,000	82 B	74 B	71 B	78 B	100 J	43 B	54 B	110 B	100 B	640 J	560 J	12.1 UL	NA	NA	NA
Chloroform	1,844	--	290	6 UJ	7 UJ	8 UJ	7 UJ	0.6 J	7 UJ	6 UJ	7 UJ	8 UJ	0.9 J	0.6 J	12.1 UL	NA	NA	NA
Methylene chloride	1,250	--	36,000	25 UJ	9 J	32 UJ	12 J	25 UJ	13 J	25 UJ	31 UJ	34 UJ	31 UJ	34 UJ	12.1 UL	NA	NA	NA
Styrene	64,000	--	630,000	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	1 J	7 UJ	6 UJ	10 J	12.1 UL	NA	NA	NA
Toluene	40,000	--	500,000	5 UJ	6 UJ	6 UJ	4 B	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	3 J	12.1 UL	NA	NA	NA
Xylene, total	1,300	--	63,000	15 UJ	17 UJ	19 UJ	17 UJ	15 UJ	18 UJ	15 UJ	19 UJ	20 UJ	18 UJ	20 UJ	12.1 UL	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)																		
1,1-Biphenyl	13,600	--	5,100	380 U	390 U	390 U	380 U	340 U	3,800	340 U	420 U	410 U	350 U	350 U	NA	NA	NA	NA
2,4-Dimethylphenol	1,000	--	120,000	580 U	600 U	590 U	580 U	520 U	420 J	520 U	640 U	630 U	530 U	530 U	3,900 U	NA	NA	NA
2-Methylnaphthalene	LMW PAH	--	23,000	23 J	25	6.8 J	23 U	21 U	49,000 U	20 J	26 U	25 U	21 U	21 U	3,900 U	2.5 J	48	7 J
2-Methylphenol	1,000	--	310,000	700 U	720 U	700 U	690 U	620 U	440 J	630 U	770 U	750 U	640 U	630 U	3,900 U	NA	NA	NA
3- and 4-Methylphenol	1,000	--	610,000	660 U	680 U	670 U	660 U	590 U	1,200	590 U	730 U	720 U	610 U	600 U	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	340,000	61	65	27	6.9 J	21 U	24,000 J	50	26 U	25 U	21 U	21 U	3,900 U	7.5 J	130	20 J
Acenaphthylene	LMW PAH	--	340,000	30	240	72	26	3.8 J	4,100 J	19 J	26 U	25 U	21 U	21 U	3,900 U	3 J	36	15 J
Anthracene	LMW PAH	--	1,700,000	140	260	200	37	3.8 J	140,000	150	26 U	2.7 J	21 U	21 U	1,700 J	19 J	260	59
Benzaldehyde	--	--	780,000	420 UJ	430 U	420 U	420 U	370 U	440 U	380 U	460 U	200 J	380 U	380 U	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	150	**590**	**1,600**	**740**	**200**	26	**180,000**	**1,100**	20 J	28	14 J	18 J	**8,800**	120	**1,200**	**400**
Benzo(a)pyrene	HMW PAH	--	15	**480**	**1,200**	**440**	**160**	**20 J**	**130,000**	**950**	**16 J**	**22 J**	11 J	14 J	**7,000**	**96**	**970**	**330**
Benzo(b)fluoranthene	HMW PAH	--	150	**840**	**2,100**	**670**	**190 J**	28 J	**200,000**	**1,400**	29	40	20 J	26	**6,800**	**160**	**1,600**	**590**
Benzo(g,h,i)perylene	HMW PAH	--	170,000	130 L	440 L	70 L	23 L	21 UL	66,000 L	320 J	3.8 B	2.6 B	21 R	2.6 B	3,400 J	54	520	180
Benzo(k)fluoranthene	HMW PAH	--	1,500	190	650	140	71	9.2 J	**81,000**	560	26 U	25 U	21 U	21 U	**6,800**	58	560	170
bis(2-Ethylhexyl)phthalate	30,000	--	35,000	120 U	120 U	120 U	120 U	100 U	240,000 U	780 J	130 U	120 U	110 U	100 U	3,900 U	NA	NA	NA
Butylbenzylphthalate	30,000	--	260,000	380 U	390 U	390 U	380 U	340 U	400 U	2,800	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA
Carbazole	--	--	--	230 J	190	80	18 J	3.2 J	120,000 J	90 J	3 J	5.6 J	3.8 J	4 J	3,900 U	NA	NA	NA
Chrysene	HMW PAH	--	15,000	730	1,300	580	170 J	17 J	**210,000**	1,400	18 J	26	12 J	16 J	8,600	130	1,500	420
Dibenz(a,h)anthracene	HMW PAH	--	15	**110 J**	**200 K**	**83 K**	**37 K**	21 U	**22,000 K**	**160**	4.3 J	4.6 J	21 U	3.6 J	**1,400 J**	**25**	**190**	**90**
Dibenzofuran	--	--	7,800	380 U	390 U	390 U	380 U	340 U	**19,000**	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA
Di-n-octylphthalate	30,000	--	61,000	740 U	760 U	750 U	740 U	670 U	780 U	770	820 U	800 U	680 U	680 U	3,900 U	NA	NA	NA
Fluoranthene	LMW PAH	--	230,000	1,700	3,000	1,600	350	44	**500,000**	2,400	40	57	31	40	14,000	250	3,000	840
Fluorene	LMW PAH	--	230,000	90	130	110	11 J	21 U	40,000 J	50	26 U	25 U	21 U	21 U	3,900 U	10 J	200	32 J
Indeno(1,2,3-cd)pyrene	HMW PAH	--	150	**610 K**	**240 J**	**280 J**	**160 J**	33 J	**69,000 J**	**920 J**	25 B	29	18 B	20 B	**3,400 J**	120 J	**850**	**430 J**
Naphthalene	LMW PAH	--	3,600	64	31	7.7 J	23 U	21 U	**26,000 J**	17 J	26 U	25 U	21 U	21 U	3,900 U	6.6 J	130	11 J
PAHs (HMW), calculated	18,000	--	--	5,080	10,130	4,003	1,281	180.2	1,348,000	9,610	150.7	217.4	113	135.4	57,200	1,003	9,790	3,310
PAHs (LMW), calculated	29,000	--	--	3,419.5	5,563	3,335	595.4	121.1	1,253,100	3,916.5	154	175.7	123.5	139.5	32,900	468.6	6,204	1,424
Phenanthrene	LMW PAH	--	1,700,000	1,300	1,800	1,300	130	17 J	470,000	1,200	23 J	41	19 J	26	5,500	170	2,400	440
Phenol	1,880	--	1,800,000	540 U	560 U	550 U	540 U	490 U	600	490 U	600 U	590 U	500 U	500 U	3,900 U	NA	NA	NA
Pyrene	HMW PAH	--	170,000	1,400	2,400	1,000	270	26	**390,000**	2,800	36	54	26	36	11,000	240	2,400 J	700
Pesticide/Polychlorinated Biphenyls (µg/kg)																		
4,4'-DDD	583	--	2,000	2.3 J	25 J	6 J	7.4 J	2.3 J	280 J	7.7 J	4 UJ	4.2 UJ	3.6 U	3.5 U	7.6 K	NA	NA	NA
4,4'-DDE	114	--	1,400	0.96 B	83	3.5 J	7.3	1.2 J	52 J	3.2 U	4 UJ	0.8 J	3.6 U	1.7 J	3.9 U	NA	NA	NA
4,4'-DDT	100	--	1,700	1 B	78	3.9 J	5.4 J	1.6 J	88 J	13 J	3.1 J	4.2 UJ	3.6 U	3.4 J	18 K	NA	NA	NA
Aldrin	3.63	--	29	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA
alpha-Chlordane	11	--	1,600	1.6 UJ	0.99 J	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA
Aroclor-1242	8,000	--	220	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	39 U	8.3 U	9.6 U	20 UL
Aroclor-1260	8,000	--	220	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	91 K	8.3 U	9.6 U	20 UL
delta-BHC	226	--	270	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	140 J	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA
Dieldrin	10.5	--	30	3.2 UJ	3.9 U	3.7 U	1.4 J	3.8 UJ	**650 J**	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA
Endosulfan I	6.32	--	37,000	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	2,200 J	1.7 U	0.79 J	0.91 J	1.8 U	1.8 U	2 U	NA	NA	NA
Endosulfan II	6.32	--	37,000	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA
Endosulfan sulfate	6.32	--	37,000	1.9 J	8.9 J	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA
Endrin	1.95	--	1,800	3.2 UJ	3.9 U	16	10	3.8 UJ	130 J	3.2 U	6.8 J	16 J	55	3.9	3.9 U	NA	NA	NA
Endrin aldehyde	1.95	--	1,800	3.2 UJ	3.9 U	3.8 J	2.6 J	3.8 UJ	78 U	3.2 U	3.5 J	5.4 J	3.6 U	2.2 J	3.9 U	NA	NA	NA
Endrin ketone	1.95	--	1,800	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	520	5.2 J	9.6	0.82 J	2 U	1.9 UJ	**860**	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA
gamma-Chlordane	11	--	1,600	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA
Explosives (µg/kg)																		
No Detections																		
Total Metals (mg/kg)																		
Aluminum	pH < 5.5	12,200	7,700	**12,600**	**8,930**	**10,800**	**9,870**	**8,080**	**10,600**	**8,070**	**11,800**	**12,600**	4,100	3,960	6,320 L	**10,300**	**8,030**	**10,700**
Antimony	78.0	--	3.1	0.13 L	0.19 L	0.25 L	0.17 L	0.07 L	0.21 L	0.07 J	0.15	0.15	0.08 J	0.07 J	0.44 UJ	0.35 U	0.42 U	1.1 U
Arsenic	18.0	6.36	0.61	**7.3**	**3**	**3.2**	**3.4**	**1.6**	**3.7**	**2.8**	**3.5**	**3.4**	**2.2**	**1**	**2.7 L**	**4.6**	**3.1**	**2.4**
Barium	330	52.9	1,500	38.5	43.6 J	47.3 J	47.7 J	36 J	55.1 J	57	28.7	29.1	11.3	16.9	101 J	41.5	36.5	61.8
Beryllium	40.0	0.587	16	0.66	0.67	0.49	0.46 J	0.44 J	0.72	0.69	0.34 J	0.34 J	0.19 J	0.24 J	0.32 B	0.58	0.52	0.6 J
Cadmium	32.0	--	7	0.95 U	0.12 J	0.06 J	0.04 J	0.04 J	0.33 J	0.7 J	1.1 U	1.2 U	0.92 U	0.02 B	0.34 U	0.11 J	0.19 J	2.7
Calcium	--	2,290	--	16,900	5,960 J	2,850 J	2,870 J	612 J	18,800 J	7,950	2,920	2,630	730	318	2,940	18,800	2,660	4,540
Chromium	64	18.2	0.29	**24.9 K**	**15.2**	**13.1**	**16.7**	**9**	**17.8**	**22.8**	**18.4**	**18.8**	**8.4**	**5.8**	**56.6**	**16**	**12.5**	**16.1**
Cobalt	13	9.93	2.3	**2.9**	**3.4**	**2.7**	**2.5**	**2.5**	**4.4**	**4.9**	1.8	1.9	0.72	0.84	**8.8 J**	**3.1**	2.2	2.3
Copper	70	4.25	310	5.3 K	9.4	4.9	5	3.8	31.8	17.7	4.8	4.2	1.9 J	1.9 J	77.8 J	37.1	31	31.5
Cyanide	15.8	--	2.2	0.84 U	0.84 U	0.7 U	0.84 U	0.77 U	0.7 U	0.77 U	0.84 U	0.84 U	0.7 U	0.77 U	0.07 L	NA	NA	NA
Iron	5 < pH > 8	19,900	5,500	**18,800**	**10,900 J**	**9,710 J**	**9,740 J**	**6,720 J**	**18,300 J**	**13,500**	**12,100**	**12,200**	**6,140**	3,450	**61,700 L**	**11,700**	**8,860**	**9,240**

				Site 4, Northwest									Site 4, Northwest			Site 4, Northwest		
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SO08	CAS04-SO09	CAS04-SO10
Sample ID				CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012
Sample Date				11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	10/23/12	10/23/12	10/23/12
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name																		
Lead	120	17.4	400	9.4 K	35.4	25.1	14.5	10.3	**793**	37	18.6	18.2	9.2	10.6	105 J	13.6 B	25.9	53.3
Magnesium	--	1,070	--	1,850 K	1,610 J	770 J	716 J	568 J	2,880 J	4,060	896	916	607	340	2,140	1,620	1,150	1,100
Manganese	220	324	180	85.1 K	155 J	121 J	106 J	98.9 J	**253 J**	**315**	39.9	35.8	19.1	27.9	**302 J**	125	91.8	70.2
Mercury	0.1	0.111	2.3	0.01 J	0.12	0.04	0.03 J	0.02 J	0.04 J	0.035 U	0.05	0.04	0.01 J	0.03 J	0.06 J	0.08	0.04	0.1
Nickel	38	9.52	150	5.5 J	9.8	5.3	5.2	3.7 J	9	8.8	4.5	4.7 J	1.8 J	1.9 J	39.6	6.2	5.1	6.5
Potassium	--	708	--	2,570 K	743 K	640 K	600 K	461 K	1,220 K	2,830	1,020	1,020	734	260	961 J	1,270	975	1,090
Selenium	0.52	0.51	39	0.36 J	0.44 J	0.45 J	0.51	0.33 J	0.84	0.16 J	0.42 J	0.47 J	0.21 J	0.24 J	0.6 U	0.31 J	0.59 U	1.5 U
Silver	560	--	39	1.4 U	1.6 U	1.4 U	1.5 U	1.5 U	2.1 U	1.3 U	0.25 J	0.27 J	0.29 J	0.1 J	20.6 L	0.28 U	0.15 J	0.09 J
Sodium	--	521	--	140 K	35 K	32.3 K	34.5 K	20.1 K	176 K	154	27.7 J	32.1 J	14.8 J	15.3 J	73.1 B	115	37.8 B	50.8 B
Thallium	1	--	0.078	0.13 B	0.17 B	0.12 B	0.13 B	0.1 B	0.13 B	0.19 B	0.14 B	0.13 B	0.09 B	0.07 B	**1.1 L**	0.35 U	0.42 U	1.1 U
Vanadium	130	27.9	39	27.2	19.5	20	17.8	14.6	26.9	24.3	29.1	29.5	11.4	8.6	35.7 J	21.2	18.8	21.6
Zinc	120	26.5	2,300	21.8 K	52.7	52.8	64.6	16.8	89.6	154	21.6	20.6	10	9.7	122 J	89.5	76.5	242
Wet Chemistry																		
pH (ph)	--	--	--	8.5	7.7	7.6	7	6.4	8.3	8.8	6.5	5.9	4.6	5	NA	7.5	6.5	5.6
Total organic carbon (TOC) (ug/g)	--	--	--	6,200	36,000	26,000	24,000	12,000	33,000	8,400	37,000	51,000	18,000	18,000	NA	10,000	36,000	84,000
Grain Size (pct)																		
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.9	9.8	3.2
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50.8	68.5	70
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.4	5.5	3.8
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.6	13.9	17
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	41.8	49.1	49.2
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.3	21.7	26.8
GRAINSIZE (PCT/P)																		
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100	100	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	95	100	100	100	100	100	100	100	100	NA	94.8	100	100
GS09 Sieve 0.5" (12.5 mm)	--	--	--	100	96	95	100	100	91	100	100	100	100	100	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	92	95	100	100	82	91	100	100	100	100	NA	76.7	97.3	100
Sieve No. 004 (4.75 mm)	--	--	--	99	75	93	100	100	73	77	100	100	100	100	NA	75.1	90.2	96.8
Sieve No. 010 (2.00 mm)	--	--	--	98	69	92	99	99	66	62	99	100	100	100	NA	72.7	84.7	93
Sieve No. 020 (850 um)	--	--	--	96	66	90	98	99	60	50	99	99	99	99	NA	70.8	78.9	85.7
Sieve No. 040 (425 um)	--	--	--	92	62	85	93	94	54	41	96	95	97	94	NA	66.1	70.8	76
Sieve No. 060 (250 um)	--	--	--	72	51	70	76	74	39	32	78	76	73	72	NA	48.3	50.8	60.4
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36.9	36.9	47.1
Sieve No. 100 (150 um)	--	--	--	46	36	50	55	53	26	24	48	46	34	37	NA	31.4	30	38.4
Sieve No. 200 (75 um)	--	--	--	36	28	38	41	40	18	17	35	36	16	24	NA	24.3	21.7	26.8

Notes:

CAX 95% UTL Surface Soil (SS) Background values are shown for reference only, no exceedances are formatted.

Shading indicates exceedance of ESVs

Bold text indicates exceedance of Adjusted Residential Soil RSLs

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

B - Analyte not detected above the level reported in blanks

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

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE 4-1

Surface Soil Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Site 4, Northwest						Site 4, South					
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS04-SS05	CAS004-4HA01	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05
Sample ID				CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS04-SS05-1109	CAS004-4HA01-00-1199	CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199
Sample Date				10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/03/09	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name															
Volatile Organic Compounds (µg/kg)															
2-Butanone	--	--	2,800,000	NA	NA	NA	NA	NA	30 UJ	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R
Acetone	--	--	6,100,000	NA	NA	NA	NA	NA	120 J	5 B	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R
Chloroform	1,844	--	290	NA	NA	NA	NA	NA	7 UJ	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R
Methylene chloride	1,250	--	36,000	NA	NA	NA	NA	NA	30 UJ	7 B	8 B	11.9 U	9 B	11 B	11 B
Styrene	64,000	--	630,000	NA	NA	NA	NA	NA	6 UJ	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R
Toluene	40,000	--	500,000	NA	NA	NA	NA	NA	6 UJ	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R
Xylene, total	1,300	--	63,000	NA	NA	NA	NA	NA	18 UJ	11.2 U	2 J	11.9 U	11.6 U	14.8 UL	14.8 R
Semivolatile Organic Compounds (µg/kg)															
1,1-Biphenyl	13,600	--	5,100	NA	NA	NA	NA	NA	380 U	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	1,000	--	120,000	NA	NA	NA	NA	NA	570 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
2-Methylnaphthalene	LMW PAH	--	23,000	10 U	10 U	10 U	9.2 J	NA	23 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
2-Methylphenol	1,000	--	310,000	NA	NA	NA	NA	NA	680 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
3- and 4-Methylphenol	1,000	--	610,000	NA	NA	NA	NA	NA	650 U	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	340,000	7.5 J	10 U	10 U	53 K	NA	23 U	380 U	330 J	2,100 U	400 U	2,600 U	5,500 U
Acenaphthylene	LMW PAH	--	340,000	18 J	10 U	10 U	62	NA	23 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Anthracene	LMW PAH	--	1,700,000	48	2.2 J	1.4 J	190 K	NA	1.8 J	380 U	530 J	2,100 U	400 U	2,600 U	5,500 U
Benzaldehyde	--	--	780,000	NA	NA	NA	NA	NA	410 U	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	150	**370**	17 J	11 J	**960**	NA	10 J	380 U	**1,100 J**	**290 J**	400 U	2,600 U	**1,100 J**
Benzo(a)pyrene	HMW PAH	--	15	**310**	15 J	10 J	**830**	NA	4.4 J	380 U	**950 J**	**440 J**	400 U	2,600 U	**2,300 J**
Benzo(b)fluoranthene	HMW PAH	--	150	**460**	22 B	17 B	**1,200**	NA	10 J	380 U	**1,100 J**	**320 J**	76 J	**330 J**	**1,700 J**
Benzo(g,h,i)perylene	HMW PAH	--	170,000	140	8.6 J	6.6 J	320 K	NA	23 UL	380 U	650 J	340 J	61 J	2,600 U	1,200 J
Benzo(k)fluoranthene	HMW PAH	--	1,500	180	9 J	6 J	420	NA	23 U	380 U	770 J	470 J	53 J	320 J	**1,700 J**
bis(2-Ethylhexyl)phthalate	30,000	--	35,000	NA	NA	NA	NA	NA	66 J	49 B	16,000 B	3,000 B	100 B	11,000 B	5,500 U
Butylbenzylphthalate	30,000	--	260,000	NA	NA	NA	NA	NA	380 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Carbazole	--	--	--	NA	NA	NA	NA	NA	2.1 J	380 U	250 J	2,100 U	400 U	2,600 U	5,500 U
Chrysene	HMW PAH	--	15,000	380	17 J	11 J	930	NA	23 U	380 U	1,300 J	520 J	75 J	410 J	2,200 J
Dibenz(a,h)anthracene	HMW PAH	--	15	**67**	3.6 J	3.5 J	**160 K**	NA	23 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Dibenzofuran	--	--	7,800	NA	NA	NA	NA	NA	380 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Di-n-octylphthalate	30,000	--	61,000	NA	NA	NA	NA	NA	730 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Fluoranthene	LMW PAH	--	230,000	670	29	19 J	1,800	NA	14 J	380 U	2,700	660 J	49 J	510 J	1,800 J
Fluorene	LMW PAH	--	230,000	16 J	10 U	10 U	92 K	NA	23 U	380 U	250 J	2,100 U	400 U	2,600 U	5,500 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	150	**260 J**	19 J	11 J	**770**	NA	23 U	380 U	**600 J**	**250 J**	48 J	2,600 U	**1,300 J**
Naphthalene	LMW PAH	--	3,600	10 U	10 U	10 U	13 J	NA	23 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
PAHs (HMW), calculated	18,000	--	--	2,717	128.2	86.6	6,990	NA	88.8	1,710 U	9,820	4,480	959	8,000	17,250
PAHs (LMW), calculated	29,000	--	--	1,089.5	70.2	54.9	3,209.2	NA	92.5	1,710 U	10,410	8,570	1,649	10,910	22,450
Phenanthrene	LMW PAH	--	1,700,000	320	14 J	9.5 J	990	NA	7.7 J	380 U	2,400	560 J	400 U	2,600 U	1,400 J
Phenol	1,880	--	1,800,000	NA	NA	NA	NA	NA	540 U	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U
Pyrene	HMW PAH	--	170,000	550	28	19 J	1,400	NA	6.9 J	380 U	2,300	800 J	46 J	440 J	3,000 J
Pesticide/Polychlorinated Biphenyls (µg/kg)															
4,4'-DDD	583	--	2,000	NA	NA	NA	NA	NA	3.7 U	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U
4,4'-DDE	114	--	1,400	NA	NA	NA	NA	NA	0.9 L	3.8 U	9.6 J	4.2 U	4 U	43 J	27 U
4,4'-DDT	100	--	1,700	NA	NA	NA	NA	NA	1.7 J	3.8 U	7 J	4.6 J	4 U	9.4	220 K
Aldrin	3.63	--	29	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	**33 K**
alpha-Chlordane	11	--	1,600	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U
Aroclor-1242	8,000	--	220	9 U	8.9 U	8.9 U	10 U	NA	20 U	38 U	42 U	42 U	40 U	52 U	**1,000 K**
Aroclor-1260	8,000	--	220	9 U	8.9 U	8.9 U	10 U	NA	19 J	53	64 J	75 J	53 J	**600 J**	**2,700 K**
delta-BHC	226	--	270	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U
Dieldrin	10.5	--	30	NA	NA	NA	NA	NA	3.7 U	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U
Endosulfan I	6.32	--	37,000	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U
Endosulfan II	6.32	--	37,000	NA	NA	NA	NA	NA	3.7 U	4.4 J	4.2 U	4.2 U	5.7 J	5.2 U	27 U
Endosulfan sulfate	6.32	--	37,000	NA	NA	NA	NA	NA	3.7 U	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U
Endrin	1.95	--	1,800	NA	NA	NA	NA	NA	3.7 U	6.3 J	4.2 U	4.2 U	4 U	5.2 U	28 K
Endrin aldehyde	1.95	--	1,800	NA	NA	NA	NA	NA	1 J	3.8 U	4.2 U	4.2 U	4 U	5.2 U	77 K
Endrin ketone	1.95	--	1,800	NA	NA	NA	NA	NA	3.7 U	3.8 U	4.2 U	4.5	4 U	5.2 U	87 K
gamma-BHC (Lindane)	7.75	--	520	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U
gamma-Chlordane	11	--	1,600	NA	NA	NA	NA	NA	1.9 U	2 U	2.1 U	2.2 U	2.1 U	2.7 U	15 K
Explosives (µg/kg)															
No Detections															
Total Metals (mg/kg)															
Aluminum	pH < 5.5	12,200	7,700	7,290	**9,390**	**9,100**	**7,850**	NA	**18,000**	4,560 L	5,810 L	7,160 L	6,760 L	**9,560 L**	6,260 L
Antimony	78.0	--	3.1	0.46 J	0.32 U	0.32 U	0.47 L	NA	0.14 L	0.49 U	0.46 U	0.55 U	0.47 U	0.67 J	12.6 B
Arsenic	18.0	6.36	0.61	**8.5**	**2.9**	**2.7**	**346 J**	NA	**3.6**	**2.9 L**	**2.7 L**	**2.6 L**	**3 L**	**4.1 L**	**3.5 L**
Barium	330	52.9	1,500	34.9	43.4	42.1	59.3 L	NA	22.2 J	20.3 J	36.6 J	27.1 J	25.5 J	164	68
Beryllium	40.0	0.587	16	0.39 J	0.48	0.46	0.34 L	NA	0.42	0.33 B	0.64 B	0.36 B	0.35 B	0.68 B	0.65 B
Cadmium	32.0	--	7	1.2 U	0.02 B	0.006 B	1.2 UL	NA	0.77 U	0.08 U	0.07 U	0.08 U	0.07 U	0.74 J	3.3
Calcium	--	2,290	--	541	1,270 J	1,830 J	7,130 J	NA	238 J	3,750	1,440	1,110 J	8,420	7,320	6,670
Chromium	64	18.2	0.29	**34**	**11.1**	**10.7**	**63 J**	**11.9 K**	**26.6**	**9.4**	**8.7**	**9.6**	**11.8**	**16.9**	**19**
Cobalt	13	9.93	2.3	**4.5**	**2.4**	2.3	**11.5 J**	NA	2.3	1.4 U	**2.8 J**	**3.7 J**	1.7 J	**4.1 J**	**4.6 J**
Copper	70	4.25	310	58.9	2.9 B	2.7 B	68.7 K	NA	3.1	4.5 B	10.5	12	3.8 B	26	150
Cyanide	15.8	--	2.2	NA	NA	NA	NA	NA	0.77 U	0.02 UL	0.12 L	0.13 L	0.02 UL	0.03 UL	0.11 L
Iron	5 < pH > 8	19,900	5,500	**53,200**	**8,040**	**7,730**	**116,000 J**	NA	**15,000 J**	**8,900 L**	**9,840 L**	**8,570 L**	**8,910 L**	**14,600 L**	**14,300 L**

				Site 4, Northwest						Site 4, South					
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS04-SS05	CAS004-4HA01	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05
Sample ID				CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS04-SS05-1109	CAS004-4HA01-00-1199	CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199
Sample Date				10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/03/09	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name															
Lead	120	17.4	400	12.9 B	11.6 B	10 B	31.7 L	NA	23.7	12.8	22.7	24	11.6	39.5	129
Magnesium	--	1,070	--	621	730	703	1,300 L	NA	1,200 J	619 J	514 J	669 J	800 J	1,110 J	2,010
Manganese	220	324	180	**263**	103	107	**511 J**	NA	24.7 J	48.7	**233**	127	43.2	151	175
Mercury	0.1	0.111	2.3	0.02 J	0.02 J	0.02 J	0.06 L	NA	0.03 J	0.04 J	0.31	0.36	0.09 J	0.76	0.88
Nickel	38	9.52	150	38	4	3.8	46.7 J	NA	5.6	2.2 B	3.8 B	4.1 B	4 B	10.1 J	12.1
Potassium	--	708	--	482	587	567	775 K	NA	1,210 K	789 J	283 B	366 J	928 J	798 J	1,420
Selenium	0.52	0.51	39	2.8 U	0.21 J	0.45 U	0.87 L	NA	0.32 J	0.67 U	0.63 U	0.75 U	0.64 U	1 J	0.81 U
Silver	560	--	39	0.99 B	0.05 J	0.09 J	1.3 L	NA	1.2 U	2.8 B	2.6 B	3 B	2.4 B	5.2 B	5.2 B
Sodium	--	521	--	25.8 B	27.5 B	56.8 B	61.3 B	NA	35.6 K	24.4 B	23.1 B	22.6 B	72.9 B	73.8 B	60.5 B
Thallium	1	--	0.078	2 U	0.32 U	0.32 U	**0.47 L**	NA	0.2 B	0.54 UL	0.5 UL	0.6 UL	0.51 UL	0.72 UL	0.65 UL
Vanadium	130	27.9	39	13.9	15.9	15.6	20.4 L	NA	**41.7**	13.9	13.9	15.1	16.6	22.2	23.5
Zinc	120	26.5	2,300	17.5	20	19	66.4 L	NA	20.3	28.6 B	106	102	32.5 B	273	324
Wet Chemistry															
pH (ph)	--	--	--	4.9	6.8	NA	7.1	NA	4.6	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (ug/g)	--	--	--	11,000	14,000	NA	55,000	NA	18,000	NA	NA	NA	NA	NA	NA
Grain Size (pct)															
Gravel (%)	--	--	--	2.3	0.1	NA	30.8	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	--	64.5	60.7	NA	51.5	NA	NA	NA	NA	NA	NA	NA	NA
Coarse Sand (%)	--	--	--	2	0.6	NA	10.1	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	8.9	7	NA	12.1	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	53.6	53.1	NA	29.3	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	33.2	39.2	NA	17.7	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)															
GS03 Sieve 3" (75 mm)	--	--	--	100	100	NA	100	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	100	100	NA	100	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	NA	100	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	NA	100	NA	100	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	NA	100	NA	100	NA	NA	NA	NA	NA	NA
GS09 Sieve 0.5" (12.5 mm)	--	--	--	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	99	100	NA	82	NA	100	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	97.7	99.9	NA	69.2	NA	100	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	95.7	99.3	NA	59.1	NA	100	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	93.3	97.9	NA	53.6	NA	99	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	86.8	92.3	NA	47	NA	96	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	68.1	74.4	NA	36.1	NA	80	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--	53.8	60.1	NA	27.9	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	45.1	51.2	NA	23.6	NA	52	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	33.2	39.2	NA	17.7	NA	37	NA	NA	NA	NA	NA	NA

Notes:

CAX 95% UTL Surface Soil (SS) Background values are shown for reference only, no exceedances are formatted.

Shading indicates exceedance of ESVs

Bold text indicates exceedance of Adjusted Residential Soil RSLs

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

B - Analyte not detected above the level reported in blanks

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

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE 4-1

Surface Soil Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Site 4, South						Site 4, East	
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SO14		CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO06	CAS04-SO07
Sample ID				CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS06-1012	CAS04-SS07-1012
Sample Date				10/23/12	10/23/12	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name											
Volatile Organic Compounds (µg/kg)											
2-Butanone	--	--	2,800,000	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
Acetone	--	--	6,100,000	NA	NA	70 B	100	78 B	94 J	NA	NA
Chloroform	1,844	--	290	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
Methylene chloride	1,250	--	36,000	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
Styrene	64,000	--	630,000	NA	NA	5 U	2 J	2 J	6 UJ	NA	NA
Toluene	40,000	--	500,000	NA	NA	5 U	6 U	6 UJ	2 J	NA	NA
Xylene, total	1,300	--	63,000	NA	NA	16 U	18 U	17 UJ	18 UJ	NA	NA
Semivolatile Organic Compounds (µg/kg)											
1,1-Biphenyl	13,600	--	5,100	NA	NA	340 U	410 U	360 U	360 U	NA	NA
2,4-Dimethylphenol	1,000	--	120,000	NA	NA	520 U	620 U	550 U	550 U	NA	NA
2-Methylnaphthalene	LMW PAH	--	23,000	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
2-Methylphenol	1,000	--	310,000	NA	NA	620 U	740 U	660 U	660 U	NA	NA
3- and 4-Methylphenol	1,000	--	610,000	NA	NA	590 U	700 U	620 U	630 U	NA	NA
Acenaphthene	LMW PAH	--	340,000	NA	NA	21 U	25 U	22 U	22 U	3 J	10 U
Acenaphthylene	LMW PAH	--	340,000	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
Anthracene	LMW PAH	--	1,700,000	NA	NA	4 J	4.2 J	1.7 J	2.4 J	6 J	2.1 J
Benzaldehyde	--	--	780,000	NA	NA	370 UJ	440 UJ	390 UJ	400 U	NA	NA
Benzo(a)anthracene	HMW PAH	--	150	NA	NA	16 J	23 J	14 J	16 J	24 J	12 J
Benzo(a)pyrene	HMW PAH	--	15	NA	NA	7.8 J	14 J	5.8 J	10 J	**20 J**	9.3 J
Benzo(b)fluoranthene	HMW PAH	--	150	NA	NA	18 J	29	16 J	20 J	37	18 B
Benzo(g,h,i)perylene	HMW PAH	--	170,000	NA	NA	21 UL	2.5 L	22 UL	22 UL	12 J	7 J
Benzo(k)fluoranthene	HMW PAH	--	1,500	NA	NA	3.7 J	6.3 J	22 U	5.5 J	9.3 J	5.9 J
bis(2-Ethylhexyl)phthalate	30,000	--	35,000	NA	NA	100 U	120 U	110 U	110 U	NA	NA
Butylbenzylphthalate	30,000	--	260,000	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Carbazole	--	--	--	NA	NA	2.6 J	3.8 J	22 U	3.6 J	NA	NA
Chrysene	HMW PAH	--	15,000	NA	NA	4 J	8.6 J	22 U	7.7 J	29 J	12 J
Dibenz(a,h)anthracene	HMW PAH	--	15	NA	NA	10 J	13 J	22 U	22 U	4.1 J	4 J
Dibenzofuran	--	--	7,800	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Di-n-octylphthalate	30,000	--	61,000	NA	NA	660 U	790 U	700 U	700 U	NA	NA
Fluoranthene	LMW PAH	--	230,000	NA	NA	21	36	17 J	29	48	22
Fluorene	LMW PAH	--	230,000	NA	NA	21 U	25 U	22 U	22 U	4.7 J	10 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	150	NA	NA	12 K	18 K	9.8 K	20 J	27 J	13 J
Naphthalene	LMW PAH	--	3,600	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
PAHs (HMW), calculated	18,000	--	--	NA	NA	96	135.4	96.6	118.2	215.4	96.2
PAHs (LMW), calculated	29,000	--	--	NA	NA	104	136.2	93.1	112.4	119.2	65.1
Phenanthrene	LMW PAH	--	1,700,000	NA	NA	16 J	21 J	8.4 J	15 J	38	16 J
Phenol	1,880	--	1,800,000	NA	NA	480 U	580 U	510 U	520 U	NA	NA
Pyrene	HMW PAH	--	170,000	NA	NA	14 J	21 J	7 J	17 J	53	24
Pesticide/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDD	583	--	2,000	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
4,4'-DDE	114	--	1,400	NA	NA	0.67 B	4.1 U	0.72 B	1.2 L	NA	NA
4,4'-DDT	100	--	1,700	NA	NA	1.3 B	4.1 U	2.2 B	3.5 U	NA	NA
Aldrin	3.63	--	29	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
alpha-Chlordane	11	--	1,600	NA	NA	1.9 UJ	2.1 U	1.9 U	0.54 J	NA	NA
Aroclor-1242	8,000	--	220	NA	NA	20 U	22 U	20 U	19 U	12 U	9.3 U
Aroclor-1260	8,000	--	220	NA	NA	20 U	35	20 U	33	55	9.3 U
delta-BHC	226	--	270	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Dieldrin	10.5	--	30	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endosulfan I	6.32	--	37,000	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Endosulfan II	6.32	--	37,000	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endosulfan sulfate	6.32	--	37,000	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endrin	1.95	--	1,800	NA	NA	3.7 UJ	4.1 U	3.5 J	3.5 U	NA	NA
Endrin aldehyde	1.95	--	1,800	NA	NA	3.7 UJ	4.1 U	1.9 J	2.1 J	NA	NA
Endrin ketone	1.95	--	1,800	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
gamma-BHC (Lindane)	7.75	--	520	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
gamma-Chlordane	11	--	1,600	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Explosives (µg/kg)											
No Detections											
Total Metals (mg/kg)											
Aluminum	pH < 5.5	12,200	7,700	NA	NA	6,360	**29,400**	4,560	5,990	**19,600**	**15,600**
Antimony	78.0	--	3.1	NA	NA	0.08 L	0.2 L	0.09 L	0.08 L	0.23 J	0.12 J
Arsenic	18.0	6.36	0.61	NA	NA	**1.6**	**6.4**	**1.4**	**1.1**	**7.2**	**5.2**
Barium	330	52.9	1,500	NA	NA	17.6	32.1	14.8	24.8 J	32.7	20.6
Beryllium	40.0	0.587	16	NA	NA	0.24 J	0.76	0.22 J	0.46 J	0.56	0.34 J
Cadmium	32.0	--	7	NA	NA	0.91 U	1.2 U	0.98 U	0.96 U	0.22 J	0.13 B
Calcium	--	2,290	--	NA	NA	267	137	637	345 J	1,120	208
Chromium	64	18.2	0.29	**7.4**	**7.2**	**9.2 K**	**45.2 K**	**7.3 K**	**6.9**	**27.8**	**21.8**
Cobalt	13	9.93	2.3	NA	NA	1.2	**3.5**	1.1	2.1	**2.7**	**2.4**
Copper	70	4.25	310	NA	NA	1.8 K	4.4 K	2.4 K	2.5	4.6	2.9
Cyanide	15.8	--	2.2	NA	NA	0.77 U	0.84 U	0.7 U	0.77 U	NA	NA
Iron	5 < pH > 8	19,900	5,500	NA	NA	**7,090**	**28,300**	**6,210**	4,370 J	**20,300**	**17,400**

				Site 4, South						Site 4, East	
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Surface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SO14		CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO06	CAS04-SO07
Sample ID				CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS06-1012	CAS04-SS07-1012
Sample Date				10/23/12	10/23/12	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12
Depth				0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'	0-0.5'
Chemical Name											
Lead	120	17.4	400	NA	NA	7.9 K	12.6 K	11.7 K	10	24	13.5
Magnesium	--	1,070	--	NA	NA	480 K	2,280 K	351 K	454 J	1,160	907
Manganese	220	324	180	NA	NA	27.7 K	33.6 K	28.8 K	59 J	40.8	30.2
Mercury	0.1	0.111	2.3	NA	NA	0.01 J	0.03 J	0.02 J	0.03 J	0.08	0.05
Nickel	38	9.52	150	NA	NA	2.3 J	8.1 J	2.2 J	3.1 J	6	4.8
Potassium	--	708	--	NA	NA	406 K	2,580 K	280 K	307 K	996	689
Selenium	0.52	0.51	39	NA	NA	0.22 J	0.27 J	0.18 J	0.28 J	0.74 B	0.59 J
Silver	560	--	39	NA	NA	1.4 U	1.8 U	1.5 U	1.4 U	0.34 U	0.28 U
Sodium	--	521	--	NA	NA	18.4 K	49.6 K	14.4 K	15.5 K	38.9 B	33.4 B
Thallium	1	--	0.078	NA	NA	0.09 B	0.21 B	0.08 B	0.08 B	0.18 B	0.16 B
Vanadium	130	27.9	39	NA	NA	13.3	**63.6**	11.9	9.8	**43.3**	34.1
Zinc	120	26.5	2,300	NA	NA	13 K	28.8 K	10.4 K	14.9	29.5	21.3
Wet Chemistry											
pH (ph)	--	--	--	NA	NA	5	6	5.2	5.5	4	3.9
Total organic carbon (TOC) (ug/g)	--	--	--	NA	NA	5,600	16,000	17,000	17,000	59,000	32,000
Grain Size (pct)											
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	0	0.1
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	66	64.1
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	0.6	0.3
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	17.7	8.7
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	47.7	55.1
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	34	35.8
GRAINSIZE (PCT/P)											
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	100	100
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	100	100	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	--	--	--	NA	NA	100	100	100	100	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	100	100	100	100	100	100
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	100	100	100	100	100	99.9
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	100	99	100	100	99.4	99.6
Sieve No. 020 (850 um)	--	--	--	NA	NA	99	99	99	99	91.4	96.9
Sieve No. 040 (425 um)	--	--	--	NA	NA	95	95	95	94	81.7	90.9
Sieve No. 060 (250 um)	--	--	--	NA	NA	74	70	77	73	63.3	72.3
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	49.4	56
Sieve No. 100 (150 um)	--	--	--	NA	NA	45	41	48	45	41.5	45.8
Sieve No. 200 (75 um)	--	--	--	NA	NA	30	30	31	29	34	35.8

Notes:

CAX 95% UTL Surface Soil (SS) Background values are shown for reference only, no exceedances are formatted.

Shading indicates exceedance of ESVs

Bold text indicates exceedance of Adjusted Residential Soil RSLs

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

B - Analyte not detected above the level reported in blanks

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

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE 4-2

Subsurface Soil Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Site 4, Northwest											Site 4, Northwest					
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Subsurface Soil**	**Adjusted Residential Soil RSLs**	CAA03-SB01	CAA03-SB02		CAA03-SB03		CAA03-SB04		CAA03-SB05		CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06
Sample ID				CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB02-1109B	CAA03-SB03-1109A	CAA03-SB03-1109B	CAA03-SB04-1109A	CAA03-SB04-1109B	CAA03-SB05-1109A	CAA03-SB05-1109B	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199
Sample Date				11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99
Depth				0.5-2'	0.5-2'	15.5-16'	0.5-2'	15.5-16'	0.5-2'	14.5-15'	0.5-2'	15.1-15.6'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-1'
Chemical Name																			
Volatile Organic Compounds (µg/kg)																			
2-Butanone	--	--	2,800,000	24 UJ	25 UJ	31 J	30 UJ	34 UJ	28 UJ	40 J	23 UJ	34 J	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	27 UJ	12.8 U
Acetone	--	--	6,100,000	69 B	29 B	290 J	68 B	73 B	60 B	310 J	65 B	210 J	45 B	52 B	220 J	240 J	74 B	100 B	12.8 U
Benzene	1,140	--	1,100	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	2 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U
Carbon disulfide	--	--	82,000	5 UJ	5 UJ	4 J	6 UJ	7 UJ	6 UJ	3 J	5 UJ	1 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U
Chloroform	1,844	--	290	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	1 J	9 UJ	6 UJ	6 UJ	0.8 J	7 UJ	7 UJ	6 UJ	12.8 U
Ethylbenzene	1,815	--	5,400	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	2 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL
Isopropylbenzene	--	--	210,000	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	9 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA
m- and p-Xylene	1,300	--	59,000	10 UJ	11 UJ	22 UJ	13 UJ	15 UJ	12 UJ	3 J	10 UJ	19 J	11 UJ	11 UJ	13 UJ	13 UJ	13 UJ	12 UJ	NA
Methylcyclohexane	--	--	--	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	2 J	5 UJ	6 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA
Methylene chloride	1,250	--	36,000	13 J	25 UJ	19 J	16 J	17 J	28 UJ	48 UJ	23 UJ	37 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	12 J	20 B
o-Xylene	1,300	--	69,000	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	5 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA
Styrene	64,000	--	630,000	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	2 J	6 UJ	6 UJ	5 UJ	12.8 UL
Tetrachloroethene	179	--	8,600	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL
Toluene	40,000	--	500,000	5 UJ	5 UJ	3 J	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	4 J	2 J	5 UJ	6 UJ	5 J	6 UJ	5 UJ	12.8 UL
Xylene, total	1,300	--	63,000	14 UJ	15 UJ	30 UJ	18 UJ	20 UJ	16 UJ	3 J	14 UJ	24 J	15 UJ	15 UJ	18 UJ	18 UJ	17 UJ	16 UJ	12.8 UL
Semivolatile Organic Compounds (µg/kg)																			
1,1-Biphenyl	13,600	--	5,100	350 U	370 U	540 U	360 U	380 U	360 U	690	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	NA
2-Methylnaphthalene	LMW PAH	--	23,000	120 J	3.6 J	210	22 U	23 U	22 U	1,600	22 U	640	9.5 J	32 J	23 U	22 U	22 U	18 U	3,800 U
Acenaphthene	LMW PAH	--	340,000	290 J	8.5 J	58	22 U	12 J	5.9 J	660	22 U	140	38	160	23 U	22 U	22 U	18 U	3,800 U
Acenaphthylene	LMW PAH	--	340,000	21 U	100	140	22 U	8.8 J	23	390 J	22 U	66	18 J	50 J	23 U	22 U	22 U	18 U	3,800 U
Anthracene	LMW PAH	--	1,700,000	1,200	66	280	22 U	17 J	35	2,400	22 U	1,500	120	560	23 U	22 U	22 U	18 U	3,800 U
Benzo(a)anthracene	HMW PAH	--	150	**1,900**	**350**	**840**	11 J	34	**180**	**2,700**	8 J	**320**	**440**	**1,800**	23 U	11 J	22 U	18 U	**500 J**
Benzo(a)pyrene	HMW PAH	--	15	**1,100**	**330**	**690**	5.3 J	**26**	**260**	**1,700**	22 U	**210**	**250**	**1,400**	23 U	12 J	22 U	18 U	**600 J**
Benzo(b)fluoranthene	HMW PAH	--	150	**1,700**	**470**	**900**	22 U	44 J	**360**	**2,200**	8.9 J	**250 J**	**480**	**2,300**	23 U	19 J	22 U	18 U	**490 J**
Benzo(g,h,i)perylene	HMW PAH	--	170,000	220 L	130 L	140 L	22 UL	23 UL	66 L	490 L	22 UL	27 L	48 L	560 J	23 R	3 B	22 R	18 R	440 J
Benzo(k)fluoranthene	HMW PAH	--	1,500	710	150	220	22 U	9.8 J	84	910	22 U	77	160	600	23 U	22 U	22 U	18 U	760 J
bis(2-Ethylhexyl)phthalate	30,000	--	35,000	110 U	110 U	660 J	110 U	110 U	110 U	290	110 U	320	41 J	160	120 U	110 U	110 U	89 U	3,800 U
Carbazole	--	--	--	650 J	39	940	22 U	18 J	17 J	2,400	22 U	1,900	180 J	210 J	23 U	22 U	22 U	18 U	3,800 U
Chrysene	HMW PAH	--	15,000	1,800	320	840	22 U	19 J	160 J	2,000	22 U	320 J	420	1,800	23 U	18 J	22 U	18 U	620 J
Dibenz(a,h)anthracene	HMW PAH	--	15	**180 J**	**85 K**	**120 K**	22 U	23 U	**70 K**	**330 K**	22 U	**36 K**	**52 K**	**250**	23 U	4.2 J	22 U	18 U	3,800 U
Dibenzofuran	--	--	7,800	350 J	370 U	280 J	360 U	380 U	360 U	2,000	360 U	350 J	370 U	120 J	380 U	360 U	360 U	290 U	3,800 U
Di-n-butylphthalate	40,000	--	610,000	110 U	110 U	160 U	110 U	110 U	110 U	150 U	110 U	140 U	110 U	110 U	120 U	110 U	110 U	89 U	3,800 U
Fluoranthene	LMW PAH	--	230,000	5,400	620	2,400	8.4 B	72	320	6,000	7.4 B	820	1,000	4,400	4.5 J	22 U	22 U	18 U	880 J
Fluorene	LMW PAH	--	230,000	660	33	390	22 U	29	12 J	2,000	22 U	450	58	220	23 U	22 U	22 U	18 U	3,800 U
Hexachlorobenzene	1,000	--	300	21 U	22 U	33 U	22 U	23 U	22 U	31 U	22 U	28 U	22 U	22 U	23 U	7.2 J	22 U	18 U	3,800 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	150	**1,400 K**	**230 J**	**430 J**	14 J	52 J	**280 J**	**240 J**	22 U	**200 J**	150 J	**1,300 J**	5.6 B	21 B	22 U	18 U	3,800 U
Naphthalene	LMW PAH	--	3,600	240	7.4 J	630	22 U	14 J	22 U	**8,000**	22 U	3,500 J	28	29	23 U	22 U	22 U	18 U	3,800 U
PAHs (HMW), calculated	18,000	--	--	13,010	2,545	5,880	89.7	248.8	1,720	14,670	87	2,080	2,810	13,910	83.3 U	98.2	88 U	72 U	7,880
PAHs (LMW), calculated	29,000	--	--	12,931	1,110	6,725	82.5 U	223.8	558.9	29,065.5	82.4 U	8,530	2,082.5	8,362	96.5	99 U	99 U	81 U	14,580
Phenanthrene	LMW PAH	--	1,700,000	5,000	260	2,600	2.5 B	48	130	8,000	3.4 B	1,400	800	2,900	23 U	22 U	22 U	18 U	400 J
Pyrene	HMW PAH	--	170,000	4,000	480	1,700	4.4 J	41	260	4,100	4.1 J	640	810	3,900	23 U	22 U	22 U	18 U	670 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																			
4,4'-DDD	583	--	2,000	2.8 J	9.2	3.3 J	5.1 J	1.2 J	13	170 J	2.6 J	4.8 UJ	2.4 J	20 J	3.8 UJ	1.1 J	3.6 UJ	3.5 U	3.8 U
4,4'-DDE	114	--	1,400	1.6 B	24	1.6 J	7.4 J	1.6 J	20	150 J	6	1.5 J	1.2 J	19	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U
4,4'-DDT	100	--	1,700	3.6 UJ	23	5.3 UJ	3.5 UJ	11 J	3.8	5.1 UJ	1.8 J	4.8 UJ	3.5 UJ	32	12 J	3.8 U	3.6 UJ	3.5 U	8.4 J
Aldrin	3.63	--	29	1.9 UJ	1.8 U	1.2 J	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	1.1 J	2 U	1.9 UJ	1.8 U	1.9 U
alpha-Chlordane	11	--	1,600	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	4 J	1.8 U	2.4 UJ	1.8 UJ	0.89 J	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U
Aroclor-1242	8,000	--	220	20 U	19 U	29 U	19 U	21 U	20 U	28 U	19 U	26 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U
Aroclor-1260	8,000	--	220	20 U	19 U	29 U	19 U	21 U	20 U	28 U	19 U	26 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U
delta-BHC	226	--	270	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	1.3 J	1.4 J	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U
Dieldrin	10.5	--	30	3.6 UJ	1.9 J	5.3 UJ	2 J	3.9 UJ	3.2 J	30 J	1 J	4.8 UJ	3.5 UJ	3.6 U	1.3 J	3.8 U	0.65 J	3.5 U	3.8 U
Endosulfan II	6.32	--	37,000	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U
Endosulfan sulfate	6.32	--	37,000	3.6 UJ	3.6 U	2.7 J	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	9.2 J	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U
Endrin	1.95	--	1,800	3.6 UJ	3.6 U	5.3 UJ	13 J	76 J	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	96 J	5.5 J	8.6 J	3.5 U	3.8 U
Endrin aldehyde	1.95	--	1,800	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	2.9 J	3.4 U	4.8 UJ	3.5 UJ	3.6 U	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U
Endrin ketone	1.95	--	1,800	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	0.88 J	3.8 U	3.6 UJ	3.5 U	3.8 U
gamma-BHC (Lindane)	7.75	--	520	6.4 J	1.5 J	6.4 J	1.8 UJ	0.72 J	0.57 J	1.6 J	1.8 U	1.2 J	4.1 J	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U
gamma-Chlordane	11	--	1,600	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1 J	11 J	1.8 U	2.4 UJ	1.8 UJ	23 J	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U
Heptachlor	52.9	--	110	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.4 B	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U
Methoxychlor	500	--	31,000	19 UJ	18 U	27 UJ	18 UJ	20 UJ	18 U	26 UJ	18 U	24 UJ	18 UJ	19 U	20 UJ	20 U	19 UJ	18 U	19 U
Explosives (µg/kg)																			
No Detections																			
Total Metals (mg/kg)																			
Aluminum	pH < 5.5	13,000	7,700	**8,290**	**15,800**	**28,600**	**12,100**	**14,000**	**10,600**	**12,800**	**10,300**	2,790	**11,600**	**10,800**	**23,100**	**24,500**	**22,600**	4,310	3,550 L
Antimony	78.0	--	3.1	0.1 L	0.11 L	0.11 L	0.11 L	1.2 L	0.09 L	0.26 L	0.05 L	0.08 L	0.08 L	0.08	0.14	0.12	0.22	0.04 J	1.1 B
Arsenic	18.0	5.54	0.61	**2.4**	**4**	**7.6**	**2.3**	**21**	**2.4**	**3.9**	**1.7**	**3.7**	**2.7**	**2.4**	**5.7**	**5.7**	**12.7**	**0.71**	**4.2 L**
Barium	330	84.5	1,500	33	54.8 J	53.1 J	50.4 J	72.4 J	45.7 J	49.8 J	49.5 J	9 J	31.8 J	32.3	28.1	30.8	31.2	17	33.2 J
Beryllium	40.0	--	16	0.45 J	0.6	1.4	0.56	0.49 J	0.53	0.98	0.53	0.18 J	0.51	0.95	0.52 J	0.55	0.89	0.31 J	0.35 B
Cadmium	32.0	--	7	1 U	0.86 U	0.1 J	1 U	0.12 J	0.85 U	0.2 J	0.89 U	0.07 J	0.03 J	0.06 J	1.1 U	0.98 U	0.03 J	0.65 U	0.15 U
Calcium	--	2,380	--	7,510	1,620 J	3,780 J	1,790 J	2,900 J	1,700 J	4,970 J	943 J	1,990 J	13,200 J	10,400	862	714	350	107	2,460
Chromium (hexavalent)	0.4	--	0.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64	33.7	0.29	**12 K**	**18.1**	**49.6**	**14.6**	**33.3**	**13.7**	**23.8**	**11.5**	**6.8**	**16**	**17.6**	**33.6**	**35.6**	**46.2**	**6**	**29.2**
Cobalt	13	5.18	2.3	**2.7**	**3.4**	**9.8**	**2.8**	**3.5**	**3**	**4.1**	**2.7**	0.68	**2.6**	**3.5**	**3**	**3.1**	**3.9**	1	**3.6 J**
Copper	70	3.17	310	4.9 K	3.6	14.8	3.6	9	2.9	5.7	3	2.2 B	3.3	9.4	3.4	3.8	4	1.4 J	19.4
Cyanide	15.8	--	2.2	0.84 U	0.77 U	1.1 U	0.84 U	0.91 U	0.7 U	0.98 U	0.77 U	0.98 U	0.7 U	0.77 U	0.84 U	0.77 U	0.7 U	0.7 U	0.02 UL
Iron	5 < pH > 8	32,000	5,500	**8,040**	**16,000 J**	**30,300 J**	**10,000 J**	**22,700 J**	**11,100 J**	**12,300 J**	**7,800 J**	2,850 J	**9,950 J**	**12,300**	**22,400**	**22,900**	**31,800**	3,390	**28,000 L**

				Site 4, Northwest											Site 4, Northwest					
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Subsurface Soil**	**Adjusted Residential Soil RSLs**	CAA03-SB01	CAA03-SB02		CAA03-SB03		CAA03-SB04		CAA03-SB05		CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06
Sample ID				CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB02-1109B	CAA03-SB03-1109A	CAA03-SB03-1109B	CAA03-SB04-1109A	CAA03-SB04-1109B	CAA03-SB05-1109A	CAA03-SB05-1109B	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199
Sample Date				11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99
Depth				0.5-2'	0.5-2'	15.5-16'	0.5-2'	15.5-16'	0.5-2'	14.5-15'	0.5-2'	15.1-15.6'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-1'
Chemical Name																			
Lead	120	8.79	400	10 K	12.9	16.7	14.9	23.4	10.8	8.2	9	3.5	9.6	20	11.3	10.8	9.8	3.8	29.7
Magnesium	--	1,120	--	823 K	907 J	7,120 J	864 J	3,600 J	785 J	1,680 J	707 J	351 J	1,120 J	2,780	1,530	1,580	2,710	355	1,730
Manganese	220	176	180	64.1 K	161 J	**410 J**	86.4 J	79.4 J	92.8 J	30 J	122 J	13.1 J	46.8 J	**259**	27.3	26.8	30.5	20.7	114
Mercury	0.1	--	2.3	0.036 U	0.06	0.05 J	0.02 J	0.06	0.03 J	0.04 J	0.01 J	0.045 U	0.01 J	0.02 J	0.02 J	0.02 J	0.01 J	0.01 J	0.05 J
Nickel	38	17.6	150	4.1 J	5.3	22.4	5	32.4	4.5	8.2	4.4	1.4 J	5.3	7.4	6.5	6.8	8.9	2.1 J	20.4
Potassium	--	901	--	826 K	734 K	4,770 K	702 K	695 K	605 K	2,010 K	593 K	343 K	1,110 K	996	1,690	1,740	3,660	235	920 B
Selenium	0.52	--	39	0.35 J	0.51	0.71	0.32 J	0.36 J	0.34 J	0.65	0.29 J	0.13 J	0.31 J	0.43	0.4 J	0.47 J	0.41 J	0.23 J	0.66 U
Silver	560	--	39	1.6 U	1.3 U	2.1 U	1.6 U	1.7 U	1.3 U	1.6 U	1.3 U	1.5 U	1.4 U	1.2 U	0.44 J	0.21 J	0.82 J	0.98 U	8.5 L
Sodium	--	811	--	66.8 K	37.2 K	690 K	43.3 K	77.2 K	39.6 K	60.2 K	27.9 K	20.8 K	101 K	70.8 J	38.9 J	39.9 J	42.3 J	12.8 J	31 B
Thallium	1	--	0.078	0.11 B	0.18 B	0.26 B	0.13 B	0.11 B	0.13 B	0.16 B	0.11 B	0.04 B	0.11 B	0.12 B	0.2 B	0.2 B	0.22 B	0.06 B	0.53 UL
Vanadium	130	48.3	39	14.8	29.2	**55.2**	20.2	30.4	20.1	31.6	16.8	7.1	20.9	23.8	**51.1**	**52.2**	**57**	6.5	20.8
Zinc	120	28	2,300	16.4 K	20.2	86.8	21.1	158	18.1	26.6	15.1	6.9	15.5	39.6	20.9	21.3	28.1	8.1	236
Wet Chemistry																			
pH (ph)	--	--	--	8.1	7.6	7.9	8.2	7.7	8.3	7.6	7.3	7.4	8.4	7.2	5.2	5.2	4.6	5	NA
Total organic carbon (TOC) (ug/g)	--	--	--	3,900	8,400	17,000	5,400	11,000	18,000	32,000	5,300	24,000	3,600	14,000	11,000	9,200	5,700	6,700	NA
Grain Size (pct/p)																			
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA
GS09 Sieve 0.5" (12.5 mm)	--	--	--	100	100	100	100	93	100	100	100	100	100	100	100	100	100	100	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	98	100	100	82	99	100	100	100	100	100	100	100	100	100	NA
Sieve No. 004 (4.75 mm)	--	--	--	99	95	100	100	78	98	99	99	99	99	98	100	100	100	100	NA
Sieve No. 010 (2.00 mm)	--	--	--	98	93	100	99	75	97	98	99	99	97	93	100	100	100	100	NA
Sieve No. 020 (850 um)	--	--	--	97	91	100	98	73	96	96	99	98	95	89	99	99	100	99	NA
Sieve No. 040 (425 um)	--	--	--	92	87	99	94	67	90	94	94	96	91	84	98	97	99	95	NA
Sieve No. 060 (250 um)	--	--	--	70	73	99	77	55	73	84	79	76	66	67	81	78	84	72	NA
Sieve No. 100 (150 um)	--	--	--	47	51	98	56	39	54	46	55	30	44	47	52	49	57	36	NA
Sieve No. 200 (75 um)	--	--	--	35	39	94	43	30	41	25	42	12	34	38	39	38	45	22	NA

Notes:
ESVs are not applicable to samples CAA03-SB02-1109B, CAA03-SB03-1109B, CAA03-SB04-1109B, or CAA03-SB05-1109B, which were collected more than 24" bgs.
CAX 95% UTL Subsurface Soil (SB) Background values are shown for reference only, no exceedances are formatted.
Shading indicates exceedance of ESVs.
Bold text indicates exceedance of Adjusted Residential Soil RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
P - Estimate (unvalidated data)
NA - Not analyzed
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
pct/p - Percent Passing
ph - pH units
µg/g - Micrograms per gram
µg/kg - Micrograms per kilogram

TABLE 4-2

Subsurface Soil Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Site 4, Northwest		Site 4, South									Site 4, East		
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Subsurface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SB05	CAS04-SO15	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
Sample ID				CAS04-SB05-1109	CAS04-SB15-1012	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109	CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
Sample Date				11/03/09	10/23/12	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Depth				0.5-2'	0.5-2'	1-2'	1-2'	1-2'	1-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'
Chemical Name																	
Volatile Organic Compounds (µg/kg)																	
2-Butanone	--	--	2,800,000	28 U	NA	8 J	14.2 U	20.4 U	13.0 U	28 UJ	27 UJ	27 UJ	27 UJ	NA	NA	NA	NA
Acetone	--	--	6,100,000	98	NA	43 B	14.2 U	20.4 U	13.0 U	74 B	46 B	76 B	120 J	NA	NA	NA	NA
Benzene	1,140	--	1,100	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Carbon disulfide	--	--	82,000	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Chloroform	1,844	--	290	7 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ	6 UJ	1 J	NA	NA	NA	NA
Ethylbenzene	1,815	--	5,400	6 U	NA	2 J	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Isopropylbenzene	--	--	210,000	6 U	NA	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
m- and p-Xylene	1,300	--	59,000	12 U	NA	NA	NA	NA	NA	12 UJ	12 UJ	12 UJ	12 UJ	NA	NA	NA	NA
Methylcyclohexane	--	--	--	6 U	NA	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Methylene chloride	1,250	--	36,000	28 U	NA	7 B	17 B	13 B	12 B	28 UJ	27 UJ	27 UJ	12 J	NA	NA	NA	NA
o-Xylene	1,300	--	69,000	6 U	NA	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Styrene	64,000	--	630,000	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Tetrachloroethene	179	--	8,600	6 U	NA	13.7 U	3 J	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Toluene	40,000	--	500,000	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	2 J	NA	NA	NA	NA
Xylene, total	1,300	--	63,000	17 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	17 UJ	16 UJ	16 UJ	16 UJ	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)																	
1,1-Biphenyl	13,600	--	5,100	380 U	NA	NA	NA	NA	NA	370 U	330 U	390 U	350 U	NA	NA	NA	NA
2-Methylnaphthalene	LMW PAH	--	23,000	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Acenaphthene	LMW PAH	--	340,000	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Acenaphthylene	LMW PAH	--	340,000	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Anthracene	LMW PAH	--	1,700,000	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Benzo(a)anthracene	HMW PAH	--	150	6.2 J	NA	77 J	11,000 UJ	17,000 UJ	4,300 U	8.5 J	7.3 J	6.2 J	21 U	NA	2.7 J	12 U	13 U
Benzo(a)pyrene	HMW PAH	--	15	23 U	NA	**110 J**	11,000 UJ	17,000 UJ	**550 J**	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Benzo(b)fluoranthene	HMW PAH	--	150	23 U	NA	130 J	11,000 UJ	17,000 UJ	**510 J**	23 U	20 U	23 U	21 U	NA	12 U	9.9 B	9.8 B
Benzo(g,h,i)perylene	HMW PAH	--	170,000	23 UL	NA	79 J	11,000 UJ	17,000 UJ	4,300 U	23 UL	20 UL	23 UL	21 UL	NA	12 U	2.4 J	13 U
Benzo(k)fluoranthene	HMW PAH	--	1,500	23 U	NA	64 J	11,000 UJ	17,000 UJ	490 J	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
bis(2-Ethylhexyl)phthalate	30,000	--	35,000	120 U	NA	670 B	**63,000 J**	2,600 B	4,300 U	110 U	100 U	120 U	110 U	NA	NA	NA	NA
Carbazole	--	--	--	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
Chrysene	HMW PAH	--	15,000	23 U	NA	130 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	2.2 J	13 U
Dibenz(a,h)anthracene	HMW PAH	--	15	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	8.1 J	13 U
Dibenzofuran	--	--	7,800	380 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Di-n-butylphthalate	40,000	--	610,000	120 U	NA	66 B	5,700 B	90,000 J	4,300 U	110 U	100 U	120 U	110 U	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	230,000	23 U	NA	160 J	11,000 UJ	17,000 UJ	880 J	23 U	20 U	23 U	21 U	NA	4.7 J	3.8 J	2.7 J
Fluorene	LMW PAH	--	230,000	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Hexachlorobenzene	1,000	--	300	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	150	23 U	NA	66 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	7.3 J	4.1 J	3.7 J
Naphthalene	LMW PAH	--	3,600	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
PAHs (HMW), calculated	18,000	--	--	98.2	NA	1,106	49,500 U	76,500 U	13,230	100.5	87.3	98.2	94.5 U	NA	49.8	43.35	54.1
PAHs (LMW), calculated	29,000	--	--	103.5 U	NA	1,940	49,500 U	76,500 U	18,080	103.5 U	90 U	103.5 U	94.5 U	NA	43.9	42.5	48.2
Phenanthrene	LMW PAH	--	1,700,000	23 U	NA	100 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	3.2 J	2.7 J	13 U
Pyrene	HMW PAH	--	170,000	23 U	NA	210 J	11,000 UJ	17,000 UJ	930 J	23 U	20 U	23 U	21 U	NA	3.8 J	3.6 J	13 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																	
4,4'-DDD	583	--	2,000	3.4 UJ	NA	4.5 L	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
4,4'-DDE	114	--	1,400	3.4 UJ	NA	5.3 P	4.6 U	24 J	10 J	3.6 UJ	3.3 U	3.8 UL	3.3 UJ	NA	NA	NA	NA
4,4'-DDT	100	--	1,700	3.4 UJ	NA	5.8 P	4.6 U	13 J	150 L	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Aldrin	3.63	--	29	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	27 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
alpha-Chlordane	11	--	1,600	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	2.4 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Aroclor-1242	8,000	--	220	18 U	NA	48 UL	46 U	67 U	**2,300 L**	20 U	18 U	21 U	18 U	NA	9.3 U	9.8 U	11 U
Aroclor-1260	8,000	--	220	18 U	NA	48 UL	51 K	**330 J**	**1,600 L**	20 U	18 U	21 U	18 U	NA	9.3 U	9.8 U	11 U
delta-BHC	226	--	270	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Dieldrin	10.5	--	30	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan II	6.32	--	37,000	3.4 UJ	NA	4.8 UL	6.5 K	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	37,000	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin	1.95	--	1,800	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin aldehyde	1.95	--	1,800	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin ketone	1.95	--	1,800	3.4 UJ	NA	4.8 UL	4.6 U	8.9 J	19 J	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	520	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
gamma-Chlordane	11	--	1,600	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	4.3 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Heptachlor	52.9	--	110	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	9.9 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Methoxychlor	500	--	31,000	18 UJ	NA	25 UL	24 U	34 U	25 J	19 UJ	17 U	20 U	17 UJ	NA	NA	NA	NA
Explosives (µg/kg)																	
No Detections																	
Total Metals (mg/kg)																	
Aluminum	pH < 5.5	13,000	7,700	**20,700**	NA	3,670 L	**9,660 L**	7,520 L	5,850 L	**29,400**	5,310	**22,800**	6,400	NA	**25,100**	**25,800**	**31,900**
Antimony	78.0	--	3.1	0.12 L	NA	0.53 U	0.53 U	0.69 U	1.1 B	0.15 L	0.04 L	0.12 L	0.05 L	NA	0.85 U	0.62 U	0.94 UL
Arsenic	18.0	5.54	0.61	**5.7**	NA	**1.8 L**	**2.9 L**	**3.9 L**	**3.7 L**	**6.9**	**0.62**	**4.8**	**0.89**	NA	**8.8**	**8.9**	**8.4**
Barium	330	84.5	1,500	22 J	NA	20.2 J	48 J	247	30.6 J	42.8	28.6	32 J	25.8 J	NA	26.1	26.8	32.8
Beryllium	40.0	--	16	0.57	NA	0.31 B	0.39 B	0.4 B	0.55 B	0.49 J	0.35 J	0.48	0.53	NA	0.47	0.48	0.5
Cadmium	32.0	--	7	0.07 J	NA	0.08 U	0.08 U	0.96 J	1.2 J	2.2 U	0.73 U	0.94 U	0.86 U	NA	0.51 U	0.37 U	0.56 U
Calcium	--	2,380	--	108 J	NA	478 J	4,060	5,970	3,240	744	300	278 J	183 J	NA	216 J	346 J	136
Chromium (hexavalent)	0.4	--	0.29	NA	0.22 U	NA	NA	NA	NA	NA	NA	NA	NA	**0.43 J**	NA	NA	NA
Chromium	64	33.7	0.29	**33.4**	**13.9**	**6.9**	**15.9**	**13.4**	**17.4**	**39.6 K**	**6.1 K**	**32**	**7.3**	**25.8**	**38.8**	**38.7**	**41.3 K**
Cobalt	13	5.18	2.3	**2.8**	NA	1.6 J	**4.3 J**	**3.8 J**	**2.8 J**	**3.9**	1.8	**3.4**	**2.6**	NA	**3**	**2.9**	**4**
Copper	70	3.17	310	3.4	NA	4.4 B	40.4	30	30.1	2.9 K	2.8 K	2.7	2 B	NA	3.6 J	3.6	1.9 B
Cyanide	15.8	--	2.2	0.77 U	NA	0.03 UL	0.03 UL	0.44 L	0.03 UL	0.84 U	0.77 U	0.77 U	0.77 U	NA	NA	NA	NA
Iron	5 < pH > 8	32,000	5,500	**21,800 J**	NA	4,960 L	**19,300 L**	**12,100 L**	**12,700 L**	**31,600**	3,830	**20,900 J**	4,300 J	NA	**28,900**	**26,800**	**27,800**

				Site 4, Northwest		Site 4, South									Site 4, East		
Station ID	**Ecological Screening Values**	**CAX BKG 95% UTL Subsurface Soil**	**Adjusted Residential Soil RSLs**	CAS04-SB05	CAS04-SO15	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
Sample ID				CAS04-SB05-1109	CAS04-SB15-1012	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109	CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
Sample Date				11/03/09	10/23/12	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Depth				0.5-2'	0.5-2'	1-2'	1-2'	1-2'	1-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'	0.5-2'
Chemical Name																	
Lead	120	8.79	400	10.7	NA	11.3	45.3	42.3	36.2	11 K	4.4 K	9.7	5.1	NA	12	12.1	11 B
Magnesium	--	1,120	--	1,670 J	NA	327 J	499 J	812 J	1,310 J	1,600 K	400 K	1,230 J	478 J	NA	1,540	1,540	1,690 K
Manganese	220	176	180	22.7 J	NA	28.3	120	105	40.4	32.7 K	72.8 K	28 J	47.2 J	NA	31.9	30.8	35.6 L
Mercury	0.1	--	2.3	0.01 J	NA	0.1 J	0.91	0.9	0.44	0.05	0.03 U	0.04	0.01 J	NA	0.03 J	0.03 J	0.04 L
Nickel	38	17.6	150	5.8	NA	3.5 B	17.3	13.6	7.7 B	8 J	2.8 J	6.7	3.6	NA	6.8	7.1	8.5
Potassium	--	901	--	1,910 K	NA	249 B	566 J	531 J	1,700	1,050 K	305 K	944 K	319 K	NA	1,380	1,470	1,530 K
Selenium	0.52	--	39	0.26 J	NA	0.78 J	0.72 U	0.94 U	0.79 U	0.51 J	0.2 J	0.45 J	0.3 J	NA	0.43 J	0.42 J	0.6 B
Silver	560	--	39	1.4 U	NA	1.6 B	5.8 B	3.9 B	3.7 B	3.2 U	1.1 U	1.4 U	1.3 U	NA	0.64 J	0.4 J	0.5 B
Sodium	--	811	--	31.4 K	NA	11.6 B	37.4 B	57.1 B	48.7 B	54.8 K	21.1 K	31.4 K	15.8 K	NA	37.9 B	38.5 B	53 B
Thallium	1	--	0.078	0.16 B	NA	0.58 UL	0.58 UL	0.75 UL	0.63 UL	**0.33**	0.07 B	0.23 B	0.08 B	NA	0.85 U	0.19 B	0.94 U
Vanadium	130	48.3	39	**51.8**	NA	10.1 B	12.2	17.1	20.5	**57.7**	7.8	**53.7**	8.4	NA	**58.7**	**58**	**64**
Zinc	120	28	2,300	22.2	NA	28.6 B	334	373	150	28.2 K	7.8 K	22.6	11.5	NA	24.5	24.4	27.1
Wet Chemistry																	
pH (ph)	--	--	--	4.4	NA	NA	NA	NA	NA	5	5.8	4.7	5	NA	3.9	NA	4
Total organic carbon (TOC) (ug/g)	--	--	--	3,400	NA	NA	NA	NA	NA	4,800	3,400	6,100	5,400	NA	NA	NA	NA
Grain Size (pct/p)																	
GS07 Sieve 1" (25.0 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS09 Sieve 0.5" (12.5 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	100	NA	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	100	NA	NA	NA	NA	NA	99	99	100	99	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	98	NA	NA	NA	NA	NA	95	95	97	95	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	79	NA	NA	NA	NA	NA	77	66	83	73	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	50	NA	NA	NA	NA	NA	56	36	62	41	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	33	NA	NA	NA	NA	NA	45	27	53	27	NA	NA	NA	NA

Notes:
ESVs are not applicable to samples CAA03-SB02-1109B, CAA03-SB03-1109B, CAA03-SB04-1109B, or CAA03-SB05-1109B, which were collected more than 24" bgs.
CAX 95% UTL Subsurface Soil (SB) Background values are shown for reference only, no exceedances are formatted.
Shading indicates exceedance of ESVs.
Bold text indicates exceedance of Adjusted Residential Soil RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
P - Estimate (unvalidated data)
NA - Not analyzed
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
pct/p - Percent Passing
ph - pH units
µg/g - Micrograms per gram
µg/kg - Micrograms per kilogram

TABLE 4-3

Groundwater Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Station ID	CAX BKG 95% UTL Groundwater	MCLs	Adjusted Tapwater RSLs	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID				CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date				11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chemical Name																		
Volatile Organic Compounds (µg/l)																		
1,2-Dichlorobenzene	--	600	28	1 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	--	75	0.42	1 U	1 U	**2 J**	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acetone	--	--	1,200	3 B	4 B	3 B	7 U	3 B	3 B	3 B	7 U	2.5 U	2.5 U	2.5 U	2.5 U	2.6 J	2.5 U	2.5 U
Benzene	--	5	0.39	1 U	1 U	1 UJ	1 U	**14**	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	--	--	72	0.7 B	1 U	1 UJ	1 U	1 U	2 B	2 B	2 B	0.5 U	0.5 U	0.5 U	0.86 J	0.54 J	0.46 J	0.29 J
Cyclohexane	--	--	1,300	1 U	1 U	1 UJ	1 U	12	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	--	700	1.3	1 U	1 U	1 UJ	0.2 J	**10**	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	--	--	39	1 U	1 U	1 UJ	1 U	4	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	--	--	19	2 U	2 U	2 UJ	1 J	**20**	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylcyclohexane	--	--	--	1 U	1 U	1 UJ	1 U	11	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl-tert-butyl ether (MTBE)	--	--	12	3	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	--	--	19	1 U	1 U	1 UJ	0.4 J	5	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	--	100	110	1 U	1 U	1 UJ	1 U	0.5 J	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	--	1,000	86	1 U	1 U	1 UJ	1 U	2	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	--	5	0.26	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	**0.4 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene, total	--	10,000	19	3 U	3 U	3 UJ	2 J	**25**	3 U	3 U	3 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (µg/l)																		
1,1-Biphenyl	--	--	0.083	10 U	9 U	12 U	9 U	**8 J**	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	--	--	27	14 U	13 U	17 U	13 U	**29**	15 U	14 U	13 U	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	--	--	2.7	0.2 U	1.5	0.3 U	**3.3**	**32**	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
3- and 4-Methylphenol	--	--	140	17 U	16 U	20 U	16 U	12 J	18 U	16 U	16 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	--	--	40	0.2 U	0.54	0.24 U	1.4	8.9 J	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Acenaphthylene	--	--	40	0.2 U	0.3	0.24 U	0.26 J	4.8	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Anthracene	--	--	130	0.2 U	0.26	0.24 U	1	6.7	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Benzaldehyde	--	--	150	10 UJ	9 UJ	12 UJ	9 U	2 J	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	--	--	0.029	0.2 U	**0.29**	0.24 U	**1.3**	**2.9**	0.21 U	0.2 U	0.19 U	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ
Benzo(a)pyrene	--	0.2	0.0029	0.2 U	**0.17 J**	**0.1 J**	**1.7**	**2**	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Benzo(b)fluoranthene	--	--	0.029	0.2 U	**0.15 J**	0.36 U	**2.2**	**2.7**	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Benzo(g,h,i)perylene	--	--	8.7	0.2 U	0.083 J	0.24 U	0.49 J	1.2	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Benzo(k)fluoranthene	--	--	0.29	0.2 U	0.19 U	0.24 U	**0.92**	**0.94**	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Carbazole	--	--	--	0.2 U	4.3	0.71 U	8.6 J	0.7 U	0.21 U	0.2 U	0.19 U	NA	NA	NA	NA	NA	NA	NA
Chrysene	--	--	2.9	0.2 U	0.19 U	0.24 U	0.58 B	2.1	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Dibenz(a,h)anthracene	--	--	0.0029	0.2 U	0.24 U	0.3 U	**0.21 J**	**0.26 J**	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Dibenzofuran	--	--	0.58	10 U	9 U	12 U	**3 J**	**19**	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	--	--	63	0.2 U	0.52	0.3 U	1.8	8.6 J	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Fluorene	--	--	22	0.2 U	0.98	0.24 U	3.2	21 J	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Indeno(1,2,3-cd)pyrene	--	--	0.029	0.2 U	0.24 B	0.29 B	0.89 B	**1.2 J**	0.21 UL	0.2 UL	0.19 UL	0.22 B	0.21 B	0.21 B	0.094 UJ	0.2 B	0.2 B	0.094 UJ
Naphthalene	--	--	0.14	0.2 U	**11**	0.24 U	**13**	**560**	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.063 J	0.094 U	0.094 U
Phenanthrene	--	--	130	0.2 U	1.6	0.24 U	3.1	36	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 UL	0.094 U	0.094 U	0.094 U	0.094 U
Phenol	--	--	450	10 U	9 U	12 U	9 U	5 J	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Pyrene	--	--	8.7	0.2 U	0.42	0.24 U	1.5	6.3	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Pesticide/Polychlorinated Biphenyls (µg/l)																		
4,4'-DDE	--	--	0.2	0.1 U	0.11 UJ	0.11 U	0.013 J	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Dieldrin	--	--	0.0015	0.1 U	0.11 UJ	0.11 U	**0.017 J**	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)																		
Aluminum	2,230	--	1,600	**2,240**	**13,300**	**23,300**	357	1,450	78.6 B	**2,700**	206 J	85.7 J	80.6 J	60.1 J	51.6 J	198 J	498	80.6 J
Antimony	--	6	0.6	0.54 J	**0.67 J**	0.58 J	0.35 J	0.54 J	0.17 J	0.4 J	0.37 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	2.28	10	0.045	**5.5**	**8**	**53.8**	**16.8**	**4.8 J**	5 U	**7.4**	**1.8 J**	2.8 B	2.8 B	4.1 B	8.3 B	6.6 B	**4.4 J**	5 U
Barium	118	2,000	290	26	114	107	139	**302**	18.6	25.7	12.1	22.5	23.1	16.7	24.5	25.3	33.9	32.3
Beryllium	2.45	4	1.6	0.17 J	0.71 J	1.4	1 U	0.11 J	1 U	0.16 J	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.605	5	0.69	0.31 J	0.26 J	0.23 J	1 U	0.09 J	1 U	0.29 J	0.07 J	0.1 B	3 U	0.06 B	0.06 B	3 U	0.54 B	0.29 B
Calcium	169,000	--	--	149,000	97,300	86,600	140,000	114,000	126,000	129,000	83,200	155,000	158,000	126,000	106,000	145,000	150,000	138,000
Chromium	15.1	100	0.031	**10.5 J**	**23.9**	**44.5**	**2.8 J**	**5 J**	**0.77 J**	**9.8 J**	**1.2 J**	**1 J**	**1.2 J**	**0.98 J**	**0.72 J**	**1.8 J**	**3.1 J**	**0.9 J**
Cobalt	20.6	--	0.47	**2.2 J**	**4.1 J**	**5.1 J**	30 U	**0.91 J**	**0.58 J**	**1.3 J**	30 U	0.29 J	0.29 J	4 U	4 U	4 U	0.27 J	4 U
Copper	--	1,300	62	13.8 J	10.7 J	10.7 J	25 U	2 J	25 U	1.4 B	25 U	3 J	2.4 J	1.1 J	1.4 J	2.2 J	2.4 J	2.2 J
Iron	894	--	1,100	**4,660**	**28,800**	**31,900**	**19,900**	**39,400**	387	**5,010**	296	53 B	65.3 B	492 J	996	**2,300**	**1,560**	60.6 B
Lead	--	15	15	2.5 J	**18.6**	**15.1**	1.6 J	5 J	5 U	3 J	5 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	11,500	--	--	3,570	19,600	5,270	6,580	10,200	2,070	2,360	946	3,180 J	3,390	1,300 J	1,220	3,630	2,760	2,490
Manganese	57.9	--	32	**50.7**	**642**	**290**	**210**	**380**	**179**	**48**	26.9	**374**	**390**	27 J	**43.5**	**419**	**93.1**	**104**
Mercury	--	2	0.43	0.2 U	**0.73**	0.03 J	0.2 U	**2.3**	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	11.4	--	30	8 J	11.1 J	12.8 J	1.9 J	3.8 J	1.7 J	3.5 J	0.69 J	0.38 J	0.7 J	4 U	0.29 J	0.42 J	0.97 J	0.68 J
Potassium	12,700	--	--	2,010	17,100	4,640	2,290	6,990	993 J	1,220	424 J	846 J	896 J	783 J	1,280	1,580	889 J	3,270
Selenium	--	50	7.8	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3.1 J	7 U	7 U	7 U	7 U	7 U	7 U
Silver	--	--	7.1	15 U	0.85 J	0.84 J	15 U	2.2 J	15 U	15 U	15 U	4 U	0.37 B	4 U	4 U	4 U	4 U	4 U
Sodium	64,500	--	--	14,400	35,800	7,070	9,790	19,800	8,890	7,520	2,310	9,760	9,980	30,600	2,220	8,030	6,980	4,770
Thallium	--	2	0.016	0.2 B	0.81 B	1.1 B	0.45 B	0.36 B	2 U	0.32 B	0.11 B	5 U	5 U	5 U	5 U	**1.1 J**	5 U	5 U
Vanadium	26.2	--	6.3	**11.8 J**	**24.8 J**	**55.2**	25 U	25 U	25 U	**11.1 J**	25 U	1.5 J	1.7 J	0.84 J	0.36 J	1.2 J	2.6 J	1.2 J
Zinc	4.52	--	470	13.2 J	55.7	39.1	10.5 J	50.4	25 U	9 J	4 J	0.85 B	0.9 B	10 UJ	0.83 B	14.8 B	3.8 B	0.92 B
Dissolved Metals (µg/l)																		
Aluminum, Dissolved	--	--	1,600	76.9 B	14.6 B	300 U	300 U	300 U	44.4 B	395	64.4 B	58.1 J	53.2 J	61.7 J	40.6 J	45.3 J	68.6 J	74.2 J
Antimony, Dissolved	--	6	0.6	0.15 J	0.17 J	0.16 J	0.23 J	0.19 J	0.18 J	0.22 J	0.26 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic, Dissolved	1.37	10	0.045	5 U	**3.4 J**	**45.4**	**11.9**	**2.5 J**	**1.6 J**	**1.8 J**	**1.9 J**	3.1 B	5 UJ	4.3 B	8.5 B	6.1 B	**5 J**	**1.7 J**
Barium, Dissolved	127	2,000	290	19.5	56.5	32.4	112	258	19.4	19.4	11.6	22.7	22.5	17.7	24.2	22.3	28.8	31
Cadmium, Dissolved	0.177	5	0.69	0.06 J	1 U	0.07 J	1 U	0.07 J	1 U	0.11 J	1 U	3 U	0.06 B	3 U	3 U	3 U	0.2 B	0.28 B
Calcium, Dissolved	113,000	--	--	139,000	92,800	89,500	135,000	111,000	131,000	126,000	80,700	160,000	155,000	136,000	105,000	126,000	132,000	132,000

TABLE 4-3

Groundwater Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Station ID	**CAX BKG 95% UTL Groundwater**	**MCLs**	**Adjusted Tapwater RSLs**	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID				CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date				11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chromium, Dissolved	6.04	100	0.031	**0.99 J**	**0.5 J**	**0.53 J**	**1.3 J**	**0.65 J**	15 U	**1.6 J**	15 U	**1 J**	**1 J**	**0.95 J**	**0.75 J**	**0.84 J**	**0.79 J**	**0.83 J**
Cobalt, Dissolved	--	--	0.47	**1.1 J**	30 U	30 U	30 U	0.45 J	**0.7 J**	**0.56 J**	30 U	0.34 J	0.39 J	4 U	4 U	4 U	4 U	4 U
Copper, Dissolved	--	1,300	62	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	3.5 B	2.4 B	2.2 K	1.9 B	1.9 B	2.6 B	2.8 B
Iron, Dissolved	275	--	1,100	95.5 J	**15,400**	**6,780**	**14,500**	**28,600**	299	840	38.8 B	26.8 B	25.6 B	582 J	923	**1,870**	576	18.7 B
Lead, Dissolved	--	15	15	5 U	5 U	1.5 J	5 U	5 U	5 U	5 U	1 J	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium, Dissolved	11,200	--	--	3,020	16,500	2,860	5,420	9,500	2,160	1,950	905	3,600 J	3,390	1,480 J	1,260	3,320	2,530	2,480
Manganese, Dissolved	49.5	--	32	**36.8**	**520**	**258**	**163**	**377**	**184**	**41.8**	24.7	**379**	**395**	**36.2 J**	**46.7**	**360**	**80.3**	**99**
Nickel, Dissolved	--	--	30	4.6 J	0.69 B	1.2 B	1.2 B	1.8 J	2 J	1 J	0.29 J	0.87 J	0.77 J	4 U	4 U	4 U	4 U	0.72 J
Potassium, Dissolved	12,600	--	--	1,360	15,000	1,800	1,970	6,550	1,080	776 J	380 J	903 J	891 J	878 J	1,280	1,450	669 J	3,170
Selenium, Dissolved	--	50	7.8	10 U	10 U	10 U	10 U	10 U	4.3 B	10 U	10 U	3.4 J	3 J	7 U	7 U	7 U	7 U	2.8 J
Silver, Dissolved	--	--	7.1	15 U	0.84 J	15 U	15 U	0.97 J	15 U	15 U	15 U	4 U	0.35 B	4 U	4 U	0.3 B	4 U	4 U
Sodium, Dissolved	62,800	--	--	14,300	35,500	7,340	9,150	19,500	9,230	7,450	2,280	10,000	9,810	29,800	2,260	7,080	6,190	4,760
Vanadium, Dissolved	--	--	6.3	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	1.6 J	1.7 J	0.8 J	0.43 J	0.69 J	0.81 J	0.88 J
Zinc, Dissolved	--	--	470	25 U	25 U	2.8 B	25 U	2.5 B	4.2 J	3.5 J	2.2 J	2.2 B	0.76 B	0.94 B	1.4 B	0.94 B	1.9 B	9.1 B
Wet Chemistry (mg/l)																		
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	370	NA	260	250	340	350	340
Nitrate	--	10	2.5	NA	NA	NA	NA	NA	NA	NA	NA	0.5	NA	0.044 J	0.026 J	0.025 U	0.025 U	0.069
Nitrite	--	1	0.16	NA	NA	NA	NA	NA	NA	NA	NA	0.033 J	NA	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	14	NA	8.2	4.5	0.34 J	11	8.6
Wet Chemistry (µg/l)																		
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	3.9 J	NA	0.91 J	18	6,000	7.4 J	5 J

Notes:
CAX 95% UTL Groundwater (GW) Background values are shown for reference only, no exceedances are formatted.
Bold box indicates exceedance of MCLs
Bold text indicates exceedance of Adjusted Tapwater RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
NA - Not analyzed
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4

Site 4 Groundwater Quality Data

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Sample ID	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05	CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Date	11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Field Parameter[1]														
Temperature °C	19.48	17.30	NR	16.58	17.43	17.60	17.59	17.60	15.28	15.90	15.88	15.94	16.59	16.16
Conductivity (ms/cm)	0.770	0.850	NR	0.830	0.740	0.730	0.850	0.400	0.658	17.650	0.447	15.370	16.210	0.601
Salinity (pct)	0	0	NR	0	0	0	0	0	NR	NR	NR	NR	NR	NR
pH	6.80	6.83	NR	6.76	6.75	7.18	7.15	7.45	6.73	7.12	7.01	6.94	6.88	6.71
ORP (mV)	-71	-156	NR	-185	-150	-255	-178	-242	198.8	-207.1	-12.8	-266.7	-248.3	231.4
Turbidity (NTU)	55	179	NR	7.3	35.8	6.8	315	12	2.2	0.0	2.5	0.0	23.5	2.8
Dissloved Oxygen mg/L)	2.91	0.00	NR	0.00	0.00	1.89	1.81	0.00	0.55	0.74	0.39	0.20	0.39	0.39
Ferrous Iron (mg/L)	NR	NR	NR	NR	NR	NR	NR	NR	0.0	NR	0.0	2.2	1.2	0.0

Notes:

[1] Field parameters presented are the final parameter readings collected before groundwater sample collection

˚C - Degrees Celsius

ft - Feet

mg/L - Milligrams per liter

ms/cm - Milli-siemens per centimeter

mv - Millivolts

NTU - Nephlometeric turbidity units

PCT - Percent

pH - Standard pH units

NR - Not Recorded

TABLE 4-5

Surface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond									Upstream Pond	
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01	
Sample ID				CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A
Sample Date				12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09
Chemical Name														
Volatile Organic Compounds (UG/KG)														
2-Butanone	1,445	--	28,000,000	40 UJ	39 J	36 UJ	56 J	12 J	15 B	17.5 U	10 B	12 B	26 UJ	31 UJ
Acetone	--	--	61,000,000	140 J	270 J	74 J	250 J	37 B	44 B	17 B	23 B	36 B	210 J	33 B
Carbon disulfide	4.55	4.55	740,000	8 UJ	21 UJ	2 J	3 J	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ
Ethylbenzene	19,264	5,880	54,000	8 UJ	21 UJ	7 UJ	7 UJ	2 J	20.5 UL	17.5 U	3 J	26.4 U	5 UJ	6 UJ
Methyl acetate	--	--	29,000,000	15 UJ	38 UJ	13 UJ	5 J	NA	NA	NA	NA	NA	9 UJ	11 UJ
Methylcyclohexane	--	--	--	8 UJ	4 J	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ
Tetrachloroethene	2,836	2,504	86,000	50 J	49 J	5 J	11 J	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	11 J
Toluene	3,585	--	820,000	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	3 L	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ
Xylene, total	856	--	260,000	24 UJ	64 UJ	22 UJ	21 UJ	15.8 U	20.5 UL	17.5 U	10 J	26.4 U	16 UJ	19 UJ
Semivolatile Organic Compounds (UG/KG)														
2-Methylnaphthalene	70	20.2	230,000	29 UL	19 J	29 UL	6.1 L	550 U	1,200 U	530 U	1,200 U	1,600 U	25 UL	24 UL
Acenaphthene	290	6.7	3,400,000	29 U	300	4.9 J	3.2 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U
Acenaphthylene	160	5.9	3,400,000	1.8 J	34 J	5 J	2.6 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U
Anthracene	57.2	57.2	17,000,000	4.6 J	66 J	16 J	4.1 J	550 U	1,200 U	530 U	1,200 U	1,600 U	2.8 J	24 U
Benzo(a)anthracene	108	108	1,500	33 B	260	110	16 B	140 J	260 J	170 J	290 J	270 J	19 B	9 B
Benzo(a)pyrene	150	150	150	31 J	**250**	120	13 B	**160 J**	**260 J**	**170 J**	**330 J**	**340 J**	17 B	9 B
Benzo(b)fluoranthene	240	27.2	1,500	62 J	420	280	31 B	220 J	370 J	330 J	450 J	550 J	34 B	16 B
Benzo(g,h,i)perylene	170	170	1,700,000	8.3 B	83 J	65 L	27 UL	56 J	130 J	84 J	1,200 U	180 J	25 UL	24 UL
Benzo(k)fluoranthene	240	240	15,000	19 B	130	82	8.5 B	120 J	290 J	170 J	420 J	440 J	12 B	6.3 B
bis(2-Ethylhexyl)phthalate	750	180	350,000	140 U	420 U	150 U	130 U	110 J	170 J	160 J	140 J	280 J	120 U	120 U
Butylbenzylphthalate	58,850	58,224	2,600,000	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U
Carbazole	140	--	--	6.7 B	34 J	19 J	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	5 B	24 U
Chrysene	166	166	150,000	30 J	280	150	19 J	190 J	400 J	240 J	460 J	490 J	18 J	9.2 J
Dibenz(a,h)anthracene	33	33	150	6.8 B	110 J	27 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U
Dibenzofuran	5,100	415	78,000	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U
Di-n-butylphthalate	110	6,466	6,100,000	140 U	420 U	150 U	130 U	64 J	1,200 U	81 J	1,200 U	1,600 U	120 U	120 U
Di-n-octylphthalate	--	--	610,000	920 U	2,700 U	930 U	850 U	550 U	1,200 U	530 U	1,200 U	1,600 U	800 U	780 U
Fluoranthene	423	423	2,300,000	75	510	260	37	260 J	640 J	410 J	600 J	580 J	42	22 J
Fluorene	77.4	77.4	2,300,000	29 U	420	6.1 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U
Indeno(1,2,3-cd)pyrene	200	17	1,500	19 B	230	81	27 U	550 U	160 J	95 J	1,200 U	210 J	9.9 B	4.9 B
Naphthalene	176	176	36,000	29 U	280	29 U	5.7 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U
PAHs (HMW), calculated	2,900	190	--	223.1	2,143	1121.5	129.8	1,666	3,040	1,874	4,360	3,870	126.95	75.8
PAHs (LMW), calculated	786	76	--	191.9	2,091	432.5	104.7	2,305	5,170	2,475	5,140	6,510	139.8	118
Pentachlorophenol	2,696	2,696	8,900	140 UL	110 J	150 UL	130 UL	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	120 UL	120 UL
Phenanthrene	204	204	17,000,000	38	420	100	19 J	120 J	330 J	210 J	340 J	330 J	20 J	12 J
Pyrene	195	195	1,700,000	57	380	220	36	230 J	570 J	350 J	610 J	590 J	38	20 J
Pesticide/Polychlorinated Biphenyls (UG/KG)														
4,4'-DDD	4.88	4.88	20,000	3.6 B	97 J	6.6 J	48 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.6 B	4.1 U
4,4'-DDE	3.16	3.16	14,000	1 B	11 J	2.1 B	12 J	5.5 U	6 UL	5.2 U	9 L	7.8 UL	1.9 B	0.92 J
4,4'-DDT	4.16	4.16	17,000	4.8 UJ	97 J	6.3 J	8.7 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.7 B	2.1 J
Aldrin	2	2	290	2.5 UJ	7.1 UJ	2.4 UL	0.85 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
alpha-Chlordane	3.24	3.24	16,000	2.5 UJ	7.1 UJ	2.4 UL	1.7 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
Aroclor-1242	59.8	59.8	2,200	26 U	75 UL	26 U	25 U	55 U	60 UL	52 U	60 UL	78 UL	25 UJ	22 U
Aroclor-1248	59.8	59.8	2,200	27 U	79 UL	27 U	26 U	55 U	60 UL	52 U	19 L	78 UL	27 UJ	24 U
Aroclor-1254	59.8	59.8	1,100	24 U	71 UL	24 U	24 U	55 U	60 UL	52 U	60 UL	78 UL	24 UJ	21 U
Aroclor-1260	59.8	59.8	2,200	160 J	1,200 L	160	100	270 K	91 L	52 U	240 L	25 JP	30 J	25
Dieldrin	1.9	1.9	300	1.7 J	14 UJ	2.4 B	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U
Endosulfan I	15.52	15.52	370,000	2.5 UJ	7.1 UJ	2.4 UL	1.6 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
Endosulfan II	74.9	74.9	370,000	4.8 UJ	110 J	4.7 UL	1.3 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U
Endosulfan sulfate	28.9	28.9	370,000	4.8 UJ	14 UJ	35 J	14 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U
Endrin	2.22	2.22	18,000	17 J	14 UJ	4.7 UL	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U
Endrin aldehyde	2.22	--	18,000	3.3 J	14 UJ	4.2 J	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U
gamma-BHC (Lindane)	2.37	2.37	5,200	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
gamma-Chlordane	3.24	3.24	16,000	2.5 UJ	11 J	1.1 L	2.1 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
Heptachlor	363.8	363.8	1,100	2.5 UJ	7.1 UJ	2.4 UL	0.69 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
Heptachlor epoxide	2.47	2.47	530	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U
Methoxychlor	101.7	100.05	310,000	25 UJ	71 UJ	24 UL	23 UJ	28 U	31 UL	27 U	31 UL	40 UL	24 UJ	21 U
Explosives (UG/KG)														
No Detections														
Total Metals (MG/KG)														
Aluminum	25,500	--	77,000	17,800	15,000	6,490	5,090	8,340 L	6,070 L	5,950 L	4,210 L	4,070 L	5,440	5,150
Antimony	3.00	2.00	31	0.5 L	2.2 L	0.79 UL	0.86 UL	1.7 B	0.67 U	0.62 U	0.65 U	0.65 U	0.83 UL	0.72 UL
Arsenic	9.79	9.80	6.1	**17.9 K**	**43.6 L**	**6.8 K**	**7.4 K**	**12.2 L**	4.5	3.2	**8.8**	**7.2**	3.5 K	2.7 K
Barium	20.0	--	15,000	56	118	21.6	80.1	71.7 J	27.1 J	24.9 J	27.5 J	23.6 J	11.7	9.9
Beryllium	--	--	160	0.98	0.87 J	0.4 J	0.3 J	0.73 B	0.56 J	0.6 J	0.36 J	0.22 J	0.25 J	0.22 J
Cadmium	0.99	0.99	70	0.45	2.9	0.6	0.46	5.7	3.2	2.9	0.79 J	0.52 J	0.11	0.07 J
Calcium	--	--	--	12,400	15,400	2,060	1,570	25,200	4,550 J	3,380 J	4,310 J	3,400 J	704	601
Chromium	43.4	43.4	2.9	**43.1 K**	**29.2 L**	**12.7 K**	**8.9 K**	**35.8**	**17.9**	**17.2**	**9.5**	**7.7**	**11.1 K**	**9.8 K**

				Upstream Pond									Upstream Pond	
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01	
Sample ID				CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A
Sample Date				12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09
Chemical Name														
Chromium (hexavalent)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50	50	23	3.6 J	3.2 J	1.8 J	1.3 J	4.6 J	3.9 J	2.9 J	1.8 U	1.8 U	0.97 J	0.83 J
Copper	31.6	31.6	3,100	4.1	85.3 J	26.3	7.6	30.7	62.7 J	65.3 J	33.5 J	21.2 J	3.3	2.6
Cyanide	--	0.1	22	0.91 U	2.7 U	0.98 U	0.98 U	0.04 UL	0.04 UL	0.03 UL	0.04 UL	0.04 UL	0.91 U	0.84 U
Iron	20,000	20,000	55,000	24,700 J	23,900	9,860 J	6,910 J	15,400	14,300 L	14,100	9,410 L	8,490 L	7,430 J	6,370 J
Lead	35.8	35.8	4,000	13.5	41.8	15.9	230	52.3	24.6	20.3	20.6	16	9.2	6.8
Magnesium	--	--	--	2,500 K	2,690	1,010 K	499 K	2,790	1,730	1,780	1,070 J	912 J	626 K	563 K
Manganese	460	460	1,800	37.3 J	119	59.1 J	17.3 J	62	93.4	74.9	72.7	60	14.8 J	14.2 J
Mercury	0.18	0.18	23	0.03 J	0.14	0.02 J	0.02 J	0.07 J	0.04 UL	0.03 UL	0.04 UL	0.04 L	0.02 J	0.02 J
Nickel	22.7	22.7	1,500	10.7	13.4	4	3.3 J	23.6	7.9 J	7.3 J	5 J	4.5 J	2.2 J	2.1 J
Potassium	--	--	--	2,170 K	1,100 K	1,210 K	560 K	1,210 J	1,290 J	1,550	352 B	368 B	637 K	598 K
Selenium	2	2	390	0.43 B	1.4 J	0.36 B	0.24 B	1.1 U	0.91 U	0.84 U	0.89 U	0.88 U	0.44 B	0.36 B
Silver	1	1	390	0.15 J	4.1 U	0.2 J	0.15 J	5.6 B	5.1 B	3.9 B	2.8 B	2 B	0.16 J	0.16 J
Sodium	--	--	--	65.7 B	235 J	27 B	24.2 B	191 B	118 B	101 B	73.6 B	80.3 B	23.4 B	22.3 B
Thallium	--	--	0.78	0.53 J	4.1 U	1.5 U	1.6 U	0.91 UL	0.73 UL	0.67 UL	0.71 UL	0.71 UL	1.6 U	1.3 U
Vanadium	57	--	390	53.8 K	38.1	17.2 K	12.3 K	36.6	21.9	21.1	15.1	13.2 J	14.6 K	12.8 K
Zinc	121	121	23,000	29.6 K	207	89.7 K	60 K	147	145	130	228	180	11.8 K	9.7 K
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)														
Zinc, SEM	--	--	--	0.0318 K	1.6	0.705 K	0.498 K	NA	NA	NA	NA	NA	0.0058 K	NA
Acid volatile sulfide, SEM	--	--	--	0.15 U	0.79	0.15 U	4.6	NA	NA	NA	NA	NA	0.14 U	NA
Cadmium, SEM	--	--	--	6.70E-04 J	0.0171	0.0021 J	0.0019 J	NA	NA	NA	NA	NA	5.00E-04 J	NA
Copper, SEM	--	--	--	0.0135 L	0.397	0.0627 L	0.0068 L	NA	NA	NA	NA	NA	0.0076 L	NA
Lead, SEM	--	--	--	0.0195 J	0.108	0.0327 J	0.527 J	NA	NA	NA	NA	NA	0.00611 J	NA
Mercury, SEM	--	--	--	7.60E-05 R	2.10E-04 U	7.50E-05 R	7.10E-05 R	NA	NA	NA	NA	NA	2.80E-05 J	NA
Nickel, SEM	--	--	--	0.0045 B	0.041 J	0.0086 B	0.01 B	NA	NA	NA	NA	NA	0.0029 B	NA
Silver, SEM	--	--	--	0.0042 UL	0.0118 U	2.10E-04 J	0.0039 UL	NA	NA	NA	NA	NA	0.0037 UL	NA
Wet Chemistry														
Ammonia (mg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	--	--	7.6	6.2	6.9	6.8	NA	NA	NA	NA	NA	6.3	6.9
Total organic carbon (TOC) (ug/g)	--	--	--	43,000	250,000	60,000	38,000	NA	NA	NA	NA	NA	25,000	17,000
Grain Size (PCT)														
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates exceedance of SD ESVs

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL

Bold box indicates exceedance of BTAG

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE 4-5

Surface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond												
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21
Sample ID				CAS04-SD02-1209A	CAS04-SD03-1209A	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012
Sample Date				12/09/09	12/09/09	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12
Chemical Name																
Volatile Organic Compounds (UG/KG)																
2-Butanone	1,445	--	28,000,000	42 UJ	37 UJ	21 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	61,000,000	34 B	13 B	100 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	4.55	4.55	740,000	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	19,264	5,880	54,000	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	--	--	29,000,000	15 UJ	13 UJ	10 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	--	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	2,836	2,504	86,000	8 J	28 J	42 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	3,585	--	820,000	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene, total	856	--	260,000	26 UJ	22 UJ	16 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																
2-Methylnaphthalene	70	20.2	230,000	34 UL	4 L	25 UL	11 J	31 U	16 J	8 J	13 U	18 U	29 J	23 U	32 U	21 U
Acenaphthene	290	6.7	3,400,000	2.9 J	4.3 J	7.9 J	29 J	21 J	32 J	32 J	4 J	13 J	33 J	23 U	6.1 J	7.9 J
Acenaphthylene	160	5.9	3,400,000	2.3 J	120	83 K	36 J	26 J	17 J	19 J	2 J	9.9 J	9.2 J	23 U	4.8 J	5.9 J
Anthracene	57.2	57.2	17,000,000	5.6 J	260	75 K	66 J	53 J	86	54	5.3 J	32 J	41	7.3 J	17 J	18 J
Benzo(a)anthracene	108	108	1,500	35 B	1,300	1,500	590	510	440	310	26 J	230	210	55	110	120
Benzo(a)pyrene	150	150	150	36	**2,100**	**1,500**	**520**	**460**	**440 L**	**330**	33	**220**	**440**	60	120	120
Benzo(b)fluoranthene	240	27.2	1,500	76	**3,900**	**3,300**	910	820	880 L	540	75	390	580	110	220	210
Benzo(g,h,i)perylene	170	170	1,700,000	7.1 B	1,900 L	490 J	310	270	250 L	170	27 L	130 L	210	33 J	68	66
Benzo(k)fluoranthene	240	240	15,000	24 J	1,600	1,100	280	240	290 L	220	24 J	140	180	34 J	97	95
bis(2-Ethylhexyl)phthalate	750	180	350,000	170 U	120 J	130 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	58,850	58,224	2,600,000	550 U	490 U	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	140	--	--	8.6 B	31	49 K	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	166	166	150,000	35	2,700	1,900	650	560	790 L	510	65	360	300	79	190	200
Dibenz(a,h)anthracene	33	33	150	34 U	**660**	**320 K**	130	110	97 L	66	9.1 J	48	88	12 J	14 J	24 J
Dibenzofuran	5,100	415	78,000	550 U	490 U	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	110	6,466	6,100,000	170 U	72 J	130 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	--	--	610,000	1,100 U	950 U	820 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	423	423	2,300,000	72	320	1,800	920	790	890 L	530	40	420	260	120	280	230
Fluorene	77.4	77.4	2,300,000	34 U	14 B	12 B	52 J	46 J	60	48 J	5.3 J	23 J	50	23 U	12 J	14 J
Indeno(1,2,3-cd)pyrene	200	17	1,500	23 B	**2,800**	1,500	680 J	570 J	380 L	260 K	34	180	340 K	44 K	95 K	100 K
Naphthalene	176	176	36,000	34 U	6.6 J	25 U	14 J	31 U	9 J	9.5 J	4 J	18 U	360	23 U	11 J	21 U
PAHs (HMW), calculated	2,900	190	--	284.6	18,060	15,410	5,070	4,460	4,447	3,176	342.1	2,218	2,618	547	1,154	1,185
PAHs (LMW), calculated	786	76	--	189.8	835	2,209	1,648	1,417	1,570	1,041	87.1	766	942	243.8	486.9	416.8
Pentachlorophenol	2,696	2,696	8,900	170 UL	150 UL	24 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	204	204	17,000,000	39	98	200 K	520	450	460	340	20 J	250	160	59	140	120
Pyrene	195	195	1,700,000	64	1,100	3,800	1,000	920	880 L	770	49	520	270	120	240	250
Pesticide/Polychlorinated Biphenyls (UG/KG)																
4,4'-DDD	4.88	4.88	20,000	5.6 U	380 J	310	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	3.16	3.16	14,000	1.8 J	600 J	160 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	4.16	17,000	5.6 U	1,600 J	55 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	2	2	290	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	3.24	16,000	2.9 U	17 J	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	59.8	59.8	2,200	31 U	280 U	24 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U
Aroclor-1248	59.8	59.8	2,200	32 U	300 U	25 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U
Aroclor-1254	59.8	59.8	1,100	29 U	**21,000**	22 U	560 L	420 L	620	270 J	11 U	240	14 U	20 U	25 U	16 U
Aroclor-1260	59.8	59.8	2,200	200	280 U	50 K	**2,400 L**	1,500 L	**2,400**	1,300 J	90	980	69 J	290 J	1,000 J	630 J
Dieldrin	1.9	1.9	300	1.8 J	**1,400 J**	47 K	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	15.52	15.52	370,000	1.7 J	58 L	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	74.9	74.9	370,000	5.6 U	830 J	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	28.9	28.9	370,000	5.6 U	5.2 UL	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	2.22	2.22	18,000	9.6	1,200	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	--	18,000	5.6 U	290 J	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	2.37	5,200	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	3.24	16,000	2 J	780 J	14 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	363.8	363.8	1,100	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	2.47	530	2.9 U	**540 J**	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	101.7	100.05	310,000	29 U	520 J	22 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives (UG/KG)																
No Detections																
Total Metals (MG/KG)																
Aluminum	25,500	--	77,000	5,560	20,400	11,800	27,100	30,900	15,000	9,440	1,570	13,800	14,400	21,100	18,700	8,490
Antimony	3.00	2.00	31	1.3 UL	2 L	0.83 UL	1.1 J	0.94 J	1.1 L	0.34 J	0.4 U	0.86 J	0.83 J	0.47 J	0.78 J	0.63 J
Arsenic	9.79	9.80	6.1	3.5 K	**8.6 K**	4.5 K	**38**	**42.2**	**19**	**26.6**	1.4	**14.3**	**111**	**20.1**	**18.1**	**7.3**
Barium	20.0	--	15,000	25.3	80.8	166	90	103	51.8	37.8	8.4	46	78.6	74.7	76.7	34.5
Beryllium	--	--	160	0.28 J	0.78	0.49 J	1.4 J	1.6	0.97	0.49 J	0.14 J	0.87	0.47 J	0.99	0.98	0.51 J
Cadmium	0.99	0.99	70	0.39	4.7	0.24	8.4	9.6	7.2	1.2	0.3 J	5.3	0.54 J	2.1	3.3	2.5
Calcium	--	--	--	12,300	9,290	2,130	22,300	25,000	12,600	9,660	1,890 B	18,200 B	6,900	16,100	17,400	14,200
Chromium	43.4	43.4	2.9	**9.6 K**	**49.7 K**	**17 K**	**50.2**	**57**	**28.8**	**14.5**	**5.5**	**24.9**	**23.9**	**32.6**	**31.4**	**18.8**

				Upstream Pond												
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21
Sample ID				CAS04-SD02-1209A	CAS04-SD03-1209A	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012
Sample Date				12/09/09	12/09/09	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12
Chemical Name																
Chromium (hexavalent)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50	50	23	1.2 J	5.1 J	2.5 J	8	9.6	4.7	2.5	0.67 B	4.1	3.1	4.7	5.1	2.8
Copper	31.6	31.6	3,100	11.1	142	6.9	172	197	106 K	24.2	7.5	63.4	19.6	41.7	85.6	68.4
Cyanide	--	0.1	22	1.3 U	0.98 U	0.91 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	20,000	20,000	55,000	7,030 J	25,900 J	12,600 J	38,200	44,000	27,300	13,900	4,010	25,200	13,300	24,600	24,500	15,900
Lead	35.8	35.8	4,000	17.2	417	200	76.4	85	49.1 L	27.2	4.5	41.2	42.6	44	76.7	23.2
Magnesium	--	--	--	652 K	2,010 K	909 K	5,140	5,980	2,580 K	1,230	522 B	2,100 B	2,540	2,160	2,800	1,820
Manganese	460	460	1,800	43.2 J	140 J	101 J	251	290	126	71.3	13.5	106	75.1	91.3	121	74.4
Mercury	0.18	0.18	23	0.05 J	0.62	0.01 J	0.19	0.17	0.14 K	0.09 J	0.01 B	0.09	0.05	0.17	0.14	0.06
Nickel	22.7	22.7	1,500	3.5 J	16.6	4.4	23.2	27.2	14.6	7.9	1.4 B	10.8	26.3	11.7	13.5	7.9
Potassium	--	--	--	504 K	1,580 K	771 K	3,130	3,520	1,890 K	724	701 B	1,880 B	607	1,740	2,000	1,500
Selenium	2	2	390	0.67 B	0.57 B	0.31 B	0.8 J	1.1 J	0.96 U	1.2 U	0.56 U	0.9 U	0.82 U	1.1 U	0.41 J	0.8 U
Silver	1	1	390	0.18 J	6.1	0.14 J	0.79 J	0.96 J	0.55 U	0.1 J	0.05 J	0.63 J	0.14 J	0.06 J	0.26 J	0.12 J
Sodium	--	--	--	57.9 B	186 B	40.9 B	175 J	187 J	74.7 J	51.1 J	18.8 B	74.4 B	70.5 J	75.8 J	91.5 J	97.8 J
Thallium	--	--	0.78	2.5 U	1.7 U	0.15 J	1.6 U	1.6 U	0.68 U	0.88 U	0.4 U	0.64 U	0.59 U	0.8 U	0.89 U	0.58 U
Vanadium	57	--	390	14.7 K	37.6 K	24.2 K	64.5	73.4	40.2	23.4	5.3	32.8	31.5	45.8	44.2	23
Zinc	121	121	23,000	32.1 K	475 K	56.2 K	544	626	405	424	29	240	88.5	244	354	178
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																
Zinc, SEM	--	--	--	0.197 K	1.16 K	0.202 K	5.98	NA	4.18	0.869	0.21	0.188	0.21	1.87	3.51	1.32
Acid volatile sulfide, SEM	--	--	--	0.18 U	0.16 U	0.18	48	NA	25	3.7	0.51	0.85	0.88	26	16	16
Cadmium, SEM	--	--	--	0.0032	0.00948	1.40E-04 J	0.0491	NA	0.0309	0.0015 J	0.00146	0.00203	0.00395	0.00367	0.012	0.0158
Copper, SEM	--	--	--	0.136 L	0.343 L	0.0431 L	0.882	NA	0.185	0.017	0.0431	0.0345	0.0114	0.06	0.158	0.291
Lead, SEM	--	--	--	0.0611 J	0.303 J	0.276 J	0.242	NA	0.117	0.0151	0.00619	0.00771	0.028	0.146	0.159	0.0584
Mercury, SEM	--	--	--	8.80E-05 R	7.20E-05 J	6.60E-05 R	7.20E-05 U	NA	4.70E-05 U	3.80E-05 U	2.30E-05 U	3.60E-05 U	2.50E-05 U	4.40E-05 U	7.00E-05 U	3.50E-05 U
Nickel, SEM	--	--	--	0.022 J	0.035	0.0058 B	0.141	NA	0.0515	0.0086	0.00462	0.0044 J	0.0363	0.0323	0.0382	0.0374
Silver, SEM	--	--	--	4.90E-04 J	0.00624 J	0.0037 UL	0.003 U	NA	0.0027 J	4.60E-04 J	9.50E-04 U	0.0015 U	2.60E-04 J	0.00611	0.0018 J	0.0017 J
Wet Chemistry																
Ammonia (mg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	74	210	110	120
pH (ph)	--	--	--	7.7	7.6	7.1	6.5	NA	6.7	6.2	6.8	6.8	7	6.7	6.6	6.7
Total organic carbon (TOC) (ug/g)	--	--	--	62,000	40,000	16,000	88,000	NA	58,000	100,000	12,000	33,000	36,000	66,000	92,000	34,000
Grain Size (PCT)																
Gravel (%)	--	--	--	NA	NA	NA	3.6	NA	1.5	8.1	0	0	16.7	0.3	0.9	0.1
Sand (%)	--	--	--	NA	NA	NA	18.5	NA	33.3	60.4	98.4	91.5	62.3	16.1	11.6	74.5
Coarse Sand (%)	--	--	--	NA	NA	NA	3	NA	1.5	2.8	1.8	1.9	4.1	1.3	1.9	0.4
Medium Sand (%)	--	--	--	NA	NA	NA	2	NA	1.6	3.9	6.2	5.7	20.1	1.1	0.5	1.1
Fine Sand (%)	--	--	--	NA	NA	NA	13.5	NA	30.2	53.7	90.4	83.9	38.1	13.7	9.2	73
Fines (%)	--	--	--	NA	NA	NA	77.9	NA	65.2	31.5	1.6	8.6	21	83.6	87.5	25.4
GRAINSIZE (PCT/P)																
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	100	NA	100	100	100	100	100	100	100	100
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	100	NA	100	100	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	100	NA	100	100	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	100	NA	100	100	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	100	NA	100	100	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	98.7	NA	99.4	94	100	100	86.9	100	100	100
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	96.4	NA	98.5	91.9	100	100	83.3	99.7	99.1	99.9
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	93.4	NA	97	89.1	98.2	98.1	79.2	98.4	97.2	99.5
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	93	NA	96.9	88.9	97.6	97.1	67.7	98.2	97.1	99.4
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	91.4	NA	95.4	85.2	92	92.4	59.1	97.3	96.7	98.4
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	88.9	NA	91.6	66.2	48.2	57.4	48.6	96.7	95.7	83.8
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	86.4	NA	84.5	52.3	17	27.7	38.2	94.3	94	52.8
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	84.5	NA	78.2	44.9	6.6	16.6	32.2	91.8	92.2	36.2
Sieve No. 140 (106 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	77.9	NA	65.2	31.5	1.6	8.6	21	83.6	87.5	25.4

Notes:

Shading indicates exceedance of SD ESVs

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL

Bold box indicates exceedance of BTAG

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE 4-5

Surface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond		Stream									Youth Pond	
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02
Sample ID				CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012
Sample Date				10/02/12	10/02/12	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12
Chemical Name																
Volatile Organic Compounds (UG/KG)																
2-Butanone	1,445	--	28,000,000	NA	NA	51 J	25 J	29 U	33 U	34 UJ	44 J	NA	NA	NA	18 J	110
Acetone	--	--	61,000,000	NA	NA	230 J	120 J	24 B	34 B	42 B	170 J	NA	NA	NA	73 L	470
Carbon disulfide	4.55	4.55	740,000	NA	NA	2 J	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	7.4 U	24 U
Ethylbenzene	19,264	5,880	54,000	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U
Methyl acetate	--	--	29,000,000	NA	NA	16 UJ	12 UJ	10 U	12 U	12 UJ	14 UJ	NA	NA	NA	7.4 U	24 U
Methylcyclohexane	--	--	--	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U
Tetrachloroethene	2,836	2,504	86,000	NA	NA	14 J	8 J	6 U	5 J	4 J	15 J	NA	NA	NA	1.5 UL	4.8 U
Toluene	3,585	--	820,000	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U
Xylene, total	856	--	260,000	NA	NA	26 UJ	21 UJ	17 U	20 U	20 UJ	24 UJ	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																
2-Methylnaphthalene	70	20.2	230,000	7 J	10 J	36 U	29 U	25 U	27 U	26 U	32 U	0.014 U	12 U	16 U	84 U	95 UL
Acenaphthene	290	6.7	3,400,000	18 J	30 J	12 J	29 U	25 U	27 U	26 U	3.2 J	0.014 J	4.1 J	8.1 J	84 U	95 UL
Acenaphthylene	160	5.9	3,400,000	14 J	20 J	30 J	29 U	25 U	27 U	26 U	5.4 J	0.0032 J	1.8 J	4.3 J	84 U	95 UL
Anthracene	57.2	57.2	17,000,000	53	82	55	29 U	25 U	27 U	26 U	2.3 J	0.031	11 J	23 J	84 U	95 UL
Benzo(a)anthracene	108	108	1,500	330	520	420	28 B	7.3 B	7.4 B	14 B	53	0.11	63	140	170 K	95 UL
Benzo(a)pyrene	150	150	150	**330**	**500**	**380**	18 J	25 U	27 U	9 J	54	0.12	57	140	**160 K**	95 UL
Benzo(b)fluoranthene	240	27.2	1,500	640	950	690	40 B	25 U	27 U	26 U	82	0.21	110	240	310 K	95 UL
Benzo(g,h,i)perylene	170	170	1,700,000	190	270	130 L	10 L	25 UL	27 UL	26 UL	16 L	0.056	31	63	110	95 UL
Benzo(k)fluoranthene	240	240	15,000	220	320	150	11 J	25 U	27 U	26 U	25 J	0.066	34	71	120	95 UL
bis(2-Ethylhexyl)phthalate	750	180	350,000	NA	NA	180 U	140 U	130 U	140 U	100 J	160 U	NA	NA	NA	590 J	750 U
Butylbenzylphthalate	58,850	58,224	2,600,000	NA	NA	590 U	470 U	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U
Carbazole	140	--	--	NA	NA	23 J	7.2 J	6 J	27 U	26 U	9 J	NA	NA	NA	660 U	750 U
Chrysene	166	166	150,000	560	810	440	17 J	25 U	27 U	3.1 J	55	0.16	87	190	230 K	95 UL
Dibenz(a,h)anthracene	33	33	150	74	110	120	16 J	25 U	27 U	26 U	16 J	0.02 J	11 J	25 J	84 U	95 UL
Dibenzofuran	5,100	415	78,000	NA	NA	590 U	470 U	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U
Di-n-butylphthalate	110	6,466	6,100,000	NA	NA	180 U	140 U	130 U	140 U	130 U	160 U	NA	NA	NA	660 U	750 U
Di-n-octylphthalate	--	--	610,000	NA	NA	1,100 U	920 U	810 U	880 U	840 U	1,000 U	NA	NA	NA	660 U	750 U
Fluoranthene	423	423	2,300,000	620	1,100	820	41	25 U	27 U	22 J	110	0.24 L	130 L	270 L	420 K	95 UL
Fluorene	77.4	77.4	2,300,000	36 J	58	30 J	29 U	25 U	27 U	26 U	5.7 B	0.016 J	5.8 J	12 J	84 U	95 UL
Indeno(1,2,3-cd)pyrene	200	17	1,500	290 K	420 K	300	23 J	25 U	27 U	11 J	42	0.084	44	100	92 J	95 UL
Naphthalene	176	176	36,000	26 U	12 J	6 J	29 U	25 U	27 U	26 U	32 U	0.0056 J	12 U	16 U	84 U	95 UL
PAHs (HMW), calculated	2,900	190	--	3,334	5,000	3,320	156	103.7 U	111.7 U	97.1	453	1.066	567	1,259	1,574	427.5 U
PAHs (LMW), calculated	786	76	--	1,111	1,902	1,329	155.5	112.5 U	121.5 U	122.7	245.8	0.48	240.7	493.4	1,242	755 U
Pentachlorophenol	2,696	2,696	8,900	NA	NA	180 UL	140 UL	130 UL	140 UL	130 UL	160 UL	NA	NA	NA	2,000 U	2,300 U
Phenanthrene	204	204	17,000,000	350	590	340	13 J	25 U	27 U	9.7 J	74	0.16	76	160	240 K	95 UL
Pyrene	195	195	1,700,000	700	1,100	690	27 J	25 U	27 U	15 J	110	0.24	130	290	340 K	95 UL
Pesticide/Polychlorinated Biphenyls (UG/KG)																
4,4'-DDD	4.88	4.88	20,000	NA	NA	34 J	4.5 J	1.6 J	4.3 UJ	21 J	12 J	NA	NA	NA	33 UL	38 UL
4,4'-DDE	3.16	3.16	14,000	NA	NA	9.1 J	1.4 J	4.1 U	4.3 UJ	6.7	13 J	NA	NA	NA	33 UL	38 UL
4,4'-DDT	4.16	4.16	17,000	NA	NA	37 J	4.3 J	4.1 U	0.83 J	43 J	4.6 J	NA	NA	NA	33 UL	38 UL
Aldrin	2	2	290	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	1 J	2.7 UJ	NA	NA	NA	33 UL	38 UL
alpha-Chlordane	3.24	3.24	16,000	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL
Aroclor-1242	59.8	59.8	2,200	21 U	18 U	32 U	52 J	22 U	24 U	25 U	20 J	12 U	10 U	12 U	66 U	150 UL
Aroclor-1248	59.8	59.8	2,200	21 U	18 U	34 U	26 U	24 U	25 U	26 U	30 U	12 U	10 U	12 U	66 U	150 UL
Aroclor-1254	59.8	59.8	1,100	21 U	510	330	24 U	21 U	22 U	24 U	27 U	12 U	10 U	12 U	66 U	150 UL
Aroclor-1260	59.8	59.8	2,200	**2,300 J**	1,600	320	44	23	24 U	230	29 U	380	500	390	48 J	150 UL
Dieldrin	1.9	1.9	300	NA	NA	5.9 UJ	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL
Endosulfan I	15.52	15.52	370,000	NA	NA	9.4 J	2.4 UJ	2.1 U	2.2 UJ	2.4 U	1.3 J	NA	NA	NA	33 UL	38 UL
Endosulfan II	74.9	74.9	370,000	NA	NA	9.4 J	1.1 J	0.64 J	4.3 UJ	2.9 J	1.5 J	NA	NA	NA	33 UL	38 UL
Endosulfan sulfate	28.9	28.9	370,000	NA	NA	5.9 UJ	3.4 J	4.1 U	4.3 UJ	18 J	5.3 UJ	NA	NA	NA	33 UL	38 UL
Endrin	2.22	2.22	18,000	NA	NA	5.9 UJ	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL
Endrin aldehyde	2.22	--	18,000	NA	NA	13 J	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL
gamma-BHC (Lindane)	2.37	2.37	5,200	NA	NA	3 UJ	0.78 J	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL
gamma-Chlordane	3.24	3.24	16,000	NA	NA	12 J	1.6 J	2.1 U	2.2 UJ	1.4 J	2 J	NA	NA	NA	33 UL	38 UL
Heptachlor	363.8	363.8	1,100	NA	NA	1.7 J	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL
Heptachlor epoxide	2.47	2.47	530	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL
Methoxychlor	101.7	100.05	310,000	NA	NA	30 UJ	24 UJ	21 U	22 UJ	24 U	27 UJ	NA	NA	NA	33 UL	38 UL
Explosives (UG/KG)																
No Detections																
Total Metals (MG/KG)																
Aluminum	25,500	--	77,000	17,600	16,800	10,100	5,510	11,400	11,600	6,550	7,320	6,580	7,580	10,200	2,620 K	13,600
Antimony	3.00	2.00	31	0.92 J	0.89 J	1.1 UL	0.8 UL	0.29 B	0.92 UL	0.34 B	0.44 B	0.18 B	0.42 U	0.26 B	2.62 U	4.83 U
Arsenic	9.79	9.80	6.1	**19.1**	**18**	4.9 L	2.5 L	3.3 L	3.6 L	5 L	**10.4 L**	3.5	4.5	5	2.65 J	**12.3**
Barium	20.0	--	15,000	62.8	56.1	31.6	17.1	27.7	26.9	19.5	21.8	25.7 B	21.2 B	35 B	17.9	80.3
Beryllium	--	--	160	1.1	0.93	0.57 J	0.34 J	0.65	0.64	0.39 J	0.38 J	0.43 J	0.5	0.59	0.233	0.959
Cadmium	0.99	0.99	70	5.9	5.2	0.32	0.17	0.44	0.36	0.65	0.16	1.2	1.4	1.6	0.499	0.698
Calcium	--	--	--	17,600	21,100	11,500	9,290	2,250	2,300	12,400	2,270	3,980	2,000 B	6,040	636	5,340
Chromium	43.4	43.4	2.9	**33.9**	**29.7**	**18.5 L**	**10.5 L**	**27.2 L**	**25.9 L**	**17.3 L**	**9.4 L**	**15.8**	**16**	**19.1**	**7.54**	**20.4**

				Upstream Pond		Stream									Youth Pond	
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02
Sample ID				CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012
Sample Date				10/02/12	10/02/12	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12
Chemical Name																
Chromium (hexavalent)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50	50	23	5.5	4.5	2.7 J	1.3 J	2.7	2.6 J	2.4 J	1.7 J	2.4	2.2	2.8	0.837 J	3.89
Copper	31.6	31.6	3,100	125	85.2	7.5 J	3.7 J	2.5 J	3.5 J	24.6 J	5.6 J	44.5	19.9	33.5	11.2	15.2
Cyanide	--	0.1	22	NA	NA	1.3 U	0.91 U	0.77 U	0.91 U	0.91 U	1.2 U	NA	NA	NA	0.3 U	0.33 J
Iron	20,000	20,000	55,000	30,200	28,900	13,200	6,690	11,800	12,000	13,600	6,400	11,000	12,300	13,000	4,100	15,700
Lead	35.8	35.8	4,000	53.7	46.3	17.5	5.7	5.7	5.6	10.6	14.2	13.6	13.3	23	15	36.6
Magnesium	--	--	--	3,330	2,730	1,350	1,010	1,630	1,640	1,750	545	2,020	1,410	1,660	379	1,070
Manganese	460	460	1,800	157	132	47.4	20.2	16.5	20.2	62.2	21.7	105 B	65.8 B	105 B	17.3	68.6
Mercury	0.18	0.18	23	0.15	0.08	0.12	0.02 J	0.02 J	0.02 J	0.01 J	0.04 J	0.03 J	0.02 J	0.13	0.0084 U	0.06
Nickel	22.7	22.7	1,500	15.6	12.9	6.5	2.9 J	7	7.4	6.9	4.6 J	6.6	5	8.3	2.24	6.63
Potassium	--	--	--	2,420	2,100	1,640 K	1,060 K	1,830 K	1,940 K	1,380 K	501 K	1,490	1,720	1,610	307	872
Selenium	2	2	390	1.1 U	1.2 U	0.87 J	0.37 J	0.3 J	0.33 J	0.25 J	1.5 U	0.22 J	0.39 J	0.47 J	2.62 U	4.83 U
Silver	1	1	390	0.17 J	0.25 J	0.18 B	1.5 U	1.1 U	0.08 B	1.3 U	2.2 U	0.34 J	0.45 J	0.36 J	0.656 U	1.21 U
Sodium	--	--	--	93.2 J	111 J	48.1 B	106 B	29.2 B	26.8 B	140	29.9 B	47.6 B	37.6 B	47.1 B	11.4 B	53.1 J
Thallium	--	--	0.78	0.78 U	0.85 U	2 U	1.5 U	1.1 U	1.7 U	1.3 U	0.5 J	0.44 U	0.42 U	0.42 U	2.62 U	4.83 U
Vanadium	57	--	390	45.8	40.8	23	12.2	30.4	30.6	19.5	15.6	18.6	18.6	24.3	6.81	30.3
Zinc	121	121	23,000	388	298	53.2	20.1	19.7	21.2	64.5	49.9	88	79	134	160	125
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																
Zinc, SEM	--	--	--	4.21	1.19	NA	NA	NA	NA	NA	NA	0.353	0.165	0.158	1.22 B	1.47
Acid volatile sulfide, SEM	--	--	--	58	14	NA	NA	NA	NA	NA	NA	0.11 U	0.091 U	0.12 U	0.12 U	0.45 U
Cadmium, SEM	--	--	--	0.044	0.0143	NA	NA	NA	NA	NA	NA	0.00542	0.00316	0.00848	0.00197	0.0063
Copper, SEM	--	--	--	0.206	0.228	NA	NA	NA	NA	NA	NA	0.198	0.0516	0.208	0.064	0.14
Lead, SEM	--	--	--	0.166	0.0526	NA	NA	NA	NA	NA	NA	0.0182	0.0177	0.0409	0.0335	0.13
Mercury, SEM	--	--	--	5.20E-05 U	5.30E-05 U	NA	NA	NA	NA	NA	NA	2.40E-05 U	2.20E-05 U	2.80E-05 U	2.00E-04 U	0.0091 U
Nickel, SEM	--	--	--	0.0831	0.0382	NA	NA	NA	NA	NA	NA	0.0175	0.00442	0.026	0.0092 U	0.066
Silver, SEM	--	--	--	0.0021 J	0.0016 J	NA	NA	NA	NA	NA	NA	1.50E-04 J	9.00E-04 U	4.10E-04 J	0.0013 U	0.0046 U
Wet Chemistry																
Ammonia (mg/kg)	--	--	--	230	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	--	--	6.8	6.1	7.4	8	8.2	NA	8	7.2	7.1	7.4	7.5	6.7	6.4
Total organic carbon (TOC) (ug/g)	--	--	--	62,000	46,000	36,000	19,000	2,300	NA	9,900	40,000	21,000	8,200	53,000	15,000	89,000
Grain Size (PCT)																
Gravel (%)	--	--	--	0.4	0	NA	NA	NA	NA	NA	NA	0.2	0.3	0.1	0.6	0.9
Sand (%)	--	--	--	34.1	47.4	NA	NA	NA	NA	NA	NA	75.1	76.5	63.2	NA	NA
Coarse Sand (%)	--	--	--	0.5	0.9	NA	NA	NA	NA	NA	NA	0.4	0.1	0.5	0.6	0.9
Medium Sand (%)	--	--	--	0.7	2.6	NA	NA	NA	NA	NA	NA	2.3	1.5	2.5	5	2
Fine Sand (%)	--	--	--	32.9	43.9	NA	NA	NA	NA	NA	NA	72.4	74.9	60.2	80.9	2
Fines (%)	--	--	--	65.5	52.6	NA	NA	NA	NA	NA	NA	24.7	23.2	36.7	12.9	94.2
GRAINSIZE (PCT/P)																
GS03 Sieve 3" (75 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	100	100	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	100	NA	NA	NA	NA	NA	NA	100	99.7	100	99.8	99.9
Sieve No. 004 (4.75 mm)	--	--	--	99.6	100	NA	NA	NA	NA	NA	NA	99.8	99.7	99.9	99.4	99.1
Sieve No. 010 (2.00 mm)	--	--	--	99.1	99.1	NA	NA	NA	NA	NA	NA	99.4	99.6	99.4	98.8	98.2
Sieve No. 020 (850 um)	--	--	--	98.9	98.9	NA	NA	NA	NA	NA	NA	99.2	99.5	98.8	98	97.1
Sieve No. 040 (425 um)	--	--	--	98.4	96.5	NA	NA	NA	NA	NA	NA	97.1	98.1	96.9	93.8	96.2
Sieve No. 060 (250 um)	--	--	--	96.5	85.8	NA	NA	NA	NA	NA	NA	79.8	80.2	83.7	66.5	95.5
Sieve No. 080 (180 um)	--	--	--	89.4	69.4	NA	NA	NA	NA	NA	NA	53.7	52.6	62.7	NA	NA
Sieve No. 100 (150 um)	--	--	--	81	61.7	NA	NA	NA	NA	NA	NA	38.7	38.7	50.1	NA	NA
Sieve No. 140 (106 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	16	94.4
Sieve No. 200 (75 um)	--	--	--	65.5	52.6	NA	NA	NA	NA	NA	NA	24.7	23.2	36.7	12.9	94.2

Notes:

Shading indicates exceedance of SD ESVs

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL

Bold box indicates exceedance of BTAG

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE 4-5

Surface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Youth Pond												York River Ditch
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11
Sample ID				CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012
Sample Date				10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12
Chemical Name																
Volatile Organic Compounds (UG/KG)																
2-Butanone	1,445	--	28,000,000	130	58	100	220	15	110	98	270	220	330 J	160 J	80	5.5 J
Acetone	--	--	61,000,000	480	230	360	710	52	440	420	960	810	1,200 J	630 J	320	26 J
Carbon disulfide	4.55	4.55	740,000	25 U	19 U	11 U	23 U	5.7 U	18 U	13 U	19 U	29 U	56 U	30 U	12 U	7.1 U
Ethylbenzene	19,264	5,880	54,000	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U
Methyl acetate	--	--	29,000,000	25 U	19 U	11 U	23 U	5.7 U	18 U	13 U	19 U	29 U	56 U	30 U	12 U	7.1 U
Methylcyclohexane	--	--	--	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U
Tetrachloroethene	2,836	2,504	86,000	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U
Toluene	3,585	--	820,000	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U
Xylene, total	856	--	260,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																
2-Methylnaphthalene	70	20.2	230,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	35 U
Acenaphthene	290	6.7	3,400,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	65
Acenaphthylene	160	5.9	3,400,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	320
Anthracene	57.2	57.2	17,000,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	44 J	600
Benzo(a)anthracene	108	108	1,500	98 UL	82 J	25 J	140 L	37 J	81 J	57 J	68 J	110 L	150 UL	110 UL	140	**2,400**
Benzo(a)pyrene	150	150	150	98 UL	58 J	56 U	140 L	25 J	64 J	45 J	50 J	84 L	150 UL	110 UL	130	**2,700**
Benzo(b)fluoranthene	240	27.2	1,500	98 UL	130	56 U	240 L	45 J	110 J	89	96 J	160 L	150 UL	110 UL	320	**3,700**
Benzo(g,h,i)perylene	170	170	1,700,000	98 UL	58 J	56 U	89 L	22 J	49 J	64 U	78 U	110 UL	150 UL	110 UL	62 J	1,600
Benzo(k)fluoranthene	240	240	15,000	98 UL	49 J	56 U	91 L	36 U	43 J	64 U	78 U	110 UL	150 UL	110 UL	90	1,200
bis(2-Ethylhexyl)phthalate	750	180	350,000	770 U	650 UJ	440 UL	380 UL	280 UL	700 U	500 UJ	610 U	910 U	1,200 U	900 U	470 UJ	280 UJ
Butylbenzylphthalate	58,850	58,224	2,600,000	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U
Carbazole	140	--	--	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U
Chrysene	166	166	150,000	98 UL	57 J	56 U	170 L	22 J	77 J	53 J	54 J	88 L	150 UL	110 UL	270	2,400
Dibenz(a,h)anthracene	33	33	150	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	**400**
Dibenzofuran	5,100	415	78,000	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U
Di-n-butylphthalate	110	6,466	6,100,000	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U
Di-n-octylphthalate	--	--	610,000	770 U	650 U	440 UL	380 UL	280 UL	700 U	440 J	610 U	910 U	1,200 U	900 U	470 U	280 U
Fluoranthene	423	423	2,300,000	98 UL	140	56 U	300 L	44 J	150	110	110	200 L	150 UL	110 UL	430	4,700
Fluorene	77.4	77.4	2,300,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	78
Indeno(1,2,3-cd)pyrene	200	17	1,500	98 UL	84 U	56 U	75 L	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	62 J	1,500
Naphthalene	176	176	36,000	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	67
PAHs (HMW), calculated	2,900	190	--	441 U	628	249	1,273	247	653	462	521	812	675 U	495 U	1,504	20,400
PAHs (LMW), calculated	786	76	--	777 U	759	444 U	928	310	832	604	688	1,040	1,200 U	890 U	1,159	8,188
Pentachlorophenol	2,696	2,696	8,900	2,300 U	2,000 U	1,300 UL	1,100 UL	840 UL	2,100 U	1,500 U	1,800 U	2,700 U	3,500 U	2,700 U	1,400 U	850 U
Phenanthrene	204	204	17,000,000	98 UL	84 U	56 U	150 L	36 U	65 J	52 J	78 U	110 UL	150 UL	110 UL	300	2,200
Pyrene	195	195	1,700,000	98 UL	110	56 U	280 L	42 J	140	90	97 J	150 L	150 UL	110 UL	400	4,500
Pesticide/Polychlorinated Biphenyls (UG/KG)																
4,4'-DDD	4.88	4.88	20,000	38 UL	66 UL	30 L	110 L	14 UL	35 UL	65 L	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
4,4'-DDE	3.16	3.16	14,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	93 L	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
4,4'-DDT	4.16	4.16	17,000	38 UL	66 UL	22 UL	3,300 L	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Aldrin	2	2	290	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
alpha-Chlordane	3.24	3.24	16,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Aroclor-1242	59.8	59.8	2,200	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U
Aroclor-1248	59.8	59.8	2,200	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U
Aroclor-1254	59.8	59.8	1,100	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U
Aroclor-1260	59.8	59.8	2,200	150 UL	140 J	89 U	150 UL	70 J	140 UL	100 J	120 UL	180 R	240 UL	180 UL	53 J	55 U
Dieldrin	1.9	1.9	300	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Endosulfan I	15.52	15.52	370,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Endosulfan II	74.9	74.9	370,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Endosulfan sulfate	28.9	28.9	370,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Endrin	2.22	2.22	18,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Endrin aldehyde	2.22	--	18,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
gamma-BHC (Lindane)	2.37	2.37	5,200	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
gamma-Chlordane	3.24	3.24	16,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Heptachlor	363.8	363.8	1,100	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Heptachlor epoxide	2.47	2.47	530	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Methoxychlor	101.7	100.05	310,000	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL
Explosives (UG/KG)																
No Detections																
Total Metals (MG/KG)																
Aluminum	25,500	--	77,000	15,100	3,120	6,160	12,500	2,670	11,600	6,090	15,000	19,200	14,100	12,000	11,700	1,780
Antimony	3.00	2.00	31	6.4 U	2.84 J	2.53 U	2.4 J	1.6 U	4.72 U	3.09 U	3.11 U	5.42 U	3.72 J	2.52 J	1.8 J	0.882 J
Arsenic	9.79	9.80	6.1	**11.4 J**	**8.77 J**	**45**	**265**	2.97 J	**12.5**	**11.5**	**14.7**	**20.4**	**14 J**	**13.7**	**191**	3.79 J
Barium	20.0	--	15,000	89.5	20.4	38.2	100	13	74	26.2	101	108	75.3	64.3	79.5	12.8
Beryllium	--	--	160	1.07	0.307	0.446	0.881	0.272	0.916	0.303	0.978	1.26	1.09	0.922	0.826	0.17
Cadmium	0.99	0.99	70	0.79	0.79	0.678	2.7	0.345	1.5	0.425	0.495	1.13	0.356 J	0.63	0.985	0.101 J
Calcium	--	--	--	5,250	5,370	7,660	9,010	3,530	5,910	4,170	6,950	8,800	16,700	15,800	34,200	5,310
Chromium	43.4	43.4	2.9	**23.1**	**8.27**	**12.8**	**24.7**	**8.52**	**25**	**12.5**	**23.1**	**34.7**	**25.7**	**21.9**	**22.6**	**7.44**

				Youth Pond												York River Ditch
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11
Sample ID				CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012
Sample Date				10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12
Chemical Name																
Chromium (hexavalent)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	50	50	23	3.73	1.57 J	1.85	3.29	1.17	3.34	1.23 J	4.37	4.67	3.57 J	3.48	3.5	1.19
Copper	31.6	31.6	3,100	16.6	87.2	8.34	29.4	9.71	21.8	13.6	13.3	30.2	9.6	12.7	12.2	14.9
Cyanide	--	0.1	22	0.7 U	0.6 U	0.41 U	0.69 U	0.26 U	0.64 U	0.46 U	0.56 U	0.82 U	1.1 U	0.82 U	0.25 J	0.25 U
Iron	20,000	20,000	55,000	17,100	6,500	12,500	40,500 J	7,570	14,700	11,000	28,800 J	29,500 J	16,200	15,700	44,200	6,300
Lead	35.8	35.8	4,000	40.4	13.6	17.9	77.2	6.57	46.8	18.2	27.9	41.9	23.6	29	54.6	181
Magnesium	--	--	--	1,210	498	706	1,570	660	1,060	607	1,320	2,050	1,600	1,340	1,420	684
Manganese	460	460	1,800	73.1	51.5	64.7	200	19.7	50.7	47.6	135	127	69.8	76	338	52.8
Mercury	0.18	0.18	23	0.0565	0.027 J	0.0467	0.787	0.00538 J	0.0646	0.0131 J	0.0873	0.12	0.0527 J	0.0673	0.116	0.028
Nickel	22.7	22.7	1,500	7.05	3.94	3.3	7.82	2.58	6.78	2.72	7.27	9.84	7.71	6.84	6.55	4.79
Potassium	--	--	--	972	417	762	1,540	843	836	694	973	1,720	1,390	1,130	1,620	302
Selenium	2	2	390	6.4 U	4.79 U	1.67 J	3.97 J	0.654 J	4.72 U	3.09 U	3.11 U	2.53 J	6.48 J	2.31 J	3.44 U	2.24 U
Silver	1	1	390	1.6 U	1.2 U	0.168 J	1.17 U	0.399 U	1.18 U	0.773 U	0.778 U	1.36 U	2.54 U	1.46 U	0.861 U	0.56 U
Sodium	--	--	--	52.6 J	36.9 J	32.3 J	65.8 J	22.1 J	37 J	28.8 B	64.3 J	99 J	86.8 J	62 J	48.2 B	71.4
Thallium	--	--	0.78	6.4 U	4.79 U	**0.841 J**	**1.86 J**	0.529 J	4.72 U	3.09 U	**1.1 J**	5.42 U	10.1 U	5.83 U	3.44 U	2.24 U
Vanadium	57	--	390	33.3	11.5	16.1	38	9.34	28.2	21.6	37.2	52.2	35.8	31.4	35.2	7.19
Zinc	121	121	23,000	131	137	83.6	470	44.1	300	59.7	95.3	162	58 J	80.9 J	229	40.1
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																
Zinc, SEM	--	--	--	NA	1.73 B	0.9	5.6	0.52	3.51	0.164 B	1.12	1.3	2.1	NA	3.5 B	0.37 B
Acid volatile sulfide, SEM	--	--	--	NA	0.28 U	0.79	0.74	0.13 U	0.44	0.14 U	0.71	0.33 U	0.37 U	NA	1.54	0.13
Cadmium, SEM	--	--	--	NA	0.0058	0.00315	0.0134	0.00336	0.016	7.10E-04 U	0.0239	0.0072	0.0061	NA	0.0346	5.70E-04 U
Copper, SEM	--	--	--	NA	0.472	0.0563	0.176	0.106	0.187	0.0273	0.0079 U	0.136	0.074	NA	0.0149	0.0819
Lead, SEM	--	--	--	NA	0.0686	0.0578	0.338	0.0183	0.176	0.0238	0.0864	0.107	0.159	NA	0.243	0.0218
Mercury, SEM	--	--	--	NA	4.70E-04 U	0.0037 U	0.0066 U	0.0027 U	0.0048 U	2.40E-04 U	0.0046 U	0.0066 U	0.0074 U	NA	3.40E-04 U	1.90E-04 U
Nickel, SEM	--	--	--	NA	0.029	0.015	0.05	0.014	0.033	0.011 U	0.034	0.049	0.046	NA	0.037	0.0754
Silver, SEM	--	--	--	NA	0.0029 U	0.0019 U	0.0034 U	0.0014 U	0.0024 U	0.0015 U	0.023 U	0.0034 U	0.0038 U	NA	0.021 U	0.0012 U
Wet Chemistry																
Ammonia (mg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	--	--	--	NA	6.6	6.7	6.6	7	6.6	6.5	6.5	6.5	6.8	NA	7	7.4
Total organic carbon (TOC) (ug/g)	--	--	--	NA	74,000	46,000	100,000	13,000	78,000	46,000	80,000	120,000	180,000	NA	41,000	9,600
Grain Size (PCT)																
Gravel (%)	--	--	--	NA	5.2	0.3	0.2	1.9	0.6	2.3	0.2	0.1	0.4	NA	15.8	34.2
Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coarse Sand (%)	--	--	--	NA	4.7	2.2	3.3	3	0.7	2.6	0.3	0.2	0.8	NA	16.5	6.4
Medium Sand (%)	--	--	--	NA	17.9	7.3	8.3	10.2	1.4	9.6	1.1	0.9	1.5	NA	14.7	11
Fine Sand (%)	--	--	--	NA	59.6	41.2	11.2	72.5	1.2	67.6	1	1.5	1.5	NA	21.4	45.2
Fines (%)	--	--	--	NA	12.6	49	77	12.4	96.1	17.9	97.4	97.3	95.8	NA	31.6	3.2
GRAINSIZE (PCT/P)																
GS03 Sieve 3" (75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	--	--	--	NA	100	100	100	100	100	100	100	100	100	NA	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	100	100	100	100	100	100	100	100	100	NA	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	100	100	100	100	100	100	100	100	100	NA	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	100	100	100	100	100	100	100	100	100	NA	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	97.7	100	100	100	100	99.3	99.9	100	99.8	NA	100	71.9
Sieve No. 004 (4.75 mm)	--	--	--	NA	94.8	99.7	99.8	98.1	99.4	97.7	99.8	99.9	99.6	NA	84.2	65.8
Sieve No. 010 (2.00 mm)	--	--	--	NA	90.1	97.5	96.5	95.1	98.7	95.1	99.5	99.7	98.8	NA	67.7	59.4
Sieve No. 020 (850 um)	--	--	--	NA	81.9	94.9	92	90.6	97.9	91.3	98.8	99.2	97.9	NA	57	54.5
Sieve No. 040 (425 um)	--	--	--	NA	72.2	90.2	88.2	84.9	97.3	85.5	98.4	98.8	97.3	NA	53	48.4
Sieve No. 060 (250 um)	--	--	--	NA	51	76.9	85.4	18.9	96.9	59.4	98.1	98.3	96.7	NA	47.6	30.7
Sieve No. 080 (180 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	--	--	--	NA	14.3	50.6	79.5	14.8	96.4	18.7	97.5	97.4	96	NA	33.2	4.1
Sieve No. 200 (75 um)	--	--	--	NA	12.6	49	77	12.4	96.1	17.9	97.4	97.3	95.8	NA	31.6	3.2

Notes:

Shading indicates exceedance of SD ESVs

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL

Bold box indicates exceedance of BTAG

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE 4-6

Subsurface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond										
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02
Sample ID				CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B
Sample Date				12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09
Chemical Name														
Volatile Organic Compounds (µg/kg)														
1,2-Dichlorobenzene	1,238	60.06	380,000	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ
1,4-Dichlorobenzene	1,274	2,180	24,000	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ
2-Butanone	983	--	28,000,000	35 U	110 J	30 U	13 J	7 B	14.9 U	13.9 U	16.0 U	28 U	30 U	32 UJ
4-Methyl-2-pentanone	120.1	--	3,400,000	35 U	37 UJ	30 U	32 UJ	16.9 U	14.9 U	2 J	16.0 U	28 U	30 U	32 UJ
Acetone	--	--	61,000,000	12 B	420 J	60 B	88 J	26 B	27 B	24 B	22 B	190 J	27 B	21 B
Carbon disulfide	3.09	3.094	740,000	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ
Methyl acetate	--	--	29,000,000	12 U	13 UJ	11 U	4 J	NA	NA	NA	NA	10 U	11 U	12 UJ
Methylcyclohexane	--	--	--	7 U	2 J	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ
Tetrachloroethene	1,929	1,704	86,000	42	23 J	9	8 J	16.9 U	14.9 U	13.9 U	16.0 U	14	17	13 J
Semivolatile Organic Compounds (µg/kg)														
Acenaphthene	290	6.7	3,400,000	27 U	90	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U
Acenaphthylene	160	5.9	3,400,000	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U
Anthracene	57.2	57.2	17,000,000	4 J	33	2.2 J	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.3 J
Benzo(a)anthracene	108	108	1,500	28 B	120	15 B	24 U	150 J	230 J	410 U	110 J	23 U	2.7 B	12 B
Benzo(a)pyrene	150	150	150	28	110	16 B	24 U	110 J	**240 J**	410 U	130 J	23 U	24 U	12 B
Benzo(b)fluoranthene	240	27.2	1,500	46 B	200	32 B	24 U	100 J	330 J	57 J	210 J	23 U	24 U	26 B
Benzo(g,h,i)perylene	170	170	1,700,000	9.8 B	29 J	23 UL	24 UL	600 U	100 J	410 U	60 J	23 UL	24 UL	28 UL
Benzo(k)fluoranthene	240	240	15,000	18 B	52	12 B	24 U	86 J	280 J	410 U	130 J	23 U	24 U	9.9 B
bis(2-Ethylhexyl)phthalate	750	180	350,000	140 U	150 U	120 U	67 J	120 J	79 J	68 J	78 J	110 U	120 U	140 U
Butylbenzylphthalate	40,040	39,614	2,600,000	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U
Carbazole	140	--	--	4.8 B	12 B	2.7 B	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.4 B
Chrysene	166	166	150,000	34	130	17 J	24 U	180 J	330 J	52 J	160 J	23 U	3.3 J	13 J
Dibenz(a,h)anthracene	33	33	150	6.4 B	45 J	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U
Di-n-butylphthalate	110	23,536	6,100,000	140 U	150 U	120 U	120 U	61 J	62 J	410 U	84 J	110 U	120 U	140 U
Fluoranthene	423	423	2,300,000	49	250	42	5 J	230 J	520	87 J	250 J	23 U	4.7 J	30
Fluorene	77.4	77.4	2,300,000	27 U	180	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U
Indeno(1,2,3-cd)pyrene	200	17	1,500	31 B	110	9.1 B	24 U	600 U	120 J	410 U	64 J	23 U	24 U	7.1 B
Naphthalene	176	176	36,000	27 U	53	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U
PAHs (HMW), calculated	2,900	190	--	218.6	986	115.1	100.8	1,776	2,335	1,423	1,359	103.5 U	81.25	100.5
PAHs (LMW), calculated	786	76	--	168	862.5	131.2	94.7	2,430	2,405	1,727	2,105	103.5 U	91.1	130.3
Pentachlorophenol	1,835	1,835	8,900	140 UL	150 U	120 UL	120 UL	1,500 U	1,200 U	1,000 U	1,200 U	110 UL	120 UL	140 UL
Phenanthrene	204	204	17,000,000	34	210	18 J	5.7 J	100 J	240 J	410 U	140 J	23 U	2.4 J	14 J
Pyrene	195	195	1,700,000	87	190	33	4.8 J	250 J	470	84 J	250 J	23 U	4.6 J	26 J
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	4.88	4.88	20,000	4.5 UJ	21 J	2 B	1.3 B	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.97 B	4.7 UJ
4,4'-DDE	3.16	3.16	14,000	1 B	4.8 J	1.3 B	1.3 B	6.6	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.73 B	0.97 B
4,4'-DDT	4.16	4.16	17,000	4.5 UJ	19 J	2.1 B	0.89 B	6 U	49 J	400 D	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
alpha-Chlordane	3.24	3.24	16,000	2.3 UJ	2.6 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ
Aroclor-1248	59.8	59.8	2,200	26 UJ	29 U	24 UL	24 UJ	60 U	33 J	41 U	49 UL	24 UJ	22 UJ	27 UJ
Aroclor-1254	59.8	59.8	1,100	23 UJ	26 U	21 UL	21 UJ	60 U	46 U	41 U	49 UL	21 UJ	20 UJ	24 UJ
Aroclor-1260	59.8	59.8	2,200	72 J	580	16 L	22 UJ	60 U	210	170	18 JP	23 UJ	7.9 J	39 J
Dieldrin	1.9	1.9	300	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
Endosulfan I	10.6	10.6	370,000	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ
Endosulfan II	51	51	370,000	4.5 UJ	2.3 J	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
Endosulfan sulfate	19.7	19.7	370,000	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
Endrin	2.22	2.22	18,000	39 J	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	43 J
Endrin aldehyde	2.22	--	18,000	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
Endrin ketone	2.22	--	18,000	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ
gamma-Chlordane	3.24	3.24	16,000	2.3 UJ	3 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ
Heptachlor epoxide	2.47	2.47	530	2.3 UJ	2.5 UJ	0.71 J	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ
Methoxychlor	69.2	68.1	310,000	23 UJ	25 UJ	21 UJ	21 UJ	31 U	24 U	21 U	25 UL	21 UJ	20 UJ	24 UJ
Explosives (µg/kg)														
No Detections														
Total Metals (mg/kg)														
Aluminum	25,500	--	77,000	10,300	6,100	20,600	13,500	5,120 L	2,780 L	1,500 L	3,370 L	25,700	14,000	4,810
Antimony	3	2	31	0.14 L	0.76 B	0.66 L	0.72 UL	1 J	0.48 U	0.43 U	0.55 U	0.56 L	0.83 UL	0.91 UL
Arsenic	9.8	9.8	6.1	**7.7 K**	**14 L**	**9.1 K**	**7.5 K**	**11.2**	1.9 J	0.98 J	**9.5**	**14.6 K**	**7.9 K**	2.3 K
Barium	20	--	15,000	32.2	38.5	28.3	46.6	39.2 J	9.9 B	6.4 B	19.2 J	24.1	17.6	12.5
Beryllium	--	--	160	0.52 J	0.34 J	1	0.45 J	0.49 B	0.27 J	0.21 J	0.31 J	0.87	0.51 J	0.22 J
Cadmium	0.99	0.99	70	0.33	1.3	0.14	0.05 J	7.2	0.15 J	0.85 J	0.09 J	0.14	0.12	0.11
Calcium	--	--	--	3,750	4,120	1,740	1,180	7,010	1,670 J	1,360 J	15,200 J	5,970 J	1,820 J	2,920
Chromium	43.4	43.4	2.9	**23.6 K**	**11.3 L**	**42.1 K**	**17.8 K**	**25**	**9.3**	**7.7**	**7**	**49 K**	**26.4 K**	**8.1 K**
Cobalt	50	50	23	2 J	1.2 J	3.9 J	3 J	3.1 J	1.3 U	1.2 U	1.5 U	4.1 J	2.1 J	0.76 J

				Upstream Pond										
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02
Sample ID				CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B
Sample Date				12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09
Copper	31.6	31.6	3,100	5	20.5 J	17.2	4.5	10.1	3.8 B	7.3 B	5.1 B	4.4	3.7	2.8
Cyanide	--	0.1	22	0.84 U	0.98 U	0.77 U	0.91 U	0.04 UL	0.03 UL	0.02 UL	0.03 UL	0.84 U	0.77 U	0.98 U
Iron	20,000	20,000	55,000	14,000 J	7,220	34,000 J	16,500 J	9,040	7,840 L	4,540 L	4,950 L	32,900 J	17,800 J	5,200 J
Lead	35.8	35.8	4,000	27.9	16.4	14.3	18.6	59.8	4.2	5.4	10.9	11.2	6.8	9.2
Magnesium	--	--	--	1,450 K	739	3,170 K	894 K	2,000	859 J	597 J	410 J	2,730 K	1,390 K	434 K
Manganese	460	460	1,800	31.8 J	31.2	34.8 J	23.2 J	26.8	14.5	12.1	36	27.4 J	17.6 J	13.1 J
Mercury	0.18	0.18	23	0.03 J	0.06	0.02 J	0.02 J	0.04 U	0.02 UL	0.03 UL	0.03 UL	0.02 J	0.01 J	0.03 J
Nickel	22.7	22.7	1,500	5.9	4.5	9.4 J	5.4	18.3	1.7 J	2 J	2.3 J	10.2	5.4	1.9 J
Potassium	--	--	--	1,330 K	471 K	4,390 K	852 K	673 J	1,440	911 J	272 B	2,630 K	1,410 K	346 K
Selenium	2	2	390	0.39 B	0.85 U	1.1 B	0.25 B	1 U	0.65 U	0.59 U	0.75 U	0.59 B	0.38 B	0.35 B
Silver	1	1	390	0.12 J	1.3 U	0.31 J	0.15 J	2.1 B	2.3 B	1.5 B	0.97 U	2.1 U	0.14 J	1.7 U
Sodium	--	--	--	152 B	62.7 B	47.9 B	30.7 B	65.2 B	57 J	59.2 B	64.3 B	100 B	63.4 B	27.2 B
Thallium	--	--	0.78	1.8 U	1.3 U	0.39 J	1.3 U	0.81 UL	0.52 UL	0.47 UL	0.6 UL	0.52 J	1.6 U	1.7 U
Vanadium	57	--	390	30.4 K	14.7	51.4 K	28 K	25.4	9.6 J	6.8 J	9.8 J	64.3 K	34.2 K	11.4 K
Zinc	121	121	23,000	29 K	83.5	51.6 K	18.7 K	87.6 B	30.2 B	44.4 B	307	27.7 K	17.1 K	13.5 K
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)														
Zinc, SEM	--	--	--	0.0147 B	0.485	0.154 K	0.401 K	NA	NA	NA	NA	0.0095 B	NA	0.0256 K
Acid volatile sulfide, SEM	--	--	--	0.14 U	0.16 U	0.13 U	0.84	NA	NA	NA	NA	0.13 U	NA	0.14 U
Cadmium, SEM	--	--	--	0.0011 J	0.0046	4.00E-04 J	0.0015 J	NA	NA	NA	NA	0.0013 J	NA	6.30E-04 J
Copper, SEM	--	--	--	0.0094 L	0.227	0.348 L	0.0185 L	NA	NA	NA	NA	0.0126 L	NA	0.011 L
Lead, SEM	--	--	--	0.0149 J	0.0463	0.0197 J	0.621 J	NA	NA	NA	NA	0.00726 J	NA	0.0131 J
Mercury, SEM	--	--	--	3.10E-05 J	7.60E-05 U	6.30E-05 R	6.20E-05 R	NA	NA	NA	NA	6.30E-05 R	NA	7.10E-05 R
Nickel, SEM	--	--	--	0.0032 B	0.0239	0.0028 B	0.0053 B	NA	NA	NA	NA	0.0018 B	NA	0.003 B
Silver, SEM	--	--	--	2.80E-04 J	0.0042 U	0.0035 UL	0.0035 UL	NA	NA	NA	NA	0.0035 UL	NA	0.004 UL
Wet Chemistry														
pH (ph)	--	--	--	7.1	6.5	6.1	6.9	NA	NA	NA	NA	7.5	7.6	7.8
Total organic carbon (TOC) (mg/kg)	--	--	--	40,000	71,000	6,500	7,300	NA	NA	NA	NA	9,500	17,000	28,000
Grain Size (pct)														
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)														
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Shading indicates exceedance of ESVs

Bold box indicates exceedance of BTAG

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSLs

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 36,412 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks

D - Result of a dilution (unvalidated data)

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

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

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

NA - Not analyzed

P - Estimated value (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PCT - Percent

PCT/P - Percent passing

PH - pH units

UG/KG - Micrograms per kilogram

UMOL/G - Micromoles per gram

TABLE 4-6

Subsurface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond		Stream						Youth Pond			
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03
Sample ID				CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012	CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012
Sample Date				12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/12/12	10/22/12	10/22/12	10/11/12
Chemical Name															
Volatile Organic Compounds (µg/kg)															
1,2-Dichlorobenzene	1,238	60.06	380,000	6 U	2 J	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U
1,4-Dichlorobenzene	1,274	2,180	24,000	6 U	6 J	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U
2-Butanone	983	--	28,000,000	31 U	9 J	14 J	26 J	32 U	30 U	28 U	18 J	2 J	99	140	14
4-Methyl-2-pentanone	120.1	--	3,400,000	31 U	33 UJ	36 UJ	36 UJ	32 U	30 U	28 U	34 U	2.4 U	9.1 U	11 U	3.2 U
Acetone	--	--	61,000,000	11 B	64 B	87 J	130 J	22 B	19 B	8 B	110 K	24	380	530	49
Carbon disulfide	3.09	3.094	740,000	6 U	6 UJ	7 UJ	1 J	6 U	6 U	6 U	7 U	4.9 U	18 U	23 U	6.3 U
Methyl acetate	--	--	29,000,000	11 U	12 UJ	13 UJ	13 UJ	12 U	11 U	10 U	12 U	4.9 U	18 U	23 U	6.3 U
Methylcyclohexane	--	--	--	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U
Tetrachloroethene	1,929	1,704	86,000	9	16 J	16 J	17 J	6 U	2 J	2 J	7 U	1 U	3.7 U	4.5 U	1.3 U
Semivolatile Organic Compounds (µg/kg)															
Acenaphthene	290	6.7	3,400,000	2.6 J	23 U	3.5 J	30 U	25 U	26 U	24 U	27 U	32 U	78 U	83 U	42 U
Acenaphthylene	160	5.9	3,400,000	15 J	8.9 J	10 J	30 U	25 U	26 U	24 U	27 U	32 U	78 U	83 U	42 U
Anthracene	57.2	57.2	17,000,000	30	8.3 J	11 J	30 U	25 U	26 U	24 U	27 U	32 U	78 U	83 U	42 U
Benzo(a)anthracene	108	108	1,500	180	120 L	130	21 B	25 U	26 U	12 B	12 B	56	32 J	83 U	51 J
Benzo(a)pyrene	150	150	150	**220**	100 L	130	9.7 J	25 U	26 U	6.4 J	6 J	49	78 U	83 U	42 J
Benzo(b)fluoranthene	240	27.2	1,500	510	23 U	220	30 B	25 U	26 U	14 B	18 B	79	78 U	83 U	74
Benzo(g,h,i)perylene	170	170	1,700,000	93 L	23 UL	56 L	30 UL	25 UL	26 UL	8.6 L	27 UL	30 J	78 U	83 U	30 J
Benzo(k)fluoranthene	240	240	15,000	140	23 U	46	5.6 J	25 U	26 U	4.2 J	27 U	31 J	78 U	83 U	29 J
bis(2-Ethylhexyl)phthalate	750	180	350,000	59 J	110 U	100 J	150 U	130 U	130 U	89 J	130 U	250 UJ	630 U	650 U	330 UJ
Butylbenzylphthalate	40,040	39,614	2,600,000	140 J	380 U	500 U	500 U	420 U	420 U	400 U	440 U	250 U	630 U	650 U	330 UL
Carbazole	140	--	--	7.6 B	23 U	9.6 J	7.5 J	25 U	26 U	7.3 J	6.5 J	250 U	630 U	650 U	330 UL
Chrysene	166	166	150,000	310	100 L	130	5.5 J	25 U	26 U	24 U	27 U	60	78 U	83 U	53 J
Dibenz(a,h)anthracene	33	33	150	84	23 U	48	12 J	25 U	26 U	14 J	27 U	32 U	78 U	83 U	42 U
Di-n-butylphthalate	110	23,536	6,100,000	110 J	110 U	150 U	150 U	130 U	130 U	120 U	130 U	250 U	630 U	650 U	330 UL
Fluoranthene	423	423	2,300,000	140	170 L	250	23 J	25 U	26 U	10 J	14 J	140 L	78 U	83 U	110
Fluorene	77.4	77.4	2,300,000	25 U	23 U	8.3 B	30 U	25 U	26 U	24 U	27 U	32 U	78 U	83 U	42 U
Indeno(1,2,3-cd)pyrene	200	17	1,500	370	71	110	14 J	25 U	26 U	12 J	8.1 J	27 J	78 U	83 U	42 U
Naphthalene	176	176	36,000	25 U	23 U	30 U	30 U	25 U	26 U	24 U	27 U	32 U	78 U	83 U	42 U
PAHs (HMW), calculated	2,900	190	--	2,207	617	1,060	103.3	112.5 U	117 U	75.5	97.1	458	344	374 U	408
PAHs (LMW), calculated	786	76	--	275.6	255.7	423.65	135.5	112.5 U	117 U	99.2	118.1	471	627 U	657 U	471
Pentachlorophenol	1,835	1,835	8,900	120 UL	110 UL	150 UL	150 UL	130 UL	130 UL	19 J	130 UL	750 U	1,900 U	1,900 U	980 UL
Phenanthrene	204	204	17,000,000	38	11 J	100	7.5 J	25 U	26 U	5.2 J	9.6 J	110	78 U	83 U	70
Pyrene	195	195	1,700,000	300	180 L	190	16 J	25 U	26 U	5.3 J	14 J	110	78 U	83 U	87
Pesticide/Polychlorinated Biphenyls (µg/kg)															
4,4'-DDD	4.88	4.88	20,000	260 J	22 J	8.4 J	5 UJ	4.3 U	4.1 UJ	4.7 J	14	26 UL	30 UL	33 UL	33 UL
4,4'-DDE	3.16	3.16	14,000	270 J	4.4 J	3.3 J	5 UJ	4.3 U	4.1 UJ	2 J	5	26 UL	30 UL	33 UL	33 UL
4,4'-DDT	4.16	4.16	17,000	740 J	2.5 B	8.2 J	5 UJ	4.3 U	4.1 UJ	120 J	1.3 J	26 UL	30 UL	33 UL	33 UL
alpha-Chlordane	3.24	3.24	16,000	6 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL
Aroclor-1248	59.8	59.8	2,200	120 UJ	23 UL	28 U	29 U	25 U	23 U	23 U	25 U	51 U	120 UL	130 UL	67 U
Aroclor-1254	59.8	59.8	1,100	**8,900 J**	20 UL	63	26 U	22 U	21 U	21 U	23 U	51 U	120 UL	130 UL	67 U
Aroclor-1260	59.8	59.8	2,200	120 UJ	25 L	72	28 U	23 U	22 U	30	24 U	51 U	120 UL	130 UL	94 J
Dieldrin	1.9	1.9	300	**600 J**	3.4 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	3.3 J	26 UL	30 UL	33 UL	33 UL
Endosulfan I	10.6	10.6	370,000	23 J	2 UJ	2.7 J	2.6 UJ	2.2 U	2.1 UJ	2.1 U	0.63 J	26 UL	30 UL	33 UL	33 UL
Endosulfan II	51	51	370,000	360 J	0.86 J	2.2 J	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL
Endosulfan sulfate	19.7	19.7	370,000	4.3 UJ	3.2 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ	2 J	4.4 U	26 UL	30 UL	33 UL	33 UL
Endrin	2.22	2.22	18,000	520	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL
Endrin aldehyde	2.22	--	18,000	140 J	4 UJ	3.6 J	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL
Endrin ketone	2.22	--	18,000	140 J	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL
gamma-Chlordane	3.24	3.24	16,000	340 J	0.75 J	2.8 J	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL
Heptachlor epoxide	2.47	2.47	530	230 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL
Methoxychlor	69.2	68.1	310,000	230 J	20 UJ	25 UJ	26 UJ	22 U	21 UJ	21 U	23 U	26 UL	30 UL	33 UL	33 UL
Explosives (µg/kg)															
No Detections															
Total Metals (mg/kg)															
Aluminum	25,500	--	77,000	16,700	7,840	11,300	5,830	28,700 J	9,020 J	3,170	6,900	1,140 K	14,300	15,400	3,690
Antimony	3	2	31	1.2 L	0.1 L	1 UL	0.89 UL	0.81 B	0.66 B	0.44 B	0.2 B	2.26 U	5.14 U	4.5 U	3.22 U
Arsenic	9.8	9.8	6.1	**7.4 K**	2.2 K	4.2 L	2.3 L	**9 L**	3.4 L	2.7 L	**13.2 L**	0.975 J	**9.37 J**	**9.98**	5.01 J
Barium	20	--	15,000	63.2	132	29.8	19.6	68.4 J	21.8 J	9.6	19.6	9.99	81.8	83.8	23.2
Beryllium	--	--	160	0.76	0.5	0.57 J	0.35 J	1.8 J	0.6 J	0.21 J	0.4 J	0.144	0.943	0.972	0.368
Cadmium	0.99	0.99	70	3.1	0.07 J	0.25	0.07 J	1.4 J	0.34 J	0.21	0.19	0.136 J	0.592	0.713	0.363
Calcium	--	--	--	6,900	1,000	7,550	4,950	4,670	1,720	19,800	2,600	233	5,480	5,700	1,910
Chromium	43.4	43.4	2.9	**37.8 K**	**8.2 K**	**19.8 L**	**10.6 L**	**71.8 L**	**25.5 L**	**13.3 L**	**14.5 L**	**3.14**	**21.2**	**22.8**	**8.73**
Cobalt	50	50	23	4.1 J	1.6 J	2.7 J	1.2 J	6.8 J	1.9 J	0.8 J	2.2 J	0.682 J	3.22	3.83	1.63

				Upstream Pond		Stream						Youth Pond			
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03
Sample ID				CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012	CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012
Sample Date				12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/12/12	10/22/12	10/22/12	10/11/12
Copper	31.6	31.6	3,100	63.9	3.8	5.9 J	2.5 J	3 J	2.9 J	3.1 J	2.8 J	2.59	10.6	10.8	12.6
Cyanide	--	0.1	22	0.84 U	0.84 U	1.1 U	1 U	0.84 U	0.84 U	0.84 U	0.91 U	0.23 U	0.56 U	0.59 U	0.3 U
Iron	20,000	20,000	55,000	23,200 J	5,260 J	12,300	5,740	28,200 J	8,850 J	4,260	7,550	2,060	16,000	16,600	6,240
Lead	35.8	35.8	4,000	235	136	13.2	4.6	14.3	4.8	3.4	7.2	4.21 J	26.5	27.2	15
Magnesium	--	--	--	1,860 K	584 K	1,330	775	4,050	1,360	777	861	178	1,050	1,130	535
Manganese	460	460	1,800	92.4 J	40.1 J	34.4	15.9	50.4	17.2	17	15.9	9.34	67.3	68.8	30.6
Mercury	0.18	0.18	23	0.18	0.01 J	0.05	0.01 J	0.04 J	0.01 J	0.04 U	0.01 J	0.00649 U	0.0402	0.0483	0.112
Nickel	22.7	22.7	1,500	22.9	3.3 J	6.3	2.7 J	20.9	7.2	2.9	4.9	0.865 J	5.97	6.45	3.39
Potassium	--	--	--	1,390 K	450 K	1,650 K	1,030 K	4,710 K	1,610 K	844 K	839 K	172	846	884	523
Selenium	2	2	390	0.98 U	0.85 U	0.4 J	1.1 U	2.2 U	1.1 U	0.39 J	0.91 U	2.26 U	5.14 U	4.5 U	3.22 U
Silver	1	1	390	3.1	0.07 J	0.14 B	1.7 U	3.4 U	1.6 U	0.98 U	0.08 B	0.564 U	1.28 U	1.12 U	0.804 U
Sodium	--	--	--	162 B	27.2 B	48 B	33.2 B	75.5 B	30.6 B	210	26.3 B	28.2 U	47.4 J	53.2 J	16.1 J
Thallium	--	--	0.78	1.5 U	1.3 U	1.9 U	1.7 U	3.4 U	1.6 U	0.98 U	1.4 U	2.26 U	5.14 U	4.5 U	3.22 U
Vanadium	57	--	390	35.5 K	10.6 K	24.4	12.1	82	29	17.2	18.5	3.51	33.5	35.6	11.2
Zinc	121	121	23,000	325 K	21.2 K	40.9	11.1	54.1 J	17.4 J	14	24.6	38.4	89	90.4	57.3
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)															
Zinc, SEM	--	--	--	0.608 K	0.0557 K	NA	NA	NA	NA	NA	NA	0.5 B	1.19	NA	0.65 B
Acid volatile sulfide, SEM	--	--	--	0.13 U	0.12 U	NA	NA	NA	NA	NA	NA	0.11 U	0.41	NA	0.13 U
Cadmium, SEM	--	--	--	0.00571	1.70E-04 J	NA	NA	NA	NA	NA	NA	6.60E-04	0.0039	NA	0.00154
Copper, SEM	--	--	--	0.218 L	0.0049 L	NA	NA	NA	NA	NA	NA	0.0318	0.105	NA	0.11
Lead, SEM	--	--	--	0.302 J	0.14 J	NA	NA	NA	NA	NA	NA	0.0113	0.0853	NA	0.057
Mercury, SEM	--	--	--	1.96E-04 J	6.10E-05 R	NA	NA	NA	NA	NA	NA	1.80E-04 U	0.0055 U	NA	2.10E-04 U
Nickel, SEM	--	--	--	0.011 B	0.0012 B	NA	NA	NA	NA	NA	NA	0.0083 U	0.026	NA	0.0181
Silver, SEM	--	--	--	0.00398 J	0.0034 UL	NA	NA	NA	NA	NA	NA	0.0011 U	0.0028 U	NA	0.0013 U
Wet Chemistry															
pH (ph)	--	--	--	8.2	7	7.8	7.9	8	NA	8.3	7.5	6.5	6.3	NA	6.6
Total organic carbon (TOC) (mg/kg)	--	--	--	19,000	22,000	14,000	34,000	2,400	NA	2,500	16,000	3,200	73,000	NA	28,000
Grain Size (pct)															
Coarse Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	0.2	0.8	NA	1.8
Medium Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	4.9	2.2	NA	9.3
Fine Sand (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	90.7	1.6	NA	65.5
Fines (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	4	94.8	NA	22
Gravel (%)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	0.2	0.6	NA	1.4
GRAINSIZE (PCT/P)															
GS05 Sieve 2" (50 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	100	100	NA	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	100	100	NA	100
GS07 Sieve 1" (25.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	100	100	NA	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	100	100	NA	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	99.8	99.9	NA	100
Sieve No. 004 (4.75 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	99.8	99.4	NA	98.6
Sieve No. 010 (2.00 mm)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	99.6	98.6	NA	96.8
Sieve No. 020 (850 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	99.1	97.3	NA	94.1
Sieve No. 040 (425 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	94.7	96.4	NA	87.5
Sieve No. 060 (250 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	62.9	95.8	NA	63.1
Sieve No. 140 (106 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	5.2	95	NA	24.4
Sieve No. 200 (75 um)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	4	94.8	NA	22

Notes:

Shading indicates exceedance of ESVs

Bold box indicates exceedance of BTAG

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSLs

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 36,412 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks

D - Result of a dilution (unvalidated data)

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

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

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

NA - Not analyzed

P - Estimated value (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PCT - Percent

PCT/P - Percent passing

PH - pH units

UG/KG - Micrograms per kilogram

UMOL/G - Micromoles per gram

TABLE 4-6

Subsurface Sediment Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Youth Pond									
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD11	CAYP-SD12	CAYP-SD13
Sample ID				CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD11-1012	CAYP-SSD12-1012	CAYP-SSD13-1012
Sample Date				11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/11/12	10/22/12	10/12/12
Chemical Name													
Volatile Organic Compounds (µg/kg)													
1,2-Dichlorobenzene	1,238	60.06	380,000	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,4-Dichlorobenzene	1,274	2,180	24,000	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
2-Butanone	983	--	28,000,000	26	150	14	120	19	110	150	13	140	85
4-Methyl-2-pentanone	120.1	--	3,400,000	3.9 U	7.8 U	1.8 U	9.6 U	3 U	5.9 U	9.8 U	2.5 U	18 U	6.4 U
Acetone	--	--	61,000,000	83	480	52	530	89	420	560	57	600	320
Carbon disulfide	3.09	3.094	740,000	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	5 U	36 U	13 U
Methyl acetate	--	--	29,000,000	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	5 U	36 U	13 U
Methylcyclohexane	--	--	--	1.6 U	3.1 U	0.7 U	3.8 U	0.7 J	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Tetrachloroethene	1,929	1,704	86,000	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Semivolatile Organic Compounds (µg/kg)													
Acenaphthene	290	6.7	3,400,000	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	190	130 UL	64 U
Acenaphthylene	160	5.9	3,400,000	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	94	130 UL	64 U
Anthracene	57.2	57.2	17,000,000	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	450	130 UL	64 U
Benzo(a)anthracene	108	108	1,500	44 UL	47 L	29 J	82 L	36 U	59 U	79 U	1,300	130 UL	75 J
Benzo(a)pyrene	150	150	150	44 UL	33 L	19 J	67 L	36 U	59 U	79 U	**1,400**	130 UL	68 J
Benzo(b)fluoranthene	240	27.2	1,500	44 UL	54 L	32 J	120 L	36 U	59 U	79 U	**1,800**	130 UL	180
Benzo(g,h,i)perylene	170	170	1,700,000	44 UL	64 UL	16 J	53 L	36 U	59 U	79 U	710	130 UL	38 J
Benzo(k)fluoranthene	240	240	15,000	44 UL	64 UL	33 U	48 L	36 U	59 U	79 U	490	130 UL	53 J
bis(2-Ethylhexyl)phthalate	750	180	350,000	340 UL	510 UL	270 UL	590 U	280 UJ	460 U	630 U	260 UJ	1,000 U	500 UJ
Butylbenzylphthalate	40,040	39,614	2,600,000	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Carbazole	140	--	--	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Chrysene	166	166	150,000	44 UL	32 L	33 U	82 L	36 U	59 U	79 U	1,300	130 UL	160
Dibenz(a,h)anthracene	33	33	150	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	**170**	130 UL	64 U
Di-n-butylphthalate	110	23,536	6,100,000	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Fluoranthene	423	423	2,300,000	44 UL	62 L	35 J	160 L	36 U	59 U	79 U	2,600	130 UL	250
Fluorene	77.4	77.4	2,300,000	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130	130 UL	64 U
Indeno(1,2,3-cd)pyrene	200	17	1,500	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	660	130 UL	39 J
Naphthalene	176	176	36,000	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	36 J	130 UL	64 U
PAHs (HMW), calculated	2,900	190	--	198 U	349	194	665	162 U	266 U	356 U	10,230	585 U	905
PAHs (LMW), calculated	786	76	--	346 U	541	285.5	744	284 U	466 U	631 U	5,346.5	1,020 U	962
Pentachlorophenol	1,835	1,835	8,900	1,000 UL	1,500 UL	800 UL	1,800 U	850 U	1,400 U	1,900 U	780 U	3,100 U	1,500 U
Phenanthrene	204	204	17,000,000	44 UL	64 UL	33 U	70 L	36 U	59 U	79 U	1,700	130 UL	270
Pyrene	195	195	1,700,000	44 UL	55 L	32 J	140 L	36 U	59 U	79 U	2,400	130 UL	260
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	4.88	4.88	20,000	17 UL	20 J	13 UL	29 UL	8.1 L	23 UL	31 UL	26 UL	51 UL	51 UL
4,4'-DDE	3.16	3.16	14,000	17 UL	26 UL	13 UL	29 UL	14 L	23 UL	31 UL	26 UL	51 UL	51 UL
4,4'-DDT	4.16	4.16	17,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
alpha-Chlordane	3.24	3.24	16,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Aroclor-1248	59.8	59.8	2,200	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1254	59.8	59.8	1,100	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1260	59.8	59.8	2,200	69 U	100 UL	60 J	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Dieldrin	1.9	1.9	300	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan I	10.6	10.6	370,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan II	51	51	370,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan sulfate	19.7	19.7	370,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin	2.22	2.22	18,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin aldehyde	2.22	--	18,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin ketone	2.22	--	18,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
gamma-Chlordane	3.24	3.24	16,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Heptachlor epoxide	2.47	2.47	530	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Methoxychlor	69.2	68.1	310,000	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Explosives (µg/kg)													
No Detections													
Total Metals (mg/kg)													
Aluminum	25,500	--	77,000	3,490	11,100	2,250	9,750	6,840	16,700	20,200	3,460	13,800	13,000
Antimony	3	2	31	1.74 U	3.03 U	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	2.3 U	7.88 U	1.57 J
Arsenic	9.8	9.8	6.1	**15.5**	**126**	2.31 J	5.06 J	4.19 J	**12**	**14.7**	4.96	**12.1 J**	**108**
Barium	20	--	15,000	21.3	69.3	9.86	61.2	15.1	116	109	16	79.3	76.6
Beryllium	--	--	160	0.276	0.762	0.213	0.799	0.226	1.08	1.35	0.261	1.12	0.905
Cadmium	0.99	0.99	70	0.199	1.04	0.354	0.395	0.122 U	0.283 J	0.683	0.119 J	0.59 J	0.69
Calcium	--	--	--	3,940	6,960	1,350	6,500	1,060	7,620	10,400	6,830	17,200	22,200
Chromium	43.4	43.4	2.9	**6.91**	**20.3**	**7.15**	**15.6**	**12.1**	**24.5**	**35**	**9.39**	**24.3**	**22.7**
Cobalt	50	50	23	0.942	2.82	0.955	2.03	0.969 J	4.04	4.68	2.51	3.64 J	3.79

				Youth Pond									
Station ID	**Fresh Sediment Ecological Screening Values[1]**	**BTAG Screening Values**	**RSLs Residential Soil X 10 (to adjust for sediment)**	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD11	CAYP-SD12	CAYP-SD13
Sample ID				CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD11-1012	CAYP-SSD12-1012	CAYP-SSD13-1012
Sample Date				11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/11/12	10/22/12	10/12/12
Copper	31.6	31.6	3,100	3.43	10.5	7.67	9.18	2.25	7.7	12.6	8.49	12.4	9.31
Cyanide	--	0.1	22	0.31 U	0.46 U	0.24 U	0.53 U	0.26 U	0.25 J	0.57 U	0.24 U	0.94 U	0.46 U
Iron	20,000	20,000	55,000	6,680	23,500	6,070	10,900	9,120	36,300 J	29,200 J	9,000	18,100	26,500 J
Lead	35.8	35.8	4,000	7.44	34.9	4.59	19.3	7.03	25.4	32.3	13.8	32.5	54.4
Magnesium	--	--	--	468	1,250	592	758	472	1,440	2,100	1,100	1,480	1,410
Manganese	460	460	1,800	28.3	92.8	15.5	29.8	14.7	221	138	69.4	85.2	158
Mercury	0.18	0.18	23	0.0156	0.444	0.00648 U	0.0492	0.00516 J	0.0734	0.0752	0.117	0.064	0.0899
Nickel	22.7	22.7	1,500	1.74	6.04	2.12	4.51	1.9	7.18	9.59	5.47	7.68	6.83
Potassium	--	--	--	543	1,280	722	497	535	1,070	1,790	571	1,270	1,460
Selenium	2	2	390	0.733 J	1.67 J	0.518 J	3.46 U	2.45 U	4.35 U	5.17 U	0.771 J	7.88 U	1.54 J
Silver	1	1	390	0.435 U	0.181 J	0.372 U	0.865 U	0.612 U	1.09 U	1.29 U	0.575 U	1.97 U	0.805 U
Sodium	--	--	--	24.4 J	41.7 J	14.5 J	37.3 J	18.5 J	65.7 J	110 J	48.7 J	68.7 J	53.5 J
Thallium	--	--	0.78	1.74 U	**1.16 J**	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	2.3 U	7.88 U	3.22 U
Vanadium	57	--	390	9.08	30.4	8.24	24.7	21	39.6	52	14.5	35.3	32.9
Zinc	121	121	23,000	30	187	36.1	77.6	11.2	63.6	93.5	33.3	84.2	191
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)													
Zinc, SEM	--	--	--	0.304	2.27	0.54	1.7	0.126 B	0.448	0.55	0.52 B	1.24	2.1 B
Acid volatile sulfide, SEM	--	--	--	0.15 U	0.55	0.74	0.92	0.12 U	0.39	0.32 U	0.15	0.51 U	1.07
Cadmium, SEM	--	--	--	7.60E-04 U	0.0051	0.00231	0.0049	5.80E-04 U	0.015	0.0051	5.70E-04 U	0.0052	0.00529
Copper, SEM	--	--	--	0.0319	0.0913	0.0713	0.119	0.0897	0.0087	0.063	0.0676	0.079	0.061
Lead, SEM	--	--	--	0.0233	0.121	0.0191	0.0925	0.0119	0.0639	0.079	0.046	0.12	0.154
Mercury, SEM	--	--	--	0.0031 U	0.0044 U	0.0028 U	0.0054 U	1.90E-04 U	0.0039 U	0.0064 U	1.90E-04 U	0.011 U	3.10E-04 U
Nickel, SEM	--	--	--	0.012 U	0.029	0.017	0.028	0.0088 U	0.03	0.043	0.0497	0.041	0.03
Silver, SEM	--	--	--	0.0016 U	0.0022 U	0.0014 U	0.0028 U	0.0012 U	0.02 U	0.0033 U	0.0012 U	0.0053 U	0.0019 U
Wet Chemistry													
pH (ph)	--	--	--	6.7	6.6	7.2	6.4	6.2	6.2	6.4	7.5	6.8	7
Total organic carbon (TOC) (mg/kg)	--	--	--	33,000	69,000	12,000	69,000	16,000	64,000	99,000	8,800	140,000	52,000
Grain Size (pct)													
Coarse Sand (%)	--	--	--	0.8	0.9	3.2	1.2	0.2	0.9	0.5	7.4	0.4	7.5
Medium Sand (%)	--	--	--	7.2	3.2	9.7	1.8	2.8	1.2	1.2	13.8	1.4	8.2
Fine Sand (%)	--	--	--	74.4	24.7	56.6	1.3	70.3	0.9	1.6	50.9	2.6	14
Fines (%)	--	--	--	17.4	71	15.7	95.3	26.6	96.8	94.7	10.2	94.6	42.9
Gravel (%)	--	--	--	0.2	0.2	14.8	0.4	0.1	0.2	2	17.7	1	27.4
GRAINSIZE (PCT/P)													
GS05 Sieve 2" (50 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	100	100	100	100	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	100	100	89.1	100	100	100	98.9	90.8	99.6	92
Sieve No. 004 (4.75 mm)	--	--	--	99.8	99.8	85.2	99.6	99.9	99.8	98	82.3	99	72.6
Sieve No. 010 (2.00 mm)	--	--	--	99	98.9	82	98.4	99.7	98.9	97.5	74.9	98.6	65.1
Sieve No. 020 (850 um)	--	--	--	97.7	97.3	76.7	97.4	99.1	98.1	96.8	67.9	97.7	60
Sieve No. 040 (425 um)	--	--	--	91.8	95.7	72.3	96.6	96.9	97.7	96.3	61.1	97.2	56.9
Sieve No. 060 (250 um)	--	--	--	67.1	90.7	59.8	96	71.9	97.5	95.8	49.3	96.7	53.2
Sieve No. 140 (106 um)	--	--	--	19.4	72.7	18.2	95.4	27.4	97	94.9	13.3	94.9	43.7
Sieve No. 200 (75 um)	--	--	--	17.4	71	15.7	95.3	26.6	96.8	94.7	10.2	94.6	42.9

Notes:

Shading indicates exceedance of ESVs

Bold box indicates exceedance of BTAG

Bold text indicates exceedance of Adjusted Residential Soil X 10 RSLs

[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 36,412 mg/kg for all samples included in table.

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

B - Analyte not detected above the level reported in blanks

D - Result of a dilution (unvalidated data)

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

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

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

NA - Not analyzed

P - Estimated value (unvalidated data)

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PCT - Percent

PCT/P - Percent passing

PH - pH units

UG/KG - Micrograms per kilogram

UMOL/G - Micromoles per gram

TABLE 4-7

Surface Water Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Upstream Pond									Stream					
Station ID	**Fresh Surface Water Ecological Screening Values**	**BTAG Screening Values**	**Adjusted Tap Water RSLs X 10 (to adjust for Surface Water)**	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07		CAS04-SW08	CAS04-SW09
Sample ID				CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209	CAS04-SW08-1209	CAS04-SW09-1209
Sample Date				12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name																		
Volatile Organic Compounds (µg/l)																		
No Detections																		
Semivolatile Organic Compounds (µg/l)																		
Acenaphthene	23	5.8	400	0.19 U	0.19 U	0.069 J	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(a)pyrene	0.014	0.015	0.029	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	**0.073 J**	**0.24 J**	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(g,h,i)perylene	7.64	--	87	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.16 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(k)fluoranthene	9.07	--	2.9	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.15 J	0.069 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
bis(2-Ethylhexyl)phthalate	32	16	48	0.94 U	0.94 U	0.94 U	1.1	0.94 U	0.86 J	0.85 L	1.3	0.75 J	0.94 U	0.96 U	0.96 U	1.5	1.5	0.48 J
Chrysene	--	--	29	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.08 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Fluoranthene	8.1	0.04	630	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.13 J	0.32	0.18 J	0.19 U	0.19 U	0.19 U	0.19 U	0.11 J
Indeno(1,2,3-cd)pyrene	4.31	--	0.29	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.24	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Naphthalene	12	1.1	1.4	0.19 U	0.19 U	0.066 J	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Phenanthrene	6.3	0.4	1,300	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.068 J	0.074 J	0.088 J	0.19 U	0.19 U	0.19 U	0.19 U	0.069 J
Pyrene	0.025	0.025	87	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.1 J	0.29	0.29 J	0.19 U	0.19 U	0.065 J	0.19 U	0.23 J
Pesticide/Polychlorinated Biphenyls (µg/l)																		
No Detections																		
Explosives (µg/l)																		
No Detections																		
Total Metals (µg/l)																		
Aluminum	87	87	16,000	300 U	44.3 B	26.7 B	212 J	306	178 J	108 B	2,730	445	83.1 J	300 U	248 J	1,120	215 J	518
Antimony	30	30	6	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic	150	5	0.45	2.9 B	3.3 B	3.3 B	5.7 B	4.4 B	3.5 B	1.7 B	**10.3**	3.8 B	1.6 B	5 U	5 U	5 U	5 U	**58**
Barium	4	4	2,900	23.1	23.8	26.8	28.4	23	24.4	24.2	44.4	25.2	25.6	26.2	26.5	30.3	26.3	42.5
Beryllium	0.66	0.66	16	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U	0.12 J	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U
Cadmium	0.45	--	6.9	0.06 J	0.11 J	1 U	0.15 J	0.23 J	0.13 J	0.16 J	0.82 J	0.22 J	1 U	0.16 J	0.3 J	0.45 J	0.28 J	1 U
Calcium	--	--	--	75,300	80,400	68,200	64,800	64,900	63,500	80,300	106,000	69,400	132,000	129,000	131,000	132,000	125,000	114,000
Cobalt	23	23	4.7	0.3 J	0.34 J	0.28 J	0.44 J	0.5 J	0.34 J	0.45 J	1.5	0.45 J	0.29 J	0.4 J	0.66 J	1.1	0.63 J	0.61 J
Copper	16.94	--	620	3	3	3	6.4	6.1	7.8	3.9	25.9	7.6	1.3	1.4	2.3	7	3.4	1.6
Iron	1000	300	11,000	1,070	1,010	1,970	2,410	1,550	1,310	1,480	**19,000**	2,200	682	339	353	1,800	424	**30,300**
Lead	7.74	--	15	0.32 B	0.26 B	0.28 B	1.3	0.98 J	0.93 J	0.56 J	5.9	1.4	0.36 B	0.18 B	0.67 J	2.6	1.2	1.5
Magnesium	--	--	--	1,900	1,910	2,230	1,970	1,820	1,830	1,990	3,040	1,890	2,200	2,040	2,000	2,160	2,000	2,660
Manganese	120	120	320	49	46.9	66.2	55.5	66.2	42.6	53.4	142	74.2	72.8	19.8	6.6	12.5	11.8	250
Nickel	94.2	--	300	1.1 B	0.92 B	0.73 B	1.5 B	1.3 B	1 B	1.1 B	3.5 J	1.7 B	0.65 B	1.1 B	1.4 B	2 J	1.5 B	0.6 B
Potassium	--	--	--	1,600	1,560	1,570	1,810	1,600	1,460	1,560	1,930	1,590	1,380 B	1,680	2,010	2,230	2,180	1,440 B
Selenium	5	1	78	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.86 J	0.82 J	1.3 J	1.3 J	1.1 J	1.2 J	5 U
Silver	0.36	--	71	1 U	1 U	1 U	0.06 J	0.07 J	1 U	0.05 J	0.06 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sodium	--	--	--	4,980	5,290	4,700	4,720	4,640	4,340	5,290	5,980	4,800	7,140	7,860	8,260	8,140	8,180	5,480
Vanadium	20	20	63	1.7 B	0.9 B	1 B	1.4 B	1.3 B	2 B	1.4 B	8.3	1.7 B	0.72 B	1 B	1.3 B	4.6 J	1.8 B	2.1 B
Zinc	216	--	4,700	17.9 J	15.4 J	9.3 J	20.1 J	16.3 J	12.9 J	13.3 J	65.4	24.4 J	3.2 B	12.6 J	16.8 J	31.4	18.2 J	16.5 J
Dissolved Metals (µg/l)																		
Antimony, Dissolved	30	--	6	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic, Dissolved	150	--	0.45	5 U	5 U	5 U	2.2 B	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**16.6**
Barium, Dissolved	4	--	2,900	24.4	23.3	25.5	21.4	21.6	19.8	20.8	24.2	22	23.8	24.3	24.4	25.4	23.9	23.8
Beryllium, Dissolved	0.66	--	16	1 U	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium, Dissolved	0.4	0.4	6.9	1 U	1 U	0.05 J	1 U	0.05 J	0.18 J	0.06 J	1 U	1 U	1 U	0.14 J	0.18 J	0.18 J	0.19 J	1 U
Calcium, Dissolved	--	--	--	77,200	78,200	68,800	61,400	66,800	61,400	73,400	99,900	66,300	128,000	128,000	120,000	128,000	122,000	114,000
Cobalt, Dissolved	23	--	4.7	0.29 J	0.27 J	0.28 J	0.13 J	0.26 J	0.45 J	0.26 J	0.41 J	0.27 J	0.2 J	0.53 J	0.43 J	0.49 J	0.56 J	0.67 J
Copper, Dissolved	16.26	16.26	620	4.2 B	2.4 B	3 B	3.6 B	3.5 B	4.3 B	2.5 B	1.9 B	3.2 B	2.2 B	1.6 B	2.6 B	3 B	2.2 B	3 B
Iron, Dissolved	1,000	--	11,000	30.4 J	29.8 J	30.1 J	54.3 J	55.8 J	96.6 J	50.9 J	17.5 J	119	8.7 B	5.2 B	13.3 B	100 U	7.9 B	5,680
Magnesium, Dissolved	--	--	--	1,880	1,880	2,300	1,920	1,810	1,750	1,880	2,180	1,800	2,150	2,030	1,780	1,910	1,860	3,110
Manganese, Dissolved	120	--	320	41.5	38.9	55.9	11.4	45.6	40.3	43.9	91.5	91.9	49.6	18.8	4.4 J	5.3	6.2	268
Nickel, Dissolved	93.9	93.9	300	0.83 J	1.1 J	0.97 J	0.73 J	0.88 J	1 J	1 J	1.1 J	1.3 J	0.54 B	0.89 B	1.2 B	0.95 B	0.95 B	0.98 B
Potassium, Dissolved	--	--	--	1,510	1,500	1,600	1,600	1,550	1,460	1,440	1,380	1,540	1,320 B	1,680	1,850	1,930	2,150	1,380 B
Selenium, Dissolved	4.61	--	78	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.84 J	1.6 J	5 U
Silver, Dissolved	0.36	3.22	71	1 U	1 U	1 U	1 U	1 U	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sodium, Dissolved	--	--	--	5,150	5,160	5,020	4,520	4,940	4,580	5,040	5,910	4,740	7,120	7,840	7,410	8,030	8,020	5,550
Vanadium, Dissolved	20	--	63	0.92 B	0.91 B	5 U	0.72 J	5 U	0.86 B	0.92 B	5 U	5 U	5 U	5 U	1.2 J	1.2 J	1.1 J	5 U
Zinc, Dissolved	213	213	4,700	10.6 B	8.4 B	7.8 B	9 B	10.1 B	10.5 B	7.5 B	6.5 B	10 B	5.2 B	11.9 B	14.8 B	16 B	12.8 B	19.8 J
Wet Chemistry																		
Hardness (mg/l)	--	--	--	196	NA	179	170	169	166	209	276	181	338	330	335	NA	321	297

Notes:

Bold text indicates exceedance of Adjusted Tap Water X 10 RSLs

Shading indicates exceedance of ESV

Bold box indicates exceedance of BTAG

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

ESVs for total and dissolved cadmium, copper, lead, nickel, and zinc were determined based on the mean hardness of 201 mg/L of the sample set included in this table.

B - Analyte not detected above the level reported in blanks

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

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE 4-7

Surface Water Data Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

				Youth Pond						
Station ID	**Fresh Surface Water Ecological Screening Values**	**BTAG Screening Values**	**Adjusted Tap Water RSLs X 10 (to adjust for Surface Water)**	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
Sample ID				CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
Sample Date				10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Chemical Name										
Volatile Organic Compounds (µg/l)										
No Detections										
Semivolatile Organic Compounds (µg/l)										
Acenaphthene	23	5.8	400	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(a)pyrene	0.014	0.015	0.029	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(g,h,i)perylene	7.64	--	87	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(k)fluoranthene	9.07	--	2.9	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
bis(2-Ethylhexyl)phthalate	32	16	48	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chrysene	--	--	29	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Fluoranthene	8.1	0.04	630	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Indeno(1,2,3-cd)pyrene	4.31	--	0.29	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Naphthalene	12	1.1	1.4	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Phenanthrene	6.3	0.4	1,300	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Pyrene	0.025	0.025	87	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Pesticide/Polychlorinated Biphenyls (µg/l)										
No Detections										
Explosives (µg/l)										
No Detections										
Total Metals (µg/l)										
Aluminum	87	87	16,000	58.8	38.1 J	25 U	9.35 J	21.5 J	15.7 J	29.5 J
Antimony	30	30	6	0.116 J	0.44 U	0.44 U	0.44 U	0.44 U	0.206 J	0.155 J
Arsenic	150	5	0.45	**1.5 J**	**1.62 J**	**1.55 J**	**1.55 J**	**1.4 J**	**1.45 J**	**1.15 J**
Barium	4	4	2,900	17.1	16.3	14.5	17	16.5	9.5 J	30
Beryllium	0.66	0.66	16	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium	0.45	--	6.9	0.177 J	0.115 J	4 U	4 U	0.292 J	4 U	4 U
Calcium	--	--	--	32,400	31,200	33,000	34,800	34,500	24,400	95,100
Cobalt	23	23	4.7	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.294 J
Copper	16.94	--	620	1	0.838 J	0.627 J	0.286 J	0.236 J	1.2	0.663 J
Iron	1000	300	11,000	928	868	1,200	1,040	891	349	716
Lead	7.74	--	15	0.886 J	0.582 J	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Magnesium	--	--	--	987	964	991	995	995	895	2,180
Manganese	120	120	320	63.2	64	64.1	78.6	59.9	12.9	48.7
Nickel	94.2	--	300	0.944 J	0.859 J	1.14 J	0.903 J	0.864 J	0.527 J	2.15 J
Potassium	--	--	--	2,430 J	2,420 J	2,350 J	2,320 J	2,310 J	1,920 J	2,230 J
Selenium	5	1	78	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.36	--	71	0.12 U	0.12 U	0.12 U	0.12 U	0.0418 J	0.12 U	0.12 U
Sodium	--	--	--	3,030	2,970	2,890	3,210	3,200	1,910	6,250
Vanadium	20	20	63	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc	216	--	4,700	10.9 J	7.98 J	12.9 L	6 U	6 U	6.94 J	3.9 J
Dissolved Metals (µg/l)										
Antimony, Dissolved	30	--	6	0.12 J	0.111 J	0.44 U	0.44 U	0.44 U	0.218 J	0.163 J
Arsenic, Dissolved	150	--	0.45	**0.873 J**	**0.84 J**	**0.936 J**	**0.87 J**	**0.896 J**	**0.92 J**	**1.07 J**
Barium, Dissolved	4	--	2,900	14.1	14.6	12.8	16	15.7	8.21 J	28.6
Beryllium, Dissolved	0.66	--	16	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium, Dissolved	0.4	0.4	6.9	4 U	0.11 J	4 U	4 U	4 U	4 U	4 U
Calcium, Dissolved	--	--	--	29,900	30,200	32,800	33,700	34,300	23,400 J	91,400
Cobalt, Dissolved	23	--	4.7	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.255 J
Copper, Dissolved	16.26	16.26	620	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.758 J	0.431 J
Iron, Dissolved	1,000	--	11,000	119	153	68	62.1	72.7	48.6	406
Magnesium, Dissolved	--	--	--	929	949	998	969	982	858	2,090
Manganese, Dissolved	120	--	320	48.3	49.7	57.7	72.7	53.1	3.58	45.6
Nickel, Dissolved	93.9	93.9	300	0.812 J	0.816 J	0.77 J	0.826 J	0.844 J	0.484 J	1.97 J
Potassium, Dissolved	--	--	--	2,300 J	2,280 J	2,220 J	2,270 J	2,260 J	1,790 J	2,160 J
Selenium, Dissolved	4.61	--	78	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver, Dissolved	0.36	3.22	71	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Sodium, Dissolved	--	--	--	2,680	2,740	2,750	2,950	3,080	1,870	5,860
Vanadium, Dissolved	20	--	63	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc, Dissolved	213	213	4,700	6 U	6 U	6 U	6 U	6 U	4.48 J	2.97 J
Wet Chemistry										
Hardness (mg/l)	--	--	--	80	NA	84	88	90	62	240

Notes:

Bold text indicates exceedance of Adjusted Tap Water X 10 RSLs

Shading indicates exceedance of ESV

Bold box indicates exceedance of BTAG

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

ESVs for total and dissolved cadmium, copper, lead, nickel, and zinc were determined based on the mean hardness of 201 mg/L of the sample set included in this table.

B - Analyte not detected above the level reported in blanks

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

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE 4-8

Tissue Sample Result Summary

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

	Site 04													
Station ID	CAS04-TS01	CAS04-TS02	CAS04-TS03	CAS04-TS04	CAS04-TS05	CAS04-TS06	CAS04-TS07	CAS04-TS08	CAS04-TS09	CAS04-TS10	CAS04-TS11	CAS04-TS12	CAS04-TS13	
Sample ID	CAS04-TS01-1012	CAS04-TS02-1012	CAS04-TS03-1012	CAS04-TS04-1012	CAS04-TS05-1012	CAS04-TS06-1012	CAS04-TS07-WB-1012	CAS04-TS08-WB-1012	CAS04-TS09-WB-1012	CAS04-TS10-WB-1012	CAS04-TS11-WB-1012	CAS04-TS12-WB-1012	CAS04-TS13-F-1012	CAS04-TS13-O-1012
Sample Date	10/11/12	10/04/12	10/24/12	10/26/12	10/26/12	10/11/12	10/04/12	10/05/12	10/05/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12
Sample Type	Earthworm	Frog	Frog	Frog	Frog	Frog	Fish	Fish	Fish	Fish	Fish	Fish	Fish	Fish
Chemical Name														
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	82 J	180 L
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	420	980 L
Polychlorinated Biphenyl Congeners (PG/G)														
3,3',4,4'-Tetrachlorobiphenyl (77)	300	37 J	140	13 X	17 X	310	1,600	690	930	53 J	800	270	240 X	1,800
3,4,4',5-Tetrachlorobiphenyl (81)	16 J	24 X	33 X	5.4 X	95 U	8.3 X	53 X	59 X	52 X	18 X	31 X	18 X	20 X	76 X
2,3,3',4,4'-Pentachlorobiphenyl (105)	1,500	1,500	4,200	200	390	2,100	10,000	15,000 K	18,000	20,000	15,000	5,400	3,200	22,000
2,3,4,4',5-Pentachlorobiphenyl (114)	82 J	110 X	500 X	12 X	51 X	62 X	440	350 X	590	570 X	630	240	110 X	840
2,3',4,4',5-Pentachlorobiphenyl (118)	4,100	7,000	31,000	1,300	2,500	6,200	29,000	49,000 K	55,000	56,000	48,000	18,000	10,000	68,000
2,3',4,4',5'-Pentachlorobiphenyl (123)	97 J	150 X	760	31 J	68 X	97 J	640	820 X	1,000	830	910	330	150 X	1,300
3,3',4,4',5-Pentachlorobiphenyl (126)	140	49 X	93 J	43 J	48 J	62 X	380	140	190	230	210 X	170 X	63 J	530
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,600	1,600	2,600	860	740	890	4,200	6,500 K	7,400	8,500	8,100	2,800	1,400	10,000
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	56 X	46 X	46 X	24 X	19 X	50 X	170	140	98 U	49 X	96 U	110	42 X	62 X
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	800	420	440	360	260	420	1,800	410	490	1,800	2,700	920	370	2,600
Decachlorobiphenyl (209)	160 X	49 J	81 X	26 X	33 X	100 X	310	130 X	160 X	320	390 X	100 J	76 J	480
Congeners (156/157)	1,800	1,500	5,400	960	1,100	1,400	6,400	1,900	2,500	6,700	11,000	4,000	1,300	9,900
Total Dichlorobiphenyls	680 J	350 J	300 J	200 J	180 J	2,800 J	17,000 J	33,000 J	34,000 J	4,200 J	6,600 J	20,000 J	7,000 J	43,000 J
Total Heptachlorobiphenyls	150,000	83,000 J	67,000 J	43,000 J	38,000 J	120,000 J	530,000 J	590,000 J	620,000 J	780,000	770,000 J	260,000 J	140,000 J	1,000,000 J
Total Hexachlorobiphenyls	160,000 J	81,000 J	110,000 J	28,000 J	26,000 J	140,000 J	670,000 J	870,000	980,000 J	1,100,000 J	1,000,000 J	370,000 J	210,000 J	1,400,000 J
Total Monochlorobiphenyls	110 U	97 U	3.6 B	97 U	95 U	61 J	310	720 J	720	99	140	370	130	810 J
Total Nonachlorobiphenyls	1,500	850	740 J	520 J	490 J	1,500	5,200	2,100	2,500	5,000	6,500	1,900	1,100 J	8,200
Total Octachlorobiphenyls	27,000 J	18,000	12,000 J	9,200 J	8,700 J	30,000 J	110,000	93,000	110,000	150,000	160,000 J	46,000 J	28,000	220,000
Total Pentachlorobiphenyls	32,000 J	18,000 J	49,000 J	2,400 J	4,300 J	53,000 J	300,000 J	380,000 J	480,000 J	350,000 J	340,000 J	150,000 J	84,000 J	550,000
Total Tetrachlorobiphenyls	17,000 J	8,000 J	7,700 J	740 J	1,500 J	36,000 J	200,000 J	280,000 J	330,000 J	190,000 J	150,000 J	110,000 J	54,000 J	360,000 J
Total Trichlorobiphenyls	6,000 J	4,300 J	2,000 J	520 J	940 J	13,000 J	120,000 J	100,000 J	120,000 J	46,000 J	32,000 J	45,000 J	20,000 J	130,000 J
Total Metals (MG/KG)														
Aluminum	1,490	24.5	51.8	121	60.3	274	36.4	11.4 J	15.2 J	7.4 J	8.5 J	53.7	1.1 J	4.7 J
Antimony	0.11 J	0.28 U	0.26 U	0.48 U	0.42 U	0.27 U	0.36 U	0.39 U	0.47 U	0.27 U	0.32 U	0.34 U	0.32 U	0.26 U
Arsenic	2.2	0.04 J	0.08 J	0.18 J	0.12 J	1.8	0.09 J	0.06 J	0.11 J	0.27 U	0.12 J	0.2 J	0.32 U	0.26 U
Barium	8.4	1.6	2.4	2.5	3.2	6.5	1.6	3.7	4.4	0.38	0.71	1.1	0.04 B	0.68
Beryllium	0.1 J	0.028 U	0.026 U	0.048 U	0.042 U	0.01 J	0.036 U	0.039 U	0.047 U	0.027 U	0.032 U	0.034 U	0.032 U	0.026 U
Cadmium	7.6	0.02 J	0.22 J	0.22 J	0.1 J	0.11 J	0.02 B	0.24 U	0.28 U	0.02 J	0.006 J	0.007 J	0.19 U	0.15 U
Calcium	1,800	12,200	7,400	8,280	11,100	4,290	9,550	12,200	13,600	5,260	23,200	18,800	615	25,600
Chromium	3.7	0.26 B	0.35 B	0.8 J	0.37 B	0.7	0.27 B	0.28 B	0.27 B	0.15 B	0.33 B	0.37 B	0.07 B	0.35 B
Cobalt	0.77 J	0.02 J	0.05 J	0.08 J	0.04 J	0.13 J	0.06 J	0.02 J	0.03 J	0.03 J	0.05 J	0.05 J	0.25 U	0.03 J
Copper	13.2	1.1 J	4.1	2.3 J	2 J	4.5	1 J	1.4 J	1.4 J	0.66 J	0.62 J	1.2 J	0.64 U	0.75 J
Iron	2,730	52.9	108	225	116	1,590	119	43.5	110	79.1	56.3	183	1.6 J	21.9
Lead	3.5	0.09 J	0.4	0.2 J	0.18 J	0.77	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.17 J	0.25 U	0.21 U
Magnesium	475	326	278	311	350	199	401	449	474	272	602	477	314	561
Manganese	27.6	1.9	2.4	2.1	2.8	34.5	3.5	5.7	7.9	0.87	6.9	2.3	0.25 U	2.2
Mercury	0.04	0.02 J	0.028 B	0.02 B	0.02 B	0.006 J	0.01 J	0.02 J	0.01 J	0.03	0.03	0.01 J	0.03	0.03
Nickel	1.7	0.23 U	0.08 J	0.22 J	0.05 J	0.29 J	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.27 U	0.25 U	0.21 U
Potassium	1,340	2,510	2,310	2,280	2,410	1,400	2,920	2,560 K	2,490	2,670	2,720	2,820	3,640	2,570
Selenium	0.94 B	0.41 B	0.44 B	0.54	0.49 B	0.42 B	0.61 B	0.36 B	0.56 B	0.59 B	0.48 B	0.57 B	0.31 B	0.53 B
Silver	0.08 J	0.23 U	0.21 U	0.38 U	0.33 U	0.06 J	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.27 U	0.25 U	0.21 U
Sodium	548	1,060	881	981	936	1,080	945	866	708	922	1,360	1,120	582	1,460
Vanadium	4.3	0.06 J	0.15 J	0.35 J	0.19 J	0.97	0.11 J	0.31 U	0.06 J	0.03 J	0.05 J	0.17 J	0.25 U	0.05 J
Zinc	57.8	16.9	17.4	17.6	16.8	24.3	30.9	57.8	65.1	23	27.3	19.7	4.4	17.9
Wet Chemistry (PCT)														
% Solids	29	20	22	21	20	14	25	25	26	30	24	22	22	26
Lipids (%)	NA	0.67	0.87	0.46	0.26	0.59	1.6	4.1	3.6	8.8	0.95	NA	0.22	3.7

Notes:

Shading indicates detections

B - Analyte not detected significantly above the level reported in an associated blank

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

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

NA - Not analyzed

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

U - The material was analyzed for, but not detected

X - PCB congeners only: Estimated Maximum Possible Concentration (EMPC)

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

All sample results are reported wet-weight; results are not adjusted for percent moisture or percent lipids

TABLE 4-8

Tissue Sample Result Summary

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

	Youth Pond								
Station ID	CAYP-TS01	CAYP-TS02	CAYP-TS03	CAYP-TS04	CAYP-TS05	CAYP-TS06	CAYP-TS07	CAYP-TS08	
Sample ID	CAYP-TS01-1012	CAYP-TS02-1012	CAYP-TS03-1012	CAYP-TS04-WB-1012	CAYP-TS05-WB-1012	CAYP-TS06-WB-1012	CAYP-TS07-WB-1012	CAYP-TS08-F-1012	CAYP-TS08-O-1012
Sample Date	10/05/12	10/26/12	10/26/12	10/05/12	10/05/12	10/09/12	10/05/12	10/05/12	10/05/12
Sample Type	Frog	Frog	Frog	Fish	Fish	Fish	Fish	Fish	Fish
Chemical Name									
Pesticide/Polychlorinated Biphenyls (UG/KG)									
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	24 U	23 UL
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	58	250 L
Polychlorinated Biphenyl Congeners (PG/G)									
3,3',4,4'-Tetrachlorobiphenyl (77)	97 U	98 U	8.2 X	84 J	95 J	62 J	99 U	10 X	94 X
3,4,4',5-Tetrachlorobiphenyl (81)	97 U	98 U	100 U	96 U	5.6 J	100 U	99 U	100 U	99 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	300	150	81 J	1,000	1,900 K	1,200	2,400	210	1,800
2,3,4,4',5-Pentachlorobiphenyl (114)	21 X	62 J	12 X	54 J	91 X	23 X	110 X	9.5 X	130
2,3',4,4',5-Pentachlorobiphenyl (118)	1,700	3,300	460	3,700	7,200 K	4,800	8,200	770	7,500
2,3',4,4',5'-Pentachlorobiphenyl (123)	27 J	46 J	13 X	45 X	86 J	39 X	74 X	6.4 X	99 J
3,3',4,4',5-Pentachlorobiphenyl (126)	57 X	31 X	19 X	70 X	110	15 X	84 X	16 X	200
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	900	830	360	930	2,500 K	1,300	1,500	330	3,500
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	10 X	43 X	8.8 X	24 X	150 X	100 U	67 X	9.8 X	140
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	350	330	160	390	580 K	63 J	610	150	1,600
Decachlorobiphenyl (209)	16 J	29 X	41 X	6.7 X	25 X	100 U	34 X	100 U	67 X
Congeners (156/157)	1,100	1,400	480	1,700	2,200 K	270	2,700	530	4,700
Total Dichlorobiphenyls	210 J	95 J	30 J	1,300 J	650 J	920 J	650 J	110 J	750
Total Heptachlorobiphenyls	60,000 J	44,000 J	21,000 J	95,000 J	220,000 J	110,000 J	150,000 J	29,000 J	310,000 J
Total Hexachlorobiphenyls	42,000 J	32,000 J	12,000 J	120,000 J	240,000 J	140,000 J	190,000 J	30,000 J	310,000 J
Total Monochlorobiphenyls	97 U	98 U	100 U	96 U	96 U	100 U	99 U	100 U	3.3 B
Total Nonachlorobiphenyls	600 J	620 J	290 J	580 J	1,000 J	240	970 J	230 J	2,300
Total Octachlorobiphenyls	14,000 J	10,000 J	4,400 J	17,000 J	37,000	15,000	25,000 J	5,800 J	65,000
Total Pentachlorobiphenyls	3,100 J	4,200 J	970 J	26,000 J	41,000 J	33,000 J	47,000 J	4,100 J	45,000 J
Total Tetrachlorobiphenyls	470 B	710 J	180 B	8,900 J	11,000 J	12,000 J	15,000 J	900 J	10,000 J
Total Trichlorobiphenyls	510 J	320 J	88 B	4,100 J	3,800 J	4,600 J	4,600 J	230 J	3,800 J
Total Metals (MG/KG)									
Aluminum	10.6 J	58.4	91.8	9.4 J	3.3 B	3.4 B	7.2 B	1.1 B	2.7 B
Antimony	0.038 U	0.01 B	0.01 B	0.026 U	0.034 U	0.045 U	0.049 U	0.048 U	0.032 U
Arsenic	0.31 U	0.12 J	0.2 J	0.21 U	0.28 U	0.16 J	0.39 U	0.39 U	0.25 U
Barium	2.6	2.9	4.5	0.8	0.49	3.1	0.54	0.05 J	0.97
Beryllium	0.015 U	0.003 B	0.005 B	0.01 U	0.014 U	0.018 U	0.004 B	0.019 U	0.013 U
Cadmium	0.04 J	0.17	0.2	0.01 U	0.03 J	0.018 U	0.02 J	0.019 U	0.013 U
Calcium	11,000	5,680	7,150	13,400	9,000 J	13,400	6,920	282	44,800
Chromium	0.13 J	0.34 J	0.32	0.14 J	0.14 J	0.11 J	0.18 J	0.14 J	0.21 J
Cobalt	0.02 B	0.04 B	0.05 B	0.02 B	0.04 B	0.02 B	0.03 B	0.006 B	0.05 B
Copper	1.5	2.3	2.4	0.46	0.72	1.2	0.55	0.22 J	0.36
Iron	57.3	81.8	123	67.8	50.1 L	86.2	37.7	5.8 U	126
Lead	0.1 B	0.18	0.4	0.05 B	0.05 B	0.05 B	0.05 B	0.008 B	0.06 B
Magnesium	318	259	268	464	393 K	422	286	266	928
Manganese	1.8 B	2.2 B	2.5 B	3.7	1.3 B	11	1.9 B	0.23 B	2.6
Mercury	0.01 J	0.03 B	0.04 B	0.009 J	0.02 J	0.009 J	0.01 J	0.09	0.04
Nickel	0.02 B	0.33 B	0.09 B	0.062 U	0.083 U	0.11 U	0.1 B	0.1 B	0.076 U
Potassium	2,320	2,220	2,140	2,780	2,820	2,210	2,230	3,380	2,350
Selenium	0.22 J	0.26 J	0.36	0.19 J	0.26 J	0.19 J	0.19 J	0.15 J	0.25 J
Silver	0.031 U	0.005 B	0.005 B	0.021 U	0.028 U	0.036 U	0.039 U	0.039 U	0.025 U
Sodium	977	838	856	912	942	786	864	629	1,600
Vanadium	0.31 U	0.1 J	0.17 J	0.21 U	0.28 U	0.36 U	0.39 U	0.39 U	0.25 U
Zinc	17.9	19.2	25.2	25.8	16.9	67.8	23.3	4.6	33.4
Wet Chemistry (PCT)									
% Solids	23	22	21	27	24	25	29	19	26
Lipids (%)	1.2	0.76	0.6	3.9	2.2	4.2	11	0.1 U	2.2

Notes:

Shading indicates detections

B - Analyte not detected significantly above the level reported in an associated blank

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

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

NA - Not analyzed

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

U - The material was analyzed for, but not detected

X - PCB congeners only: Estimated Maximum Possible Concentration (EMPC)

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

All sample results are reported wet-weight; results are not adjusted for percent moisture or percent lipids

TABLE 4-9

Surface Features Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

					Northern Ditch								
Station ID	**Adjusted Residential Soil RSLs**	**Soil Ecological Screening Values***	**Freshwater Sediment Ecological Screening Values****	**BTAG Sediment Screening Values****	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID					CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date					10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Chemical Name													
Volatile Organic Compounds (UG/KG)													
2-Butanone	2,800,000	--	--	--	6.4	2.9 U	3.3 U	2.8 U	3.5 J	3.2 J	3.1 U	3 U	3 U
Acetone	6,100,000	--	--	--	42	5.4 J	16 U	14 U	45	27 J	15 U	9.6 J	15 U
Toluene	500,000	40,000	670	--	0.4 J	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Semivolatile Organic Compounds (UG/KG)													
Acenaphthene	340,000	LMW PAH	290	6.7	31 U	33 U	330 U	32 U	31 U	31 U	31 U	36 J	30 U
Acenaphthylene	340,000	LMW PAH	160	5.9	31 U	33 U	330 U	32 U	31 U	31 U	31 U	70	30 U
Anthracene	1,700,000	LMW PAH	57.2	57.2	31 U	33 U	420 J	32 U	31 U	31 U	31 J	120	22 J
Benzo(a)anthracene	150	HMW PAH	108	108	25 J	68	**1,300**	92	51	41	110	**450**	88
Benzo(a)pyrene	15	HMW PAH	150	150	**17 J**	**64**	**1,100**	**79**	**45**	**38 J**	**94**	**450**	**77**
Benzo(b)fluoranthene	150	HMW PAH	240	27.2	33 J	130	**1,800**	**190**	80	69	**170**	**810**	130
Benzo(g,h,i)perylene	170,000	HMW PAH	170	170	31 U	28 J	530	43	32 J	27 J	42	190	49
Benzo(k)fluoranthene	1,500	HMW PAH	240	240	31 U	36 J	640	59	30 J	24 J	45	260	48
bis(2-Ethylhexyl)phthalate	35,000	30,000	750	180	240 UJ	390 J	260 U	130 U	130 UL	130 UL	250 UL	3,500 L	240 UL
Butylbenzylphthalate	260,000	30,000	11,000	10,883	240 UL	7,400	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Carbazole	--	--	--	--	240 UL	260 U	420 J	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Chrysene	15,000	HMW PAH	166	166	17 J	86	1,400	120	58	47	120	580	97
Dibenz(a,h)anthracene	15	HMW PAH	33	33	31 U	33 U	330 U	**17 J**	31 U	31 U	31 U	**54**	30 U
Dibenzofuran	7,800	--	5,100	415	240 UL	260 U	380 J	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Fluoranthene	230,000	LMW PAH	423	423	36 J	180	3,400	75	100	92	260	1,100	180
Fluorene	230,000	LMW PAH	77.4	77.4	31 U	33 U	330 U	32 U	31 U	31 U	31 U	67	30 U
Indeno(1,2,3-cd)pyrene	150	HMW PAH	200	17	31 U	26 J	**520**	42	28 J	24 J	40 J	**190**	44
Naphthalene	3,600	LMW PAH	176	176	31 U	33 U	330 U	32 U	31 U	31 U	31 U	28 J	30 U
PAH (HMW)	--	18,000	2,900	190	185	584.5	10,055	721	424.5	362.5	836.5	3,874	698
PAH (LMW)	--	29,000	786	76	271	539	7,675	252	312	300	673.5	2,256	507
Phenanthrene	1,700,000	LMW PAH	204	204	22 J	130	2,900	32 U	54	50	180	700	110
Pyrene	170,000	HMW PAH	195	195	31 J	130	2,600	79	85	77	200	890	150
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDT	1,700	100	4.16	4.16	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	20 J	12 UL
Aroclor-1260	220	8,000	59.8	59.8	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	26 L	24 UL
Explosives (UG/KG)													
No Detections													
Total Metals (MG/KG)													
Aluminum	7,700	pH < 5.5	25,500	--	1,580	1,820	5,330	**11,000**	6,840	6,900	5,710	4,460	2,560
Antimony	3.1	78	3	2.00	1.57 U	1.73 U	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	0.56 J	1.98 UL
Arsenic	0.61	18	9.79	9.80	**2.07 J**	**1.46 J**	**3.79**	**4.72**	**7.69**	**7.54**	**4.86**	**6.08**	**3.65 J**
Barium	1,500	330	20	--	9.34	13.3	37.4	32.3	41.2	41.2	35.4	25.5	20.6
Beryllium	16	40	--	--	0.26	0.185	0.337	0.309	0.748	0.726	0.491	0.315	0.297
Cadmium	7	32	0.99	0.99	0.153 J	0.204	0.581	0.0744 J	0.934	1.03	0.671	0.808	0.245
Calcium	--	--	--	--	232	634	1,920	1,770	1,570	1,600	1,260	1,150	484 K
Chromium (hexavalent)	0.29	--	--	--	NA	NA	NA	**0.53**	0.25 U	0.25 U	NA	NA	0.24 J
Chromium	0.29	64	43.4	43.4	**5.19**	**3.77**	**10.9**	**15.7**	**10.4**	**10.9**	**10.5**	**17.8**	**11.5**
Cobalt	2.3	13	50	50	0.556 J	0.746 J	**2.82**	1.5	**2.48**	**2.48**	**2.69**	**2.59**	1.18
Copper	310	70	31.6	31.6	3.34	4.38	19.7	5.54	30.3	34.1	17.2	26.4	7.08
Iron	5,500	5 < pH > 8	20,000	20,000	**5,820**	2,940	**11,200**	**19,400**	**6,510**	**6,870**	**11,300**	**10,500**	**7,230**
Lead	400	120	35.8	35.8	5.14	6.57	39.6	14.9	15.8	17.4	14.7	71.9	9.21
Magnesium	--	--	--	--	197	245	1,760	665	514	547	760	934	287 K
Manganese	180	220	460	460	19.7	12	177	52.8	**217**	**205**	**189**	88.3	28.9 K
Mercury	2.3	0.1	0.18	0.18	0.00697 U	0.00743 U	0.0245	0.0656	0.0213	0.0221	0.00587 J	0.0352	0.00667 J
Nickel	150	38	22.7	22.7	1.19	1.41	4.75	2.47	5.24	5.6	5.57	4.64	2.13
Potassium	--	--	--	--	176	177	419	598	453	452	386	928	257
Selenium	39	0.52	2	2	1.57 U	1.73 U	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	0.663 J	1.98 U
Sodium	--	--	--	--	5.79 B	8.02 B	16.7 J	29.1 J	20.4 J	20.9 J	14.5 J	17 J	9.47 J
Vanadium	39	130	--	--	6.41	4.62	13.5	27.4	11.9	12.2	10.4	14.9	8.33
Zinc	2,300	120	121	121	51.6	79.2	164	50.7	234	258	272	271	107 K

TABLE 4-9

Surface Features Exceedance Results

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

					Northern Ditch								
Station ID	**Adjusted Residential Soil RSLs**	**Soil Ecological Screening Values***	**Freshwater Sediment Ecological Screening Values****	**BTAG Sediment Screening Values****	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID					CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date					10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)													
Zinc, SEM					0.58 B	0.9 B	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	--	--	--	--	7.20E-04	0.00107	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	--	--	--	--	0.0374	0.0508	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	--	--	--	--	0.0146	0.0229	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	--	--	--	--	0.0083 U	0.01	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry													
pH (pH units)	--	--	--	--	6.6	6.9	6.7	6.7	6.4	NA	6.9	6.3	6.7
Total organic carbon (TOC) (mg/kg)	--	--	--	--	2,700	2,700	11,000	3,800	17,000	NA	7,100	11,000	4,100
Grain Size (PCT)													
Coarse Sand (%)	--	--	--	--	0.9	0.4	7.8	0.3	0.5	NA	9.9	1	1.9
Fine Sand (%)	--	--	--	--	75.4	81.2	43.6	37.2	54.3	NA	40.4	61.8	67
Fines (%)	--	--	--	--	5.5	8.4	15.7	58	39.8	NA	23.2	28.8	11.4
Gravel (%)	--	--	--	--	0.1	0.5	23	0.6	0.1	NA	6.4	0.5	6.9
Medium Sand (%)	--	--	--	--	18.1	9.5	9.9	3.9	5.3	NA	20.1	7.9	12.8
				--									
Grain Size (PCT/P)				--									
GS05 Sieve 2" (50 mm)	--	--	--	--	100	100	100	100	100	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	--	--	--	--	100	100	100	100	100	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	--	--	--	--	100	100	100	100	100	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	--	--	--	--	100	100	100	100	100	NA	100	100	100
GS10 Sieve 0.375" (9.5 mm)	--	--	--	--	99.9	100	88.8	100	100	NA	100	100	94.4
Sieve No. 004 (4.75 mm)	--	--	--	--	99.9	99.5	77	99.4	99.9	NA	93.6	99.5	93.1
Sieve No. 010 (2.00 mm)	--	--	--	--	99	99.1	69.2	99.1	99.4	NA	83.7	98.5	91.2
Sieve No. 020 (850 um)	--	--	--	--	95.3	97.8	65.8	98.4	98.5	NA	74.2	96.5	87.7
Sieve No. 040 (425 um)	--	--	--	--	80.9	89.6	59.3	95.2	94.1	NA	63.6	90.6	78.4
Sieve No. 060 (250 um)	--	--	--	--	43.3	55.7	44.7	83	78.2	NA	46.8	72.3	51.1
Sieve No. 140 (106 um)	--	--	--	--	6.4	9.7	18.1	60.3	42.7	NA	24.6	32.3	12.9
Sieve No. 200 (75 um)	--	--	--	--	5.5	8.4	15.7	58	39.8	NA	23.2	28.8	11.4

Notes:

Shading indicates exceedance of Freshwater Sediment ESV

Underline text indicates exceedance of Soil ESV

Bold text indicates exceedance of Adjusted Residential Soil RSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple

Bold box indicates exceedance of BTAG

B - Analyte not detected significantly above the level reported in blanks (validated data)

B - Analyte also detected in an associated blank (unvalidated data)

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

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

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

MG/KG - Milligrams per kilogram

PCT - Percent

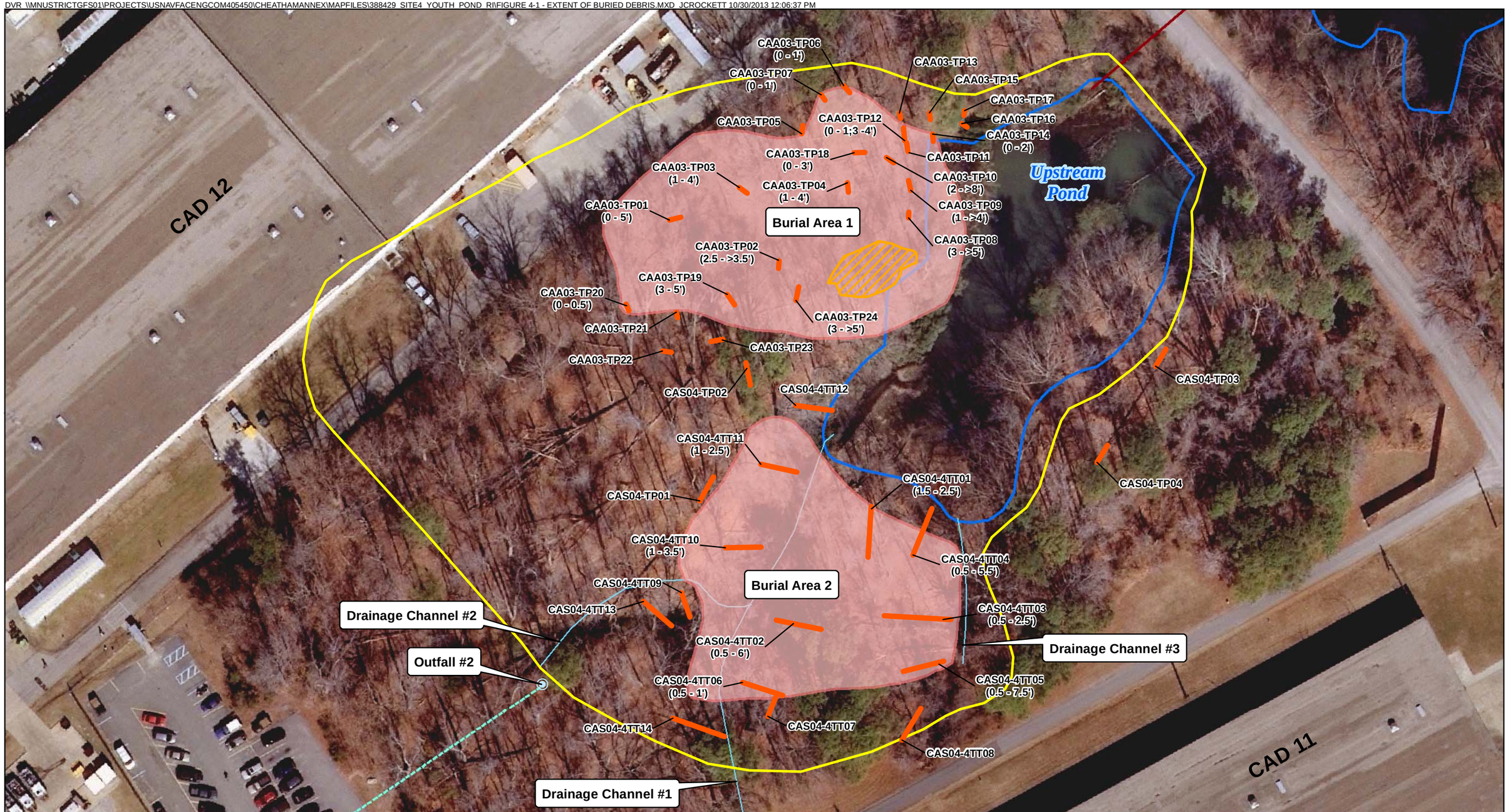
PCT/P - Percent passing

UG/KG - Micrograms per kilogram

UMOL/G - Micromoles per gram

*Only samples from locations CAYP-SS01, CAYP-SS02, CAYP-SS03, CAYP-SS04, CAYP-SS05, CAYP-SS06 and CAYP-SD14 are screened against the Soil ESVs. CAYP-SD14 and CAYP-SD15 are screened against the sediment ESVs and BTAG sediment values. Sediment ESVs assume 1% TOC.

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-1 - EXTENT OF BURIED DEBRIS.MXD JCROCKETT 10/30/2013 12:06:37 PM



Legend

- Outfall
- Test Pit Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

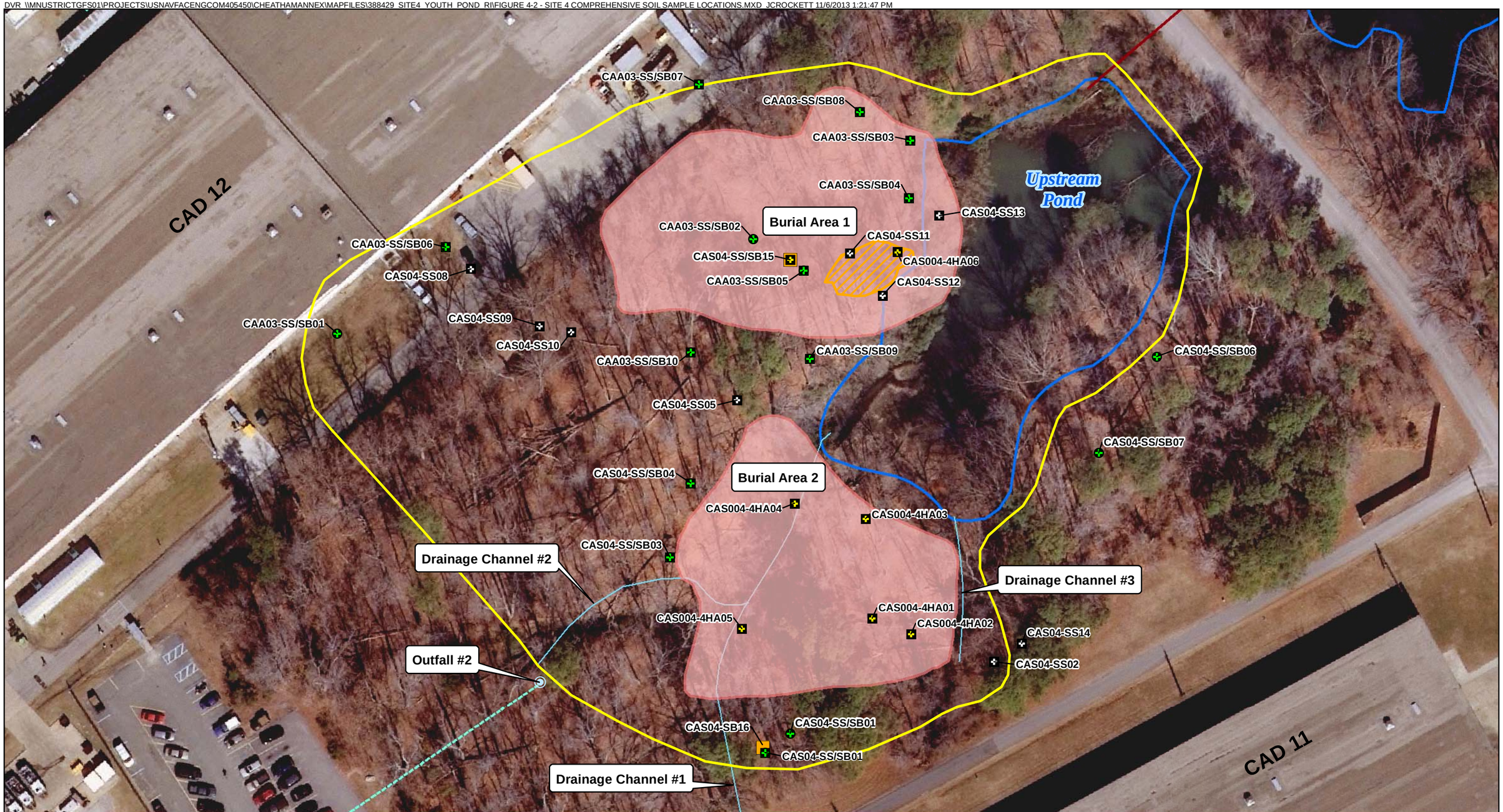
N
W E
S

0 60
Feet

Figure 4-1
Site 4, Extent of Buried Debris
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-2 - SITE 4 COMPREHENSIVE SOIL SAMPLE LOCATIONS.MXD JCROCKETT 11/6/2013 1:21:47 PM



Legend

- Outfall
- Surface Soil Samples
- Surface/Subsurface Soil Samples
- Subsurface Soil Samples for Total and Hexavalent Chromium Analysis
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

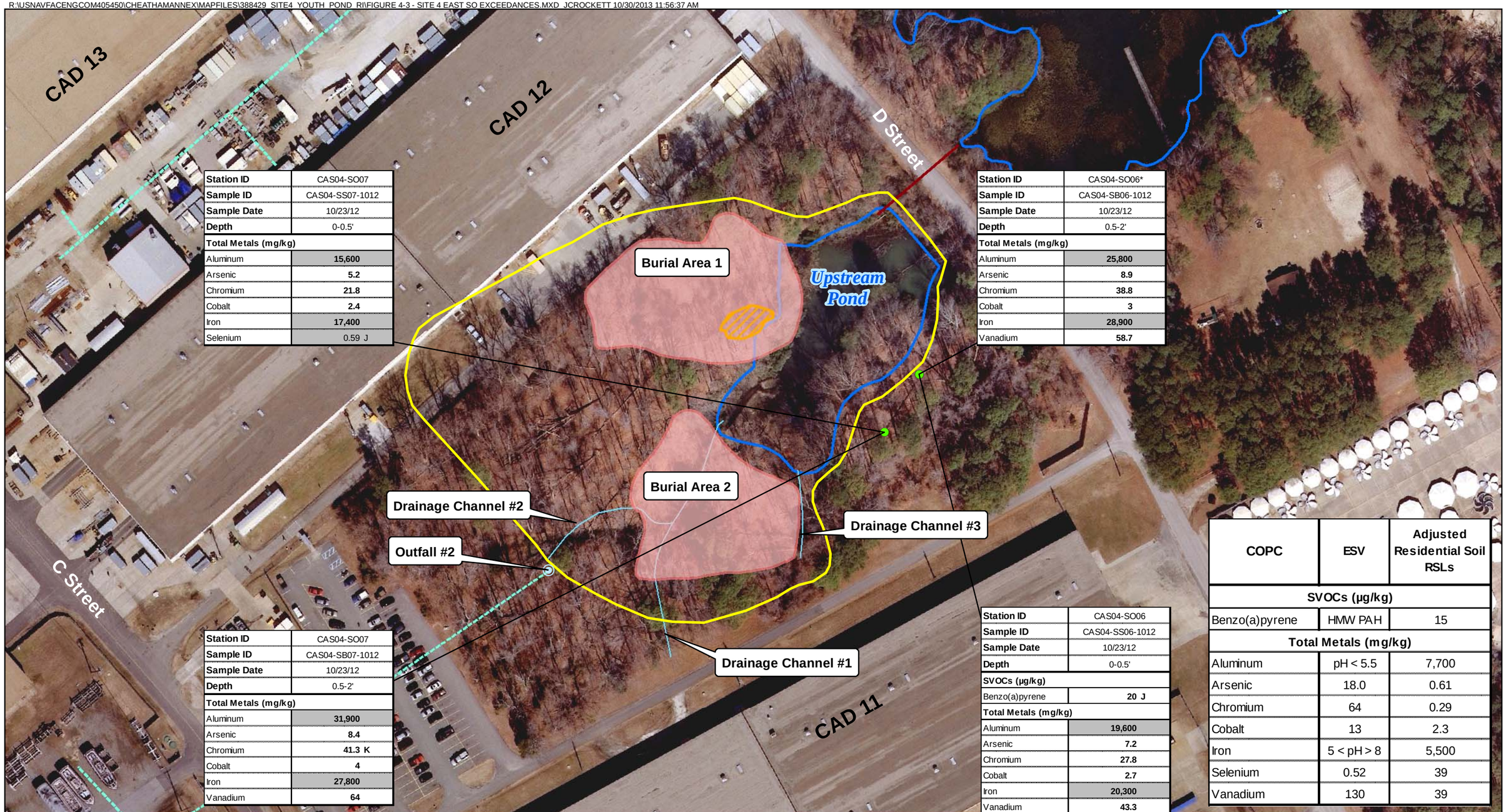
N
W E
S

0 60
Feet

Figure 4-2
Site 4, Comprehensive Soil Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-3 - SITE 4 EAST SO EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:56:37 AM



Station ID	CAS04-SO07
Sample ID	CAS04-SS07-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**15,600**
Arsenic	**5.2**
Chromium	**21.8**
Cobalt	**2.4**
Iron	**17,400**
Selenium	0.59 J

Station ID	CAS04-SO06*
Sample ID	CAS04-SB06-1012
Sample Date	10/23/12
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**25,800**
Arsenic	**8.9**
Chromium	**38.8**
Cobalt	**3**
Iron	**28,900**
Vanadium	**58.7**

Station ID	CAS04-SO07
Sample ID	CAS04-SB07-1012
Sample Date	10/23/12
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**31,900**
Arsenic	**8.4**
Chromium	**41.3 K**
Cobalt	**4**
Iron	**27,800**
Vanadium	**64**

Station ID	CAS04-SO06
Sample ID	CAS04-SS06-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	**20 J**
Total Metals (mg/kg)	
Aluminum	**19,600**
Arsenic	**7.2**
Chromium	**27.8**
Cobalt	**2.7**
Iron	**20,300**
Vanadium	**43.3**

COPC	ESV	Adjusted Residential Soil RSLs
SVOCs (µg/kg)		
Benzo(a)pyrene	HMW PAH	15
Total Metals (mg/kg)		
Aluminum	pH < 5.5	7,700
Arsenic	18.0	0.61
Chromium	64	0.29
Cobalt	13	2.3
Iron	5 < pH > 8	5,500
Selenium	0.52	39
Vanadium	130	39

Legend

- Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; greater value is shown.

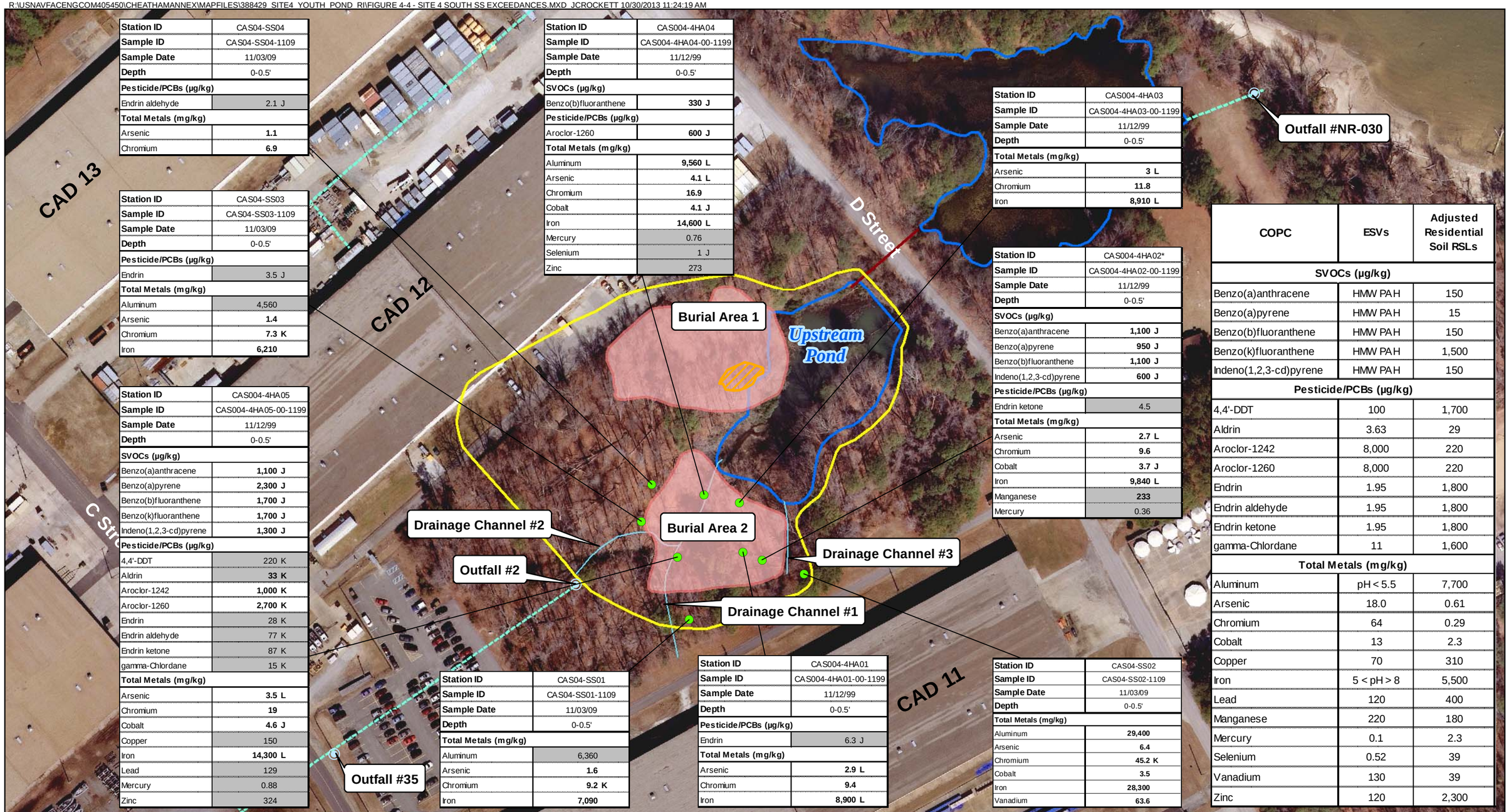
N
W E
S

0 100
Feet

Figure 4-3
Site 4, East - Soil Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-4 - SITE 4 SOUTH SS EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:24:19 AM



Station ID	CAS04-SS04
Sample ID	CAS04-SS04-1109
Sample Date	11/03/09
Depth	0-0.5'
Pesticide/PCBs (µg/kg)	
Endrin aldehyde	2.1 J
Total Metals (mg/kg)	
Arsenic	**1.1**
Chromium	**6.9**

Station ID	CAS04-SS03
Sample ID	CAS04-SS03-1109
Sample Date	11/03/09
Depth	0-0.5'
Pesticide/PCBs (µg/kg)	
Endrin	3.5 J
Total Metals (mg/kg)	
Aluminum	4,560
Arsenic	**1.4**
Chromium	**7.3 K**
Iron	**6,210**

Station ID	CAS004-4HA05
Sample ID	CAS004-4HA05-00-1199
Sample Date	11/12/99
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,100 J**
Benzo(a)pyrene	**2,300 J**
Benzo(b)fluoranthene	**1,700 J**
Benzo(k)fluoranthene	**1,700 J**
Indeno(1,2,3-cd)pyrene	**1,300 J**
Pesticide/PCBs (µg/kg)	
4,4'-DDT	220 K
Aldrin	**33 K**
Aroclor-1242	**1,000 K**
Aroclor-1260	**2,700 K**
Endrin	28 K
Endrin aldehyde	77 K
Endrin ketone	87 K
gamma-Chlordane	15 K
Total Metals (mg/kg)	
Arsenic	**3.5 L**
Chromium	**19**
Cobalt	**4.6 J**
Copper	150
Iron	**14,300 L**
Lead	129
Mercury	0.88
Zinc	324

Station ID	CAS004-4HA04
Sample ID	CAS004-4HA04-00-1199
Sample Date	11/12/99
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(b)fluoranthene	**330 J**
Pesticide/PCBs (µg/kg)	
Aroclor-1260	**600 J**
Total Metals (mg/kg)	
Aluminum	**9,560 L**
Arsenic	**4.1 L**
Chromium	**16.9**
Cobalt	**4.1 J**
Iron	**14,600 L**
Mercury	0.76
Selenium	1 J
Zinc	273

Station ID	CAS004-4HA03
Sample ID	CAS004-4HA03-00-1199
Sample Date	11/12/99
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	**3 L**
Chromium	**11.8**
Iron	**8,910 L**

Station ID	CAS004-4HA02*
Sample ID	CAS004-4HA02-00-1199
Sample Date	11/12/99
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,100 J**
Benzo(a)pyrene	**950 J**
Benzo(b)fluoranthene	**1,100 J**
Indeno(1,2,3-cd)pyrene	**600 J**
Pesticide/PCBs (µg/kg)	
Endrin ketone	4.5
Total Metals (mg/kg)	
Arsenic	**2.7 L**
Chromium	**9.6**
Cobalt	**3.7 J**
Iron	**9,840 L**
Manganese	**233**
Mercury	0.36

Station ID	CAS004-4HA01
Sample ID	CAS004-4HA01-00-1199
Sample Date	11/12/99
Depth	0-0.5'
Pesticide/PCBs (µg/kg)	
Endrin	6.3 J
Total Metals (mg/kg)	
Arsenic	**2.9 L**
Chromium	**9.4**
Iron	**8,900 L**

Station ID	CAS04-SS01
Sample ID	CAS04-SS01-1109
Sample Date	11/03/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	6,360
Arsenic	**1.6**
Chromium	**9.2 K**
Iron	**7,090**

Station ID	CAS04-SS02
Sample ID	CAS04-SS02-1109
Sample Date	11/03/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**29,400**
Arsenic	**6.4**
Chromium	**45.2 K**
Cobalt	**3.5**
Iron	**28,300**
Vanadium	**63.6**

COPC	ESVs	Adjusted Residential Soil RSLs
SVOCs (µg/kg)		
Benzo(a)anthracene	HMW PAH	150
Benzo(a)pyrene	HMW PAH	15
Benzo(b)fluoranthene	HMW PAH	150
Benzo(k)fluoranthene	HMW PAH	1,500
Indeno(1,2,3-cd)pyrene	HMW PAH	150
Pesticide/PCBs (µg/kg)		
4,4'-DDT	100	1,700
Aldrin	3.63	29
Aroclor-1242	8,000	220
Aroclor-1260	8,000	220
Endrin	1.95	1,800
Endrin aldehyde	1.95	1,800
Endrin ketone	1.95	1,800
gamma-Chlordane	11	1,600
Total Metals (mg/kg)		
Aluminum	pH < 5.5	7,700
Arsenic	18.0	0.61
Chromium	64	0.29
Cobalt	13	2.3
Copper	70	310
Iron	5 < pH > 8	5,500
Lead	120	400
Manganese	220	180
Mercury	0.1	2.3
Selenium	0.52	39
Vanadium	130	39
Zinc	120	2,300

Legend

- Surface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Site 4 Boundary
- Water Body

Notes:
Shading indicates exceedance of ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; greater value is shown.

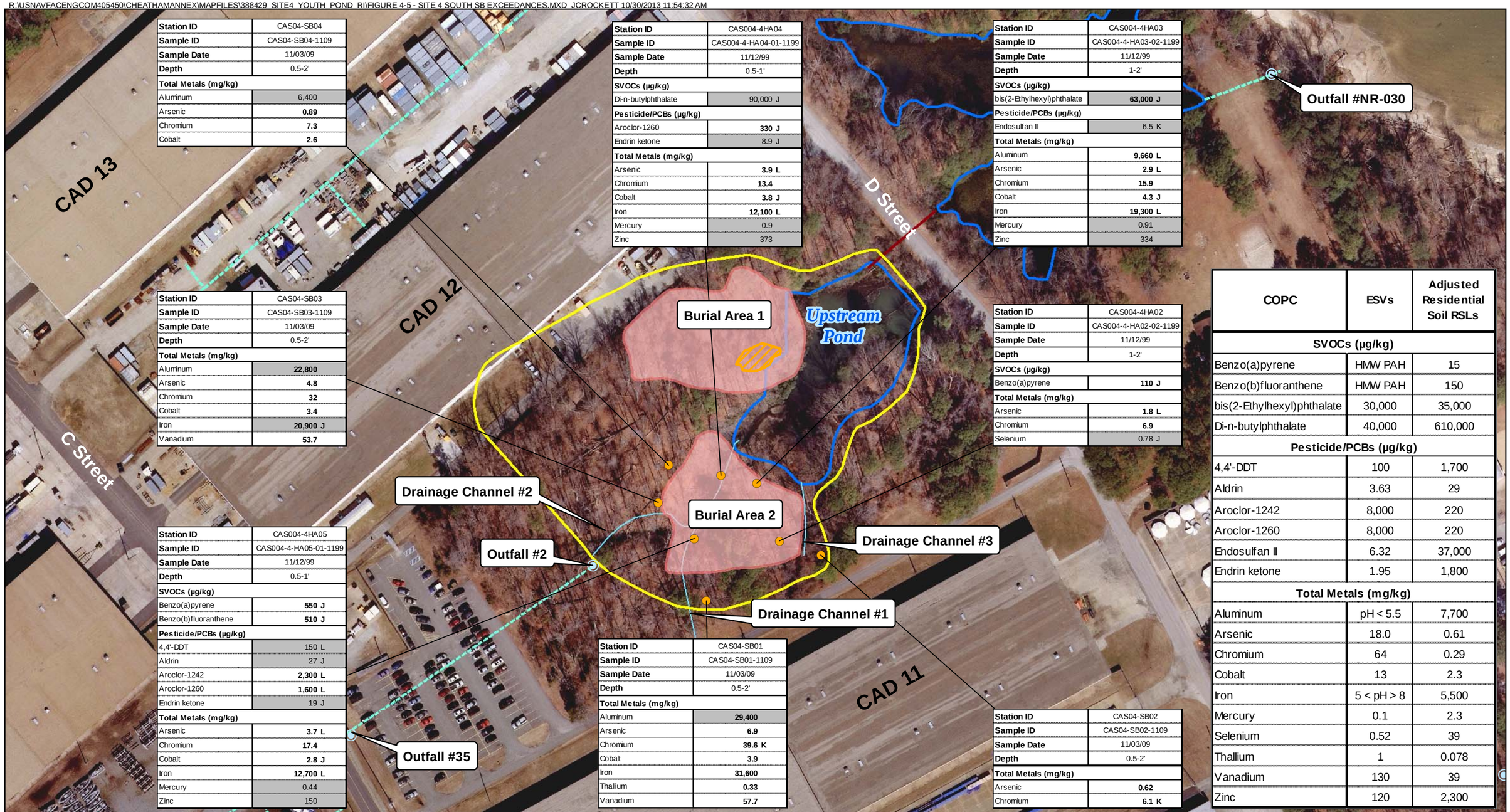
N
W E
S

0 120
Feet

Figure 4-4
Site 4, South - Surface Soil Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-5 - SITE 4 SOUTH SB EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:54:32 AM



Station ID	CAS04-SB04
Sample ID	CAS04-SB04-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	6,400
Arsenic	**0.89**
Chromium	**7.3**
Cobalt	**2.6**

Station ID	CAS004-4HA04
Sample ID	CAS004-4-HA04-01-1199
Sample Date	11/12/99
Depth	0.5-1'
SVOCs (µg/kg)	
Di-n-butylphthalate	90,000 J
Pesticide/PCBs (µg/kg)	
Aroclor-1260	**330 J**
Endrin ketone	8.9 J
Total Metals (mg/kg)	
Arsenic	**3.9 L**
Chromium	**13.4**
Cobalt	**3.8 J**
Iron	**12,100 L**
Mercury	0.9
Zinc	373

Station ID	CAS004-4HA03
Sample ID	CAS004-4-HA03-02-1199
Sample Date	11/12/99
Depth	1-2'
SVOCs (µg/kg)	
bis(2-Ethylhexyl)phthalate	**63,000 J**
Pesticide/PCBs (µg/kg)	
Endosulfan II	6.5 K
Total Metals (mg/kg)	
Aluminum	**9,660 L**
Arsenic	**2.9 L**
Chromium	**15.9**
Cobalt	**4.3 J**
Iron	**19,300 L**
Mercury	0.91
Zinc	334

Station ID	CAS04-SB03
Sample ID	CAS04-SB03-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**22,800**
Arsenic	**4.8**
Chromium	**32**
Cobalt	**3.4**
Iron	**20,900 J**
Vanadium	**53.7**

Station ID	CAS004-4HA02
Sample ID	CAS004-4-HA02-02-1199
Sample Date	11/12/99
Depth	1-2'
SVOCs (µg/kg)	
Benzo(a)pyrene	**110 J**
Total Metals (mg/kg)	
Arsenic	**1.8 L**
Chromium	**6.9**
Selenium	0.78 J

Station ID	CAS004-4HA05
Sample ID	CAS004-4-HA05-01-1199
Sample Date	11/12/99
Depth	0.5-1'
SVOCs (µg/kg)	
Benzo(a)pyrene	**550 J**
Benzo(b)fluoranthene	**510 J**
Pesticide/PCBs (µg/kg)	
4,4'-DDT	150 L
Aldrin	27 J
Aroclor-1242	**2,300 L**
Aroclor-1260	**1,600 L**
Endrin ketone	19 J
Total Metals (mg/kg)	
Arsenic	**3.7 L**
Chromium	**17.4**
Cobalt	**2.8 J**
Iron	**12,700 L**
Mercury	0.44
Zinc	150

Station ID	CAS04-SB01
Sample ID	CAS04-SB01-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**29,400**
Arsenic	**6.9**
Chromium	**39.6 K**
Cobalt	**3.9**
Iron	**31,600**
Thallium	**0.33**
Vanadium	**57.7**

Station ID	CAS04-SB02
Sample ID	CAS04-SB02-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Arsenic	**0.62**
Chromium	**6.1 K**

COPC	ESVs	Adjusted Residential Soil RSLs
SVOCs (µg/kg)		
Benzo(a)pyrene	HMW PAH	15
Benzo(b)fluoranthene	HMW PAH	150
bis(2-Ethylhexyl)phthalate	30,000	35,000
Di-n-butylphthalate	40,000	610,000
Pesticide/PCBs (µg/kg)		
4,4'-DDT	100	1,700
Aldrin	3.63	29
Aroclor-1242	8,000	220
Aroclor-1260	8,000	220
Endosulfan II	6.32	37,000
Endrin ketone	1.95	1,800
Total Metals (mg/kg)		
Aluminum	pH < 5.5	7,700
Arsenic	18.0	0.61
Chromium	64	0.29
Cobalt	13	2.3
Iron	5 < pH > 8	5,500
Mercury	0.1	2.3
Selenium	0.52	39
Thallium	1	0.078
Vanadium	130	39
Zinc	120	2,300

Legend

- Subsurface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; greater value is shown.

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Figure 4-5
Site 4, South - Subsurface Soil Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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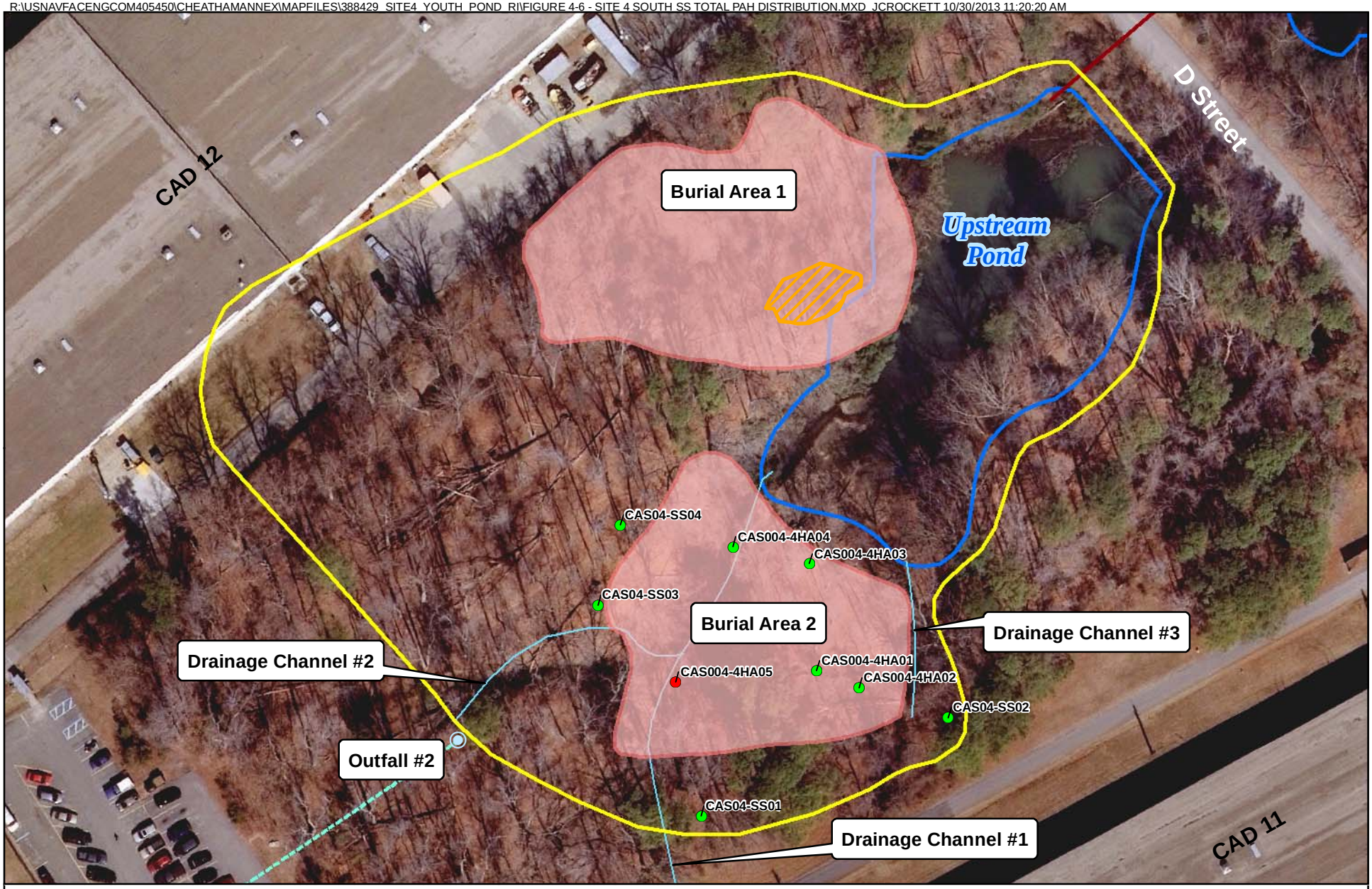
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-6 - SITE 4 SOUTH SS TOTAL PAH DISTRIBUTION.MXD JCROCKETT 10/30/2013 11:20:20 AM



Legend

Total PAH Concentrations

- <500 µg/kg
- 500-5,000 µg/kg
- >5,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-6
Site 4, South - Surface Soil Total PAH Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
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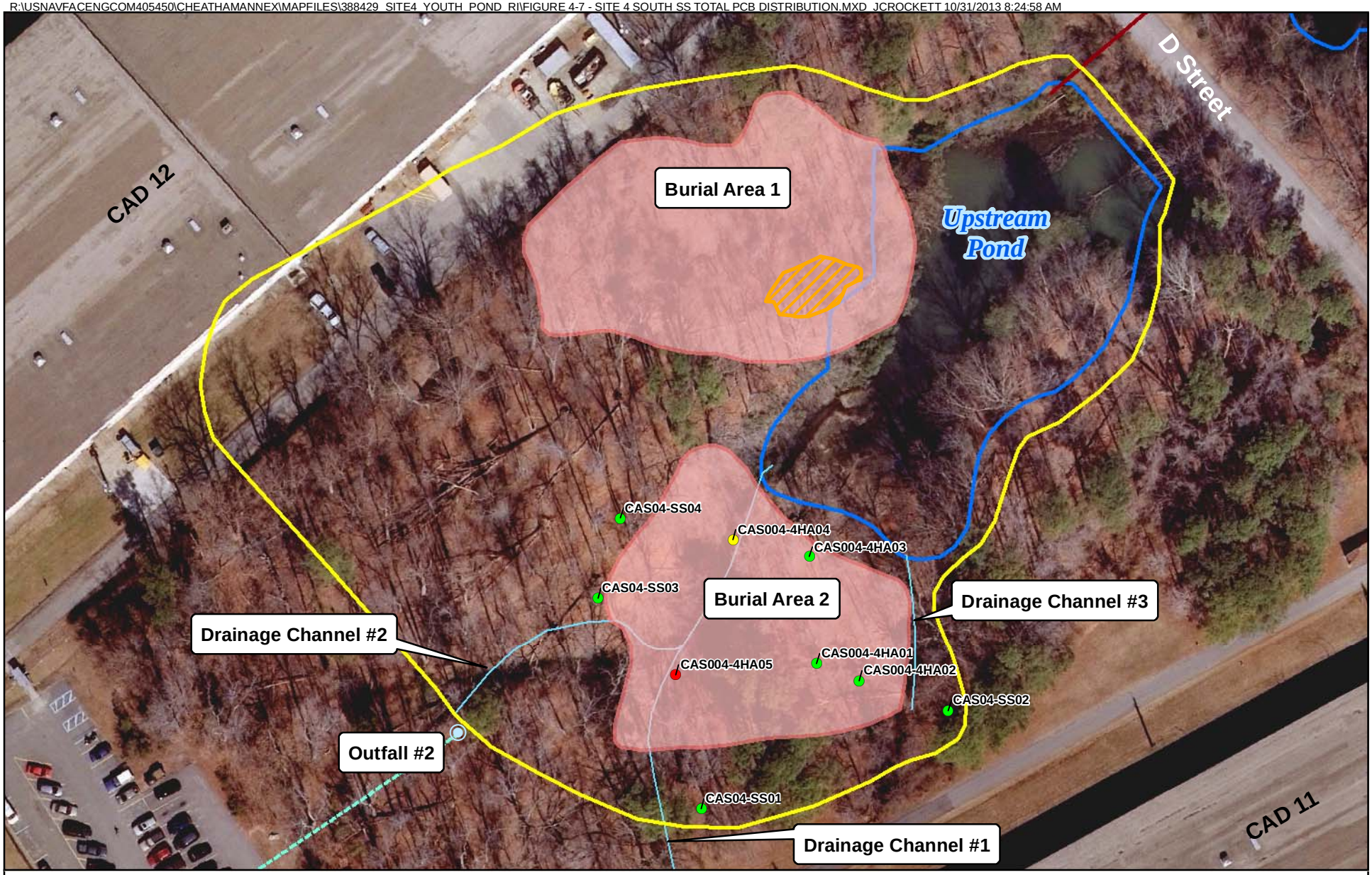
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-7 - SITE 4 SOUTH SS TOTAL PCB DISTRIBUTION.MXD JCROCKETT 10/31/2013 8:24:58 AM



Legend

Total PCB Concentrations

- <500 µg/kg
- 500-1,000 µg/kg
- >1,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-7
Site 4, South - Surface Soil Total PCB Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
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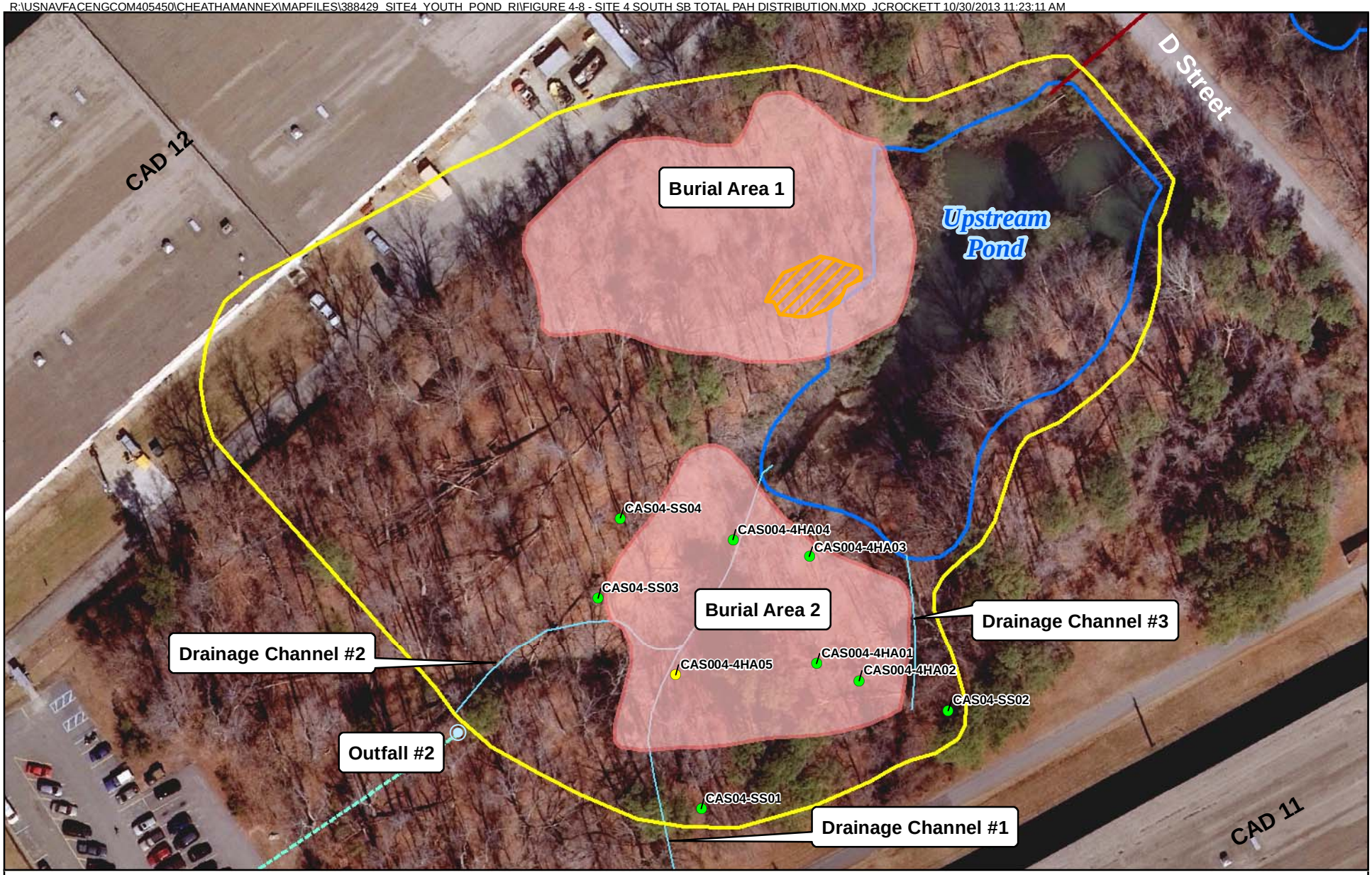
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-8 - SITE 4 SOUTH SB TOTAL PAH DISTRIBUTION.MXD JCROCKETT 10/30/2013 11:23:11 AM



Legend

Total PAH Concentrations

- <500 µg/kg
- 500-5,000 µg/kg
- >5,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-8
Site 4, South - Subsurface Soil Total PAH Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
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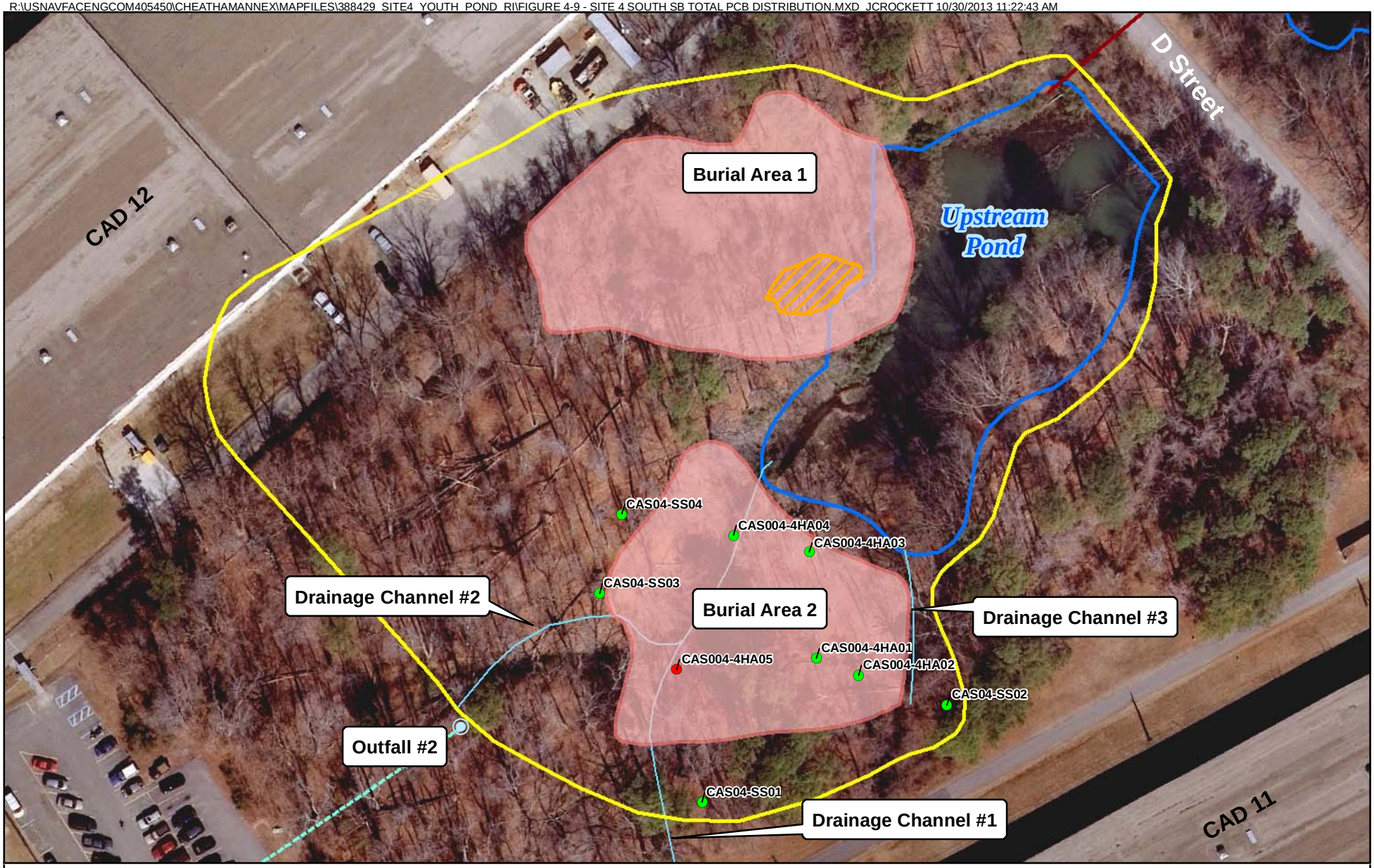
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-9 - SITE 4 SOUTH SB TOTAL PCB DISTRIBUTION.MXD JCROCKETT 10/30/2013 11:22:43 AM



Legend

Total PAH Concentrations

- <500 µg/kg
- 500-1,000 µg/kg
- >1,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-9
Site 4, South - Subsurface Soil Total PCB Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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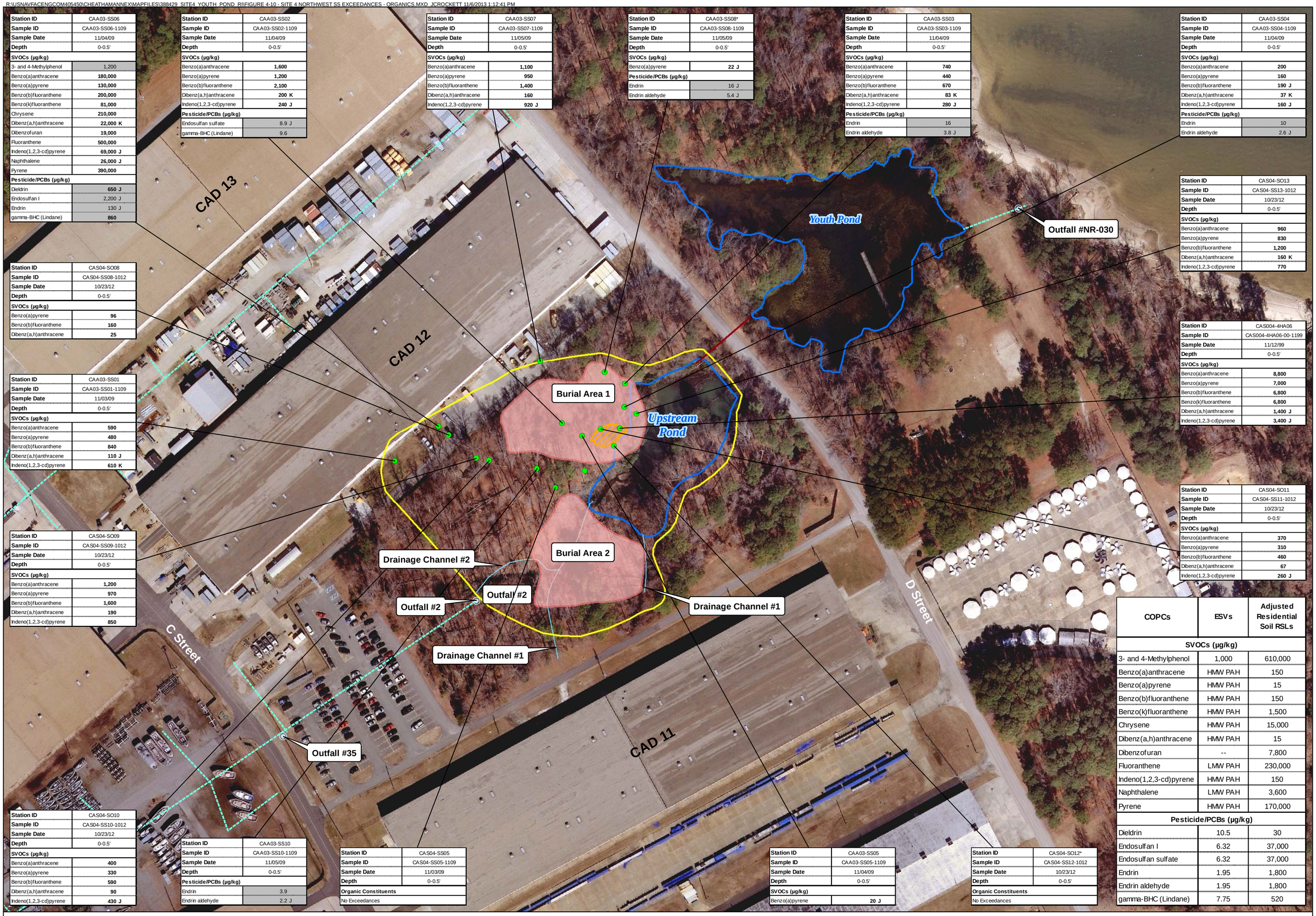
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-10 - SITE 4 NORTHWEST SS EXCEEDANCES - ORGANICS.MXD JCROCKETT 11/6/2013 1:12:41 PM



Station ID	CAA03-SS06
Sample ID	CAA03-SS06-1109
Sample Date	11/04/09
Depth	0-0.5'
SVOCs (µg/kg)	
3- and 4-Methylphenol	1,200
Benzo(a)anthracene	**180,000**
Benzo(a)pyrene	**130,000**
Benzo(b)fluoranthene	**200,000**
Benzo(k)fluoranthene	**81,000**
Chrysene	**210,000**
Dibenz(a,h)anthracene	**22,000 K**
Dibenzofuran	**19,000**
Fluoranthene	**500,000**
Indeno(1,2,3-cd)pyrene	**69,000 J**
Naphthalene	**26,000 J**
Pyrene	**390,000**
Pesticide/PCBs (µg/kg)	
Dieldrin	**650 J**
Endosulfan I	2,200 J
Endrin	130 J
gamma-BHC (Lindane)	**860**

Station ID	CAA03-SS02
Sample ID	CAA03-SS02-1109
Sample Date	11/04/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,600**
Benzo(a)pyrene	**1,200**
Benzo(b)fluoranthene	**2,100**
Dibenz(a,h)anthracene	**200 K**
Indeno(1,2,3-cd)pyrene	**240 J**
Pesticide/PCBs (µg/kg)	
Endosulfan sulfate	8.9 J
gamma-BHC (Lindane)	9.6

Station ID	CAA03-SS07
Sample ID	CAA03-SS07-1109
Sample Date	11/05/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,100**
Benzo(a)pyrene	**950**
Benzo(b)fluoranthene	**1,400**
Dibenz(a,h)anthracene	**160**
Indeno(1,2,3-cd)pyrene	**920 J**

Station ID	CAA03-SS08*
Sample ID	CAA03-SS08-1109
Sample Date	11/05/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	**22 J**
Pesticide/PCBs (µg/kg)	
Endrin	16 J
Endrin aldehyde	5.4 J

Station ID	CAA03-SS03
Sample ID	CAA03-SS03-1109
Sample Date	11/04/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**740**
Benzo(a)pyrene	**440**
Benzo(b)fluoranthene	**670**
Dibenz(a,h)anthracene	**83 K**
Indeno(1,2,3-cd)pyrene	**280 J**
Pesticide/PCBs (µg/kg)	
Endrin	16
Endrin aldehyde	3.8 J

Station ID	CAA03-SS04
Sample ID	CAA03-SS04-1109
Sample Date	11/04/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**200**
Benzo(a)pyrene	**160**
Benzo(b)fluoranthene	**190 J**
Dibenz(a,h)anthracene	**37 K**
Indeno(1,2,3-cd)pyrene	**160 J**
Pesticide/PCBs (µg/kg)	
Endrin	10
Endrin aldehyde	2.6 J

Station ID	CAS04-SO13
Sample ID	CAS04-SS13-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**960**
Benzo(a)pyrene	**830**
Benzo(b)fluoranthene	**1,200**
Dibenz(a,h)anthracene	**160 K**
Indeno(1,2,3-cd)pyrene	**770**

Station ID	CAS004-4HA06
Sample ID	CAS004-4HA06-00-1199
Sample Date	11/12/99
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**8,800**
Benzo(a)pyrene	**7,000**
Benzo(b)fluoranthene	**6,800**
Benzo(k)fluoranthene	**6,800**
Dibenz(a,h)anthracene	**1,400 J**
Indeno(1,2,3-cd)pyrene	**3,400 J**

Station ID	CAS04-SO11
Sample ID	CAS04-SS11-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**370**
Benzo(a)pyrene	**310**
Benzo(b)fluoranthene	**460**
Dibenz(a,h)anthracene	**67**
Indeno(1,2,3-cd)pyrene	**260 J**

Station ID	CAS04-SO08
Sample ID	CAS04-SS08-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	**96**
Benzo(b)fluoranthene	**160**
Dibenz(a,h)anthracene	**25**

Station ID	CAA03-SS01
Sample ID	CAA03-SS01-1109
Sample Date	11/03/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**590**
Benzo(a)pyrene	**480**
Benzo(b)fluoranthene	**840**
Dibenz(a,h)anthracene	**110 J**
Indeno(1,2,3-cd)pyrene	**610 K**

Station ID	CAS04-SO09
Sample ID	CAS04-SS09-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,200**
Benzo(a)pyrene	**970**
Benzo(b)fluoranthene	**1,600**
Dibenz(a,h)anthracene	**190**
Indeno(1,2,3-cd)pyrene	**850**

Station ID	CAS04-SO10
Sample ID	CAS04-SS10-1012
Sample Date	10/23/12
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)anthracene	**400**
Benzo(a)pyrene	**330**
Benzo(b)fluoranthene	**590**
Dibenz(a,h)anthracene	**90**
Indeno(1,2,3-cd)pyrene	**430 J**

Station ID	CAA03-SS10
Sample ID	CAA03-SS10-1109
Sample Date	11/05/09
Depth	0-0.5'
Pesticide/PCBs (µg/kg)	
Endrin	3.9
Endrin aldehyde	2.2 J

Station ID	CAS04-SS05
Sample ID	CAS04-SS05-1109
Sample Date	11/03/09
Depth	0-0.5'
Organic Constituents	
No Exceedances	

Station ID	CAA03-SS05
Sample ID	CAA03-SS05-1109
Sample Date	11/04/09
Depth	0-0.5'
SVOCs (µg/kg)	
Benzo(a)pyrene	**20 J**

Station ID	CAS04-SO12*
Sample ID	CAS04-SS12-1012
Sample Date	10/23/12
Depth	0-0.5'
Organic Constituents	
No Exceedances	

COPCs	ESVs	Adjusted Residential Soil RSLs
SVOCs (µg/kg)		
3- and 4-Methylphenol	1,000	610,000
Benzo(a)anthracene	HMW PAH	150
Benzo(a)pyrene	HMW PAH	15
Benzo(b)fluoranthene	HMW PAH	150
Benzo(k)fluoranthene	HMW PAH	1,500
Chrysene	HMW PAH	15,000
Dibenz(a,h)anthracene	HMW PAH	15
Dibenzofuran	--	7,800
Fluoranthene	LMW PAH	230,000
Indeno(1,2,3-cd)pyrene	HMW PAH	150
Naphthalene	LMW PAH	3,600
Pyrene	HMW PAH	170,000
Pesticide/PCBs (µg/kg)		
Dieldrin	10.5	30
Endosulfan I	6.32	37,000
Endosulfan sulfate	6.32	37,000
Endrin	1.95	1,800
Endrin aldehyde	1.95	1,800
gamma-BHC (Lindane)	7.75	520

Legend

- Surface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; highest value is shown

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Figure 4-10
Site 4, Northwest - Surface Soil Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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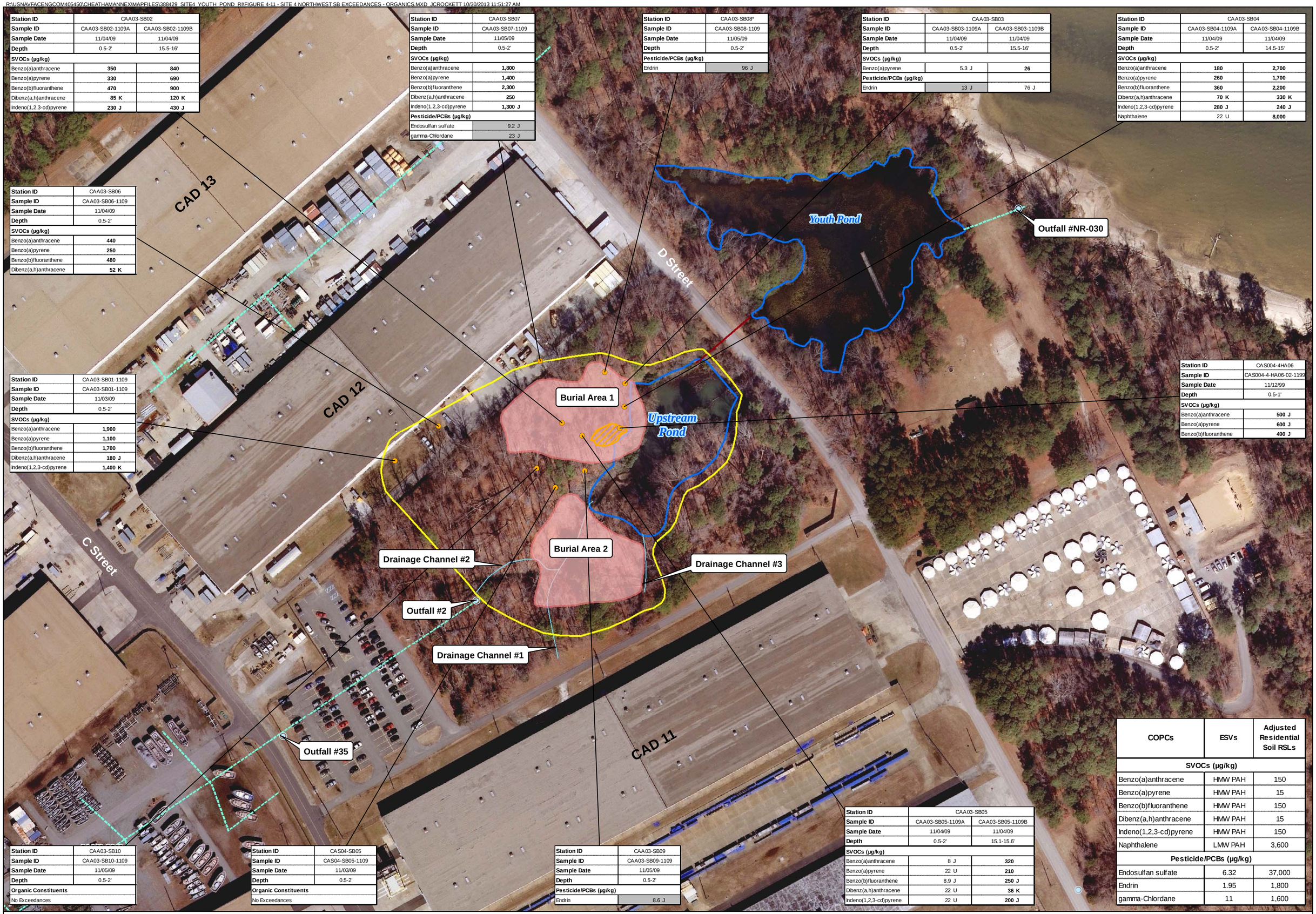
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-11 - SITE 4 NORTHWEST SB EXCEEDANCES - ORGANICS.MXD JCROCKETT 10/30/2013 11:51:27 AM



Station ID	CAA03-SB02	
Sample ID	CAA03-SB02-1109A	CAA03-SB02-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.5-16'
SVOCs (µg/kg)		
Benzo(a)anthracene	**350**	**840**
Benzo(a)pyrene	**330**	**690**
Benzo(b)fluoranthene	**470**	**900**
Dibenz(a,h)anthracene	**85 K**	**120 K**
Indeno(1,2,3-cd)pyrene	**230 J**	**430 J**

Station ID	CAA03-SB07
Sample ID	CAA03-SB07-1109
Sample Date	11/05/09
Depth	0.5-2'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,800**
Benzo(a)pyrene	**1,400**
Benzo(b)fluoranthene	**2,300**
Dibenz(a,h)anthracene	**250**
Indeno(1,2,3-cd)pyrene	**1,300 J**
Pesticide/PCBs (µg/kg)	
Endosulfan sulfate	9.2 J
gamma-Chlordane	23 J

Station ID	CAA03-SB08*
Sample ID	CAA03-SB08-1109
Sample Date	11/05/09
Depth	0.5-2'
Pesticide/PCBs (µg/kg)	
Endrin	96 J

Station ID	CAA03-SB03	
Sample ID	CAA03-SB03-1109A	CAA03-SB03-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.5-16'
SVOCs (µg/kg)		
Benzo(a)pyrene	5.3 J	**26**
Pesticide/PCBs (µg/kg)		
Endrin	13 J	76 J

Station ID	CAA03-SB04	
Sample ID	CAA03-SB04-1109A	CAA03-SB04-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	14.5-15'
SVOCs (µg/kg)		
Benzo(a)anthracene	**180**	**2,700**
Benzo(a)pyrene	**260**	**1,700**
Benzo(b)fluoranthene	**360**	**2,200**
Dibenz(a,h)anthracene	**70 K**	**330 K**
Indeno(1,2,3-cd)pyrene	**280 J**	**240 J**
Naphthalene	22 U	**8,000**

Station ID	CAA03-SB06
Sample ID	CAA03-SB06-1109
Sample Date	11/04/09
Depth	0.5-2'
SVOCs (µg/kg)	
Benzo(a)anthracene	**440**
Benzo(a)pyrene	**250**
Benzo(b)fluoranthene	**480**
Dibenz(a,h)anthracene	**52 K**

Station ID	CAA03-SB01-1109
Sample ID	CAA03-SB01-1109
Sample Date	11/03/09
Depth	0.5-2'
SVOCs (µg/kg)	
Benzo(a)anthracene	**1,900**
Benzo(a)pyrene	**1,100**
Benzo(b)fluoranthene	**1,700**
Dibenz(a,h)anthracene	**180 J**
Indeno(1,2,3-cd)pyrene	**1,400 K**

Station ID	CAS004-4HA06
Sample ID	CAS004-4-HA06-02-1199
Sample Date	11/12/99
Depth	0.5-1'
SVOCs (µg/kg)	
Benzo(a)anthracene	**500 J**
Benzo(a)pyrene	**600 J**
Benzo(b)fluoranthene	**490 J**

Station ID	CAA03-SB10
Sample ID	CAA03-SB10-1109
Sample Date	11/05/09
Depth	0.5-2'
Organic Constituents	
No Exceedances	

Station ID	CAS04-SB05
Sample ID	CAS04-SB05-1109
Sample Date	11/03/09
Depth	0.5-2'
Organic Constituents	
No Exceedances	

Station ID	CAA03-SB09
Sample ID	CAA03-SB09-1109
Sample Date	11/05/09
Depth	0.5-2'
Pesticide/PCBs (µg/kg)	
Endrin	8.6 J

Station ID	CAA03-SB05	
Sample ID	CAA03-SB05-1109A	CAA03-SB05-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.1-15.6'
SVOCs (µg/kg)		
Benzo(a)anthracene	8 J	**320**
Benzo(a)pyrene	22 U	**210**
Benzo(b)fluoranthene	8.9 J	**250 J**
Dibenz(a,h)anthracene	22 U	**36 K**
Indeno(1,2,3-cd)pyrene	22 U	**200 J**

COPCs	ESVs	Adjusted Residential Soil RSLs
SVOCs (µg/kg)		
Benzo(a)anthracene	HMW PAH	150
Benzo(a)pyrene	HMW PAH	15
Benzo(b)fluoranthene	HMW PAH	150
Dibenz(a,h)anthracene	HMW PAH	15
Indeno(1,2,3-cd)pyrene	HMW PAH	150
Naphthalene	LMW PAH	3,600
Pesticide/PCBs (µg/kg)		
Endosulfan sulfate	6.32	37,000
Endrin	1.95	1,800
gamma-Chlordane	11	1,600

Legend

- Subsurface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; highest value is shown

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Figure 4-11
Site 4, Northwest - Subsurface Soil Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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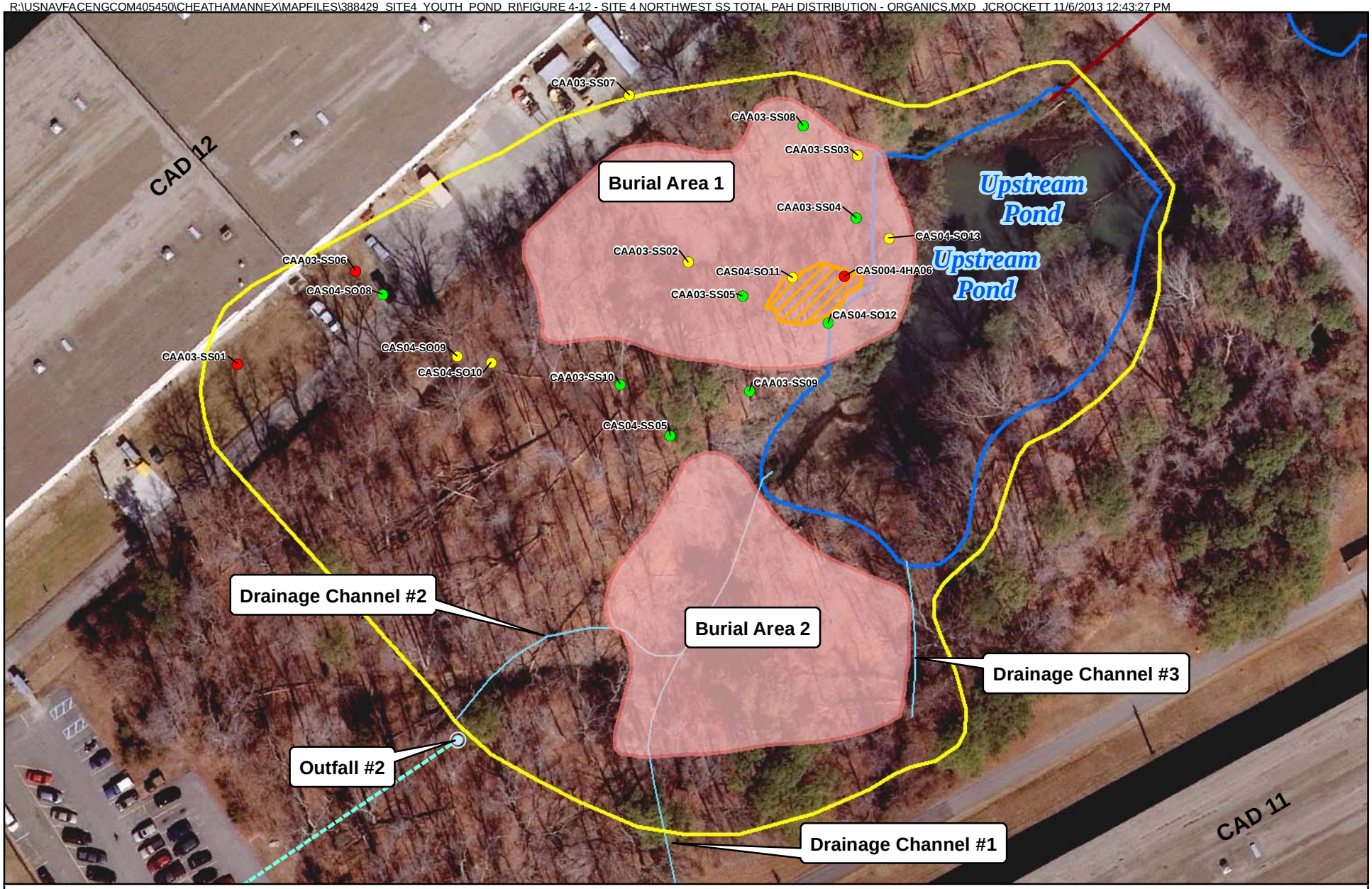
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-12 - SITE 4 NORTHWEST SS TOTAL PAH DISTRIBUTION - ORGANICS.MXD JCROCKETT 11/6/2013 12:43:27 PM



Legend

Total PAH Concentrations

- <1,000 µg/kg
- 1,000-10,000 µg/kg
- >10,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-12
Site 4, Northwest - Surface Soil Total PAH Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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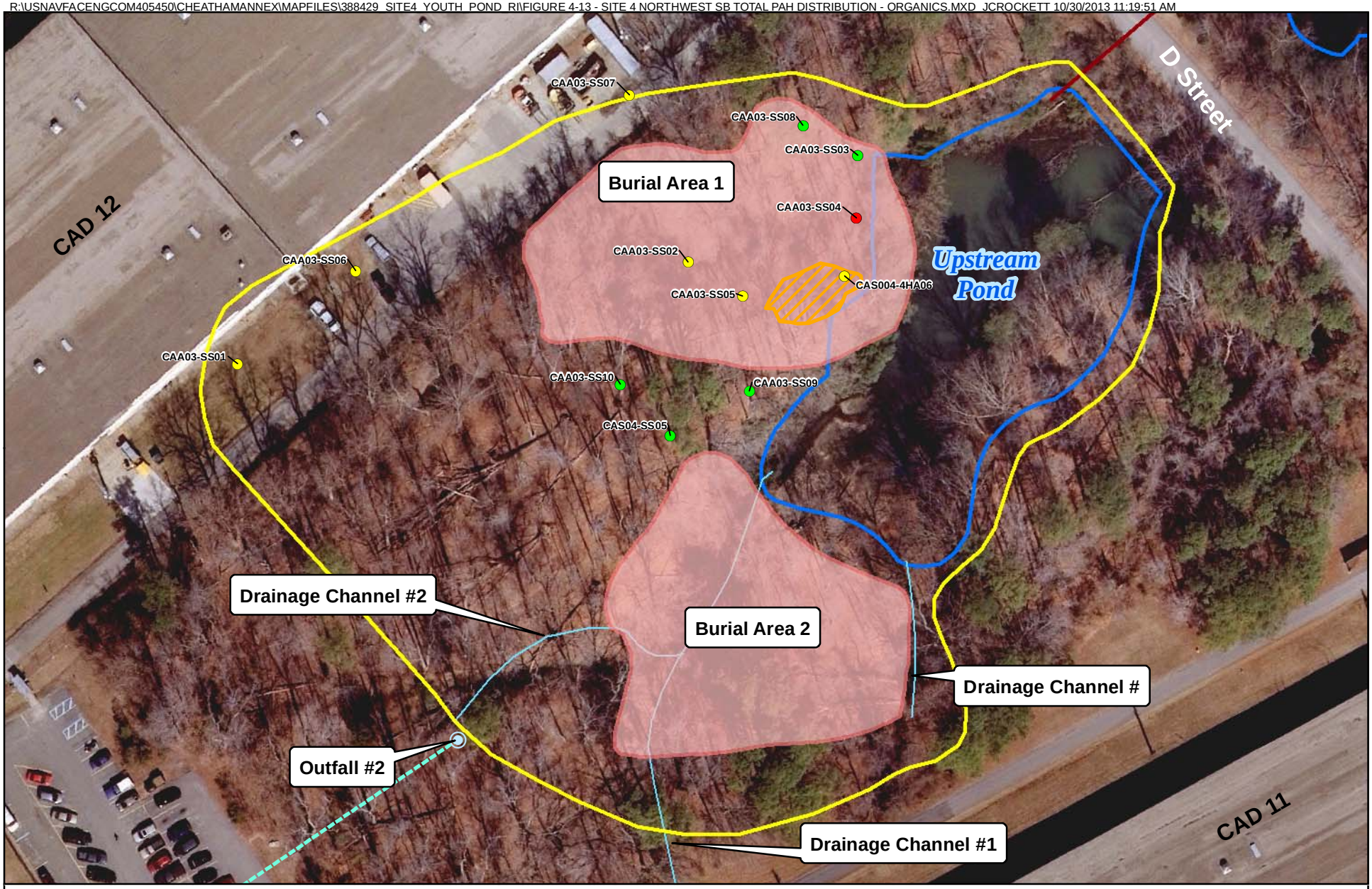
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-13 - SITE 4 NORTHWEST SB TOTAL PAH DISTRIBUTION - ORGANICS.MXD JCROCKETT 10/30/2013 11:19:51 AM



Legend

Total PAH Concentrations

- <1,000 µg/kg
- 1,000-10,000 µg/kg
- >10,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-13
Site 4, Northwest - Subsurface Soil Total PAH Distribution
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-14 - SITE 4 NORTHWEST SS EXCEEDANCES - METALS.MXD JCROCKETT 11/6/2013 1:04:54 PM

Station ID	CAA03-SS02
Sample ID	CAA03-SS02-1109
Sample Date	11/04/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**8,930**
Arsenic	**3**
Chromium	**15.2**
Cobalt	**3.4**
Iron	**10,900 J**
Mercury	0.12

Station ID	CAA03-SS07
Sample ID	CAA03-SS07-1109
Sample Date	11/05/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**8,070**
Arsenic	**2.8**
Chromium	**22.8**
Cobalt	**4.9**
Iron	**13,500**
Manganese	**315**
Zinc	154

Station ID	CAA03-SS05
Sample ID	CAA03-SS05-1109
Sample Date	11/04/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**8,080**
Arsenic	**1.6**
Chromium	**9**
Cobalt	**2.5**
Iron	**6,720 J**

Station ID	CAA03-SS08*
Sample ID	CAA03-SS08-1109
Sample Date	11/05/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**12,600**
Arsenic	**3.5**
Chromium	**18.8**
Iron	**12,200**

Station ID	CAA03-SS03
Sample ID	CAA03-SS03-1109
Sample Date	11/04/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**10,800**
Arsenic	**3.2**
Chromium	**13.1**
Cobalt	**2.7**
Iron	**9,710 J**

Station ID	CAA03-SS04
Sample ID	CAA03-SS04-1109
Sample Date	11/04/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**9,870**
Arsenic	**3.4**
Chromium	**16.7**
Cobalt	**2.5**
Iron	**9,740 J**

Station ID	CAA03-SS06
Sample ID	CAA03-SS06-1109
Sample Date	11/04/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**10,600**
Arsenic	**3.7**
Chromium	**17.8**
Cobalt	**4.4**
Iron	**18,300 J**
Lead	**793**
Manganese	**253 J**
Selenium	0.84
Endosulfan I	2,200 J
Endrin	130 J
gamma-BHC (Lindane)	**860**

Station ID	CAS04-SO08
Sample ID	CAS04-SS08-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**10,300**
Arsenic	**4.6**
Chromium	**16**
Cobalt	**3.1**
Iron	**11,700**

Station ID	CAA03-SS01
Sample ID	CAA03-SS01-1109
Sample Date	11/03/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**12,600**
Arsenic	**7.3**
Chromium	**24.9 K**
Cobalt	**2.9**
Iron	**18,800**

Station ID	CAS04-SO09
Sample ID	CAS04-SS09-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**8,030**
Arsenic	**3.1**
Chromium	**12.5**
Iron	**8,860**

Station ID	CAS04-SO10
Sample ID	CAS04-SS10-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**10,700**
Arsenic	**2.4**
Chromium	**16.1**
Iron	**9,240**
Zinc	242

Station ID	CAA03-SS10
Sample ID	CAA03-SS10-1109
Sample Date	11/05/09
Depth	0-0.5'
Pesticide/PCBs (µg/kg)	
Endrin	3.9
Endrin aldehyde	2.2 J

Station ID	CAS04-SS05
Sample ID	CAS04-SS05-1109
Sample Date	11/03/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**18,000**
Arsenic	**3.6**
Chromium	**26.6**
Iron	**15,000 J**
Vanadium	**41.7**

Station ID	CAA03-SS09
Sample ID	CAA03-SS09-1109
Sample Date	11/05/09
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	4,100
Arsenic	**2.2**
Chromium	**8.4**
Iron	**6,140**

Station ID	CAS04-SO12*
Sample ID	CAS04-SS12-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**9,390**
Arsenic	**2.9**
Chromium	**11.1**
Cobalt	**2.4**
Iron	**8,040**

Station ID	CAS04-SO13
Sample ID	CAS04-SS13-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	**7,850**
Arsenic	**346 J**
Chromium	**63 J**
Cobalt	**11.5 J**
Iron	**116,000 J**
Manganese	**511 J**
Nickel	46.7 J
Selenium	0.87 L
Thallium	**0.47 L**
Indeno(1,2,3-cd)pyrene	770

Station ID	CAS004-4HA06
Sample ID	CAS004-4HA06-00-1199
Sample Date	11/12/99
Depth	0-0.5'
Total Metals (mg/kg)	
Arsenic	**2.7 L**
Chromium	**56.6**
Cobalt	**8.8 J**
Copper	77.8 J
Iron	**61,700 L**
Manganese	**302 J**
Nickel	39.6
Thallium	**1.1 L**
Zinc	122 J

Station ID	CAS04-SO11
Sample ID	CAS04-SS11-1012
Sample Date	10/23/12
Depth	0-0.5'
Total Metals (mg/kg)	
Aluminum	7,290
Arsenic	**8.5**
Chromium	**34**
Cobalt	**4.5**
Iron	**53,200**
Manganese	**263**

COPCs	ESVs	Adjusted Residential Soil RSLs
Total Metals (mg/kg)		
Aluminum	pH < 5.5	7,700
Arsenic	18.0	0.61
Chromium	64	0.29
Cobalt	13	2.3
Copper	70	310
Iron	5 < pH > 8	5,500
Lead	120	400
Manganese	220	180
Mercury	0.1	2.3
Nickel	38	150
Selenium	0.52	39
Thallium	1	0.078
Vanadium	130	39
Zinc	120	2,300

Legend

- Surface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; highest value is shown

N W E S

0 100 Feet

Figure 4-14
Site 4, Northwest - Surface Soil Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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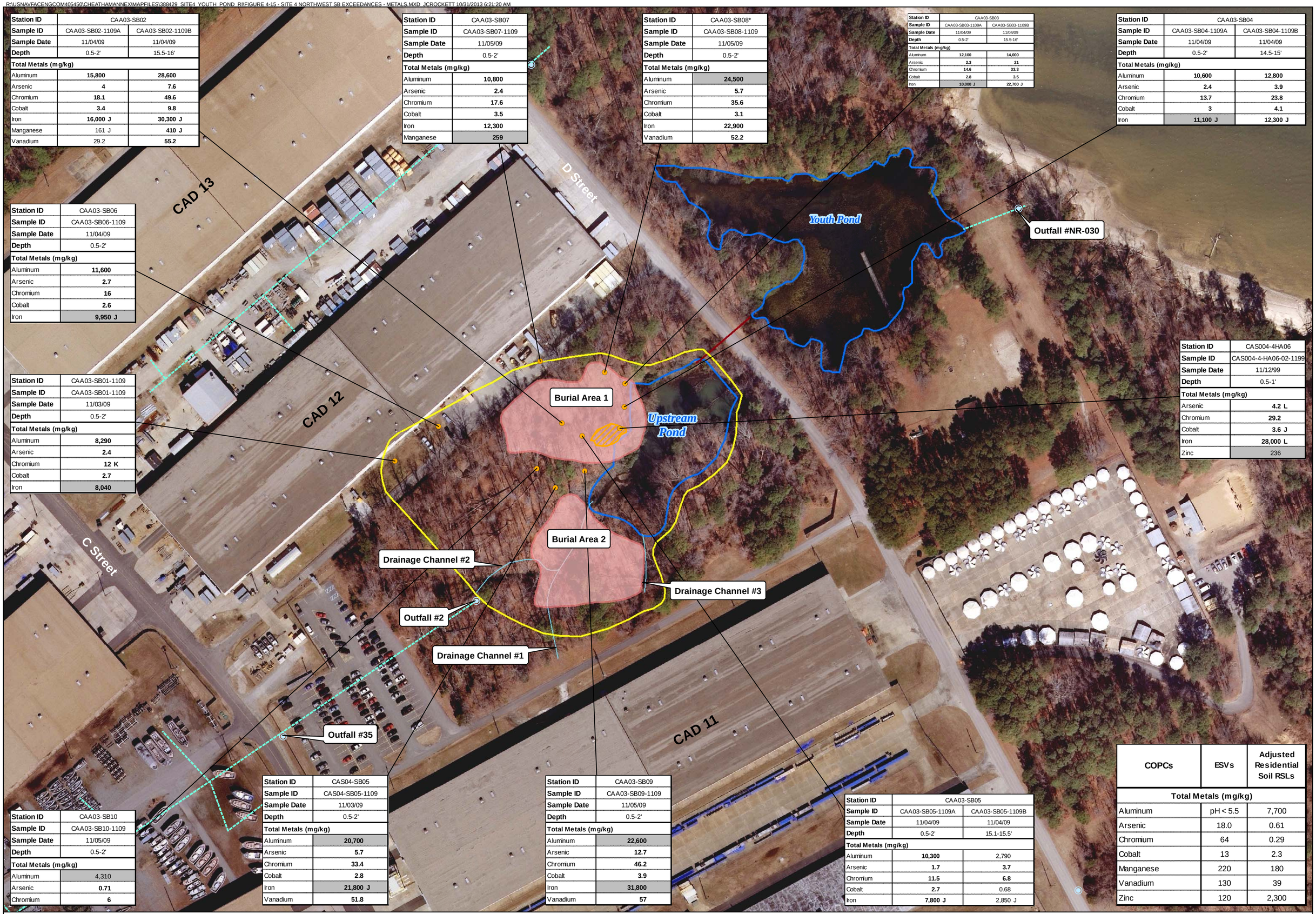
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-15 - SITE 4 NORTHWEST SB EXCEEDANCES - METALS.MXD JCROCKETT 10/31/2013 6:21:20 AM



Station ID	CAA03-SB02	
Sample ID	CAA03-SB02-1109A	CAA03-SB02-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.5-16'
Total Metals (mg/kg)		
Aluminum	**15,800**	**28,600**
Arsenic	**4**	**7.6**
Chromium	**18.1**	**49.6**
Cobalt	**3.4**	**9.8**
Iron	**16,000 J**	**30,300 J**
Manganese	161 J	**410 J**
Vanadium	29.2	**55.2**

Station ID	CAA03-SB07
Sample ID	CAA03-SB07-1109
Sample Date	11/05/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**10,800**
Arsenic	**2.4**
Chromium	**17.6**
Cobalt	**3.5**
Iron	**12,300**
Manganese	**259**

Station ID	CAA03-SB08*
Sample ID	CAA03-SB08-1109
Sample Date	11/05/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**24,500**
Arsenic	**5.7**
Chromium	**35.6**
Cobalt	**3.1**
Iron	**22,900**
Vanadium	**52.2**

Station ID	CAA03-SB03	
Sample ID	CAA03-SB03-1109A	CAA03-SB03-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.5-16'
Total Metals (mg/kg)		
Aluminum	**12,100**	**14,000**
Arsenic	**2.3**	**21**
Chromium	**14.6**	**33.3**
Cobalt	**2.8**	**3.5**
Iron	**10,000 J**	**22,700 J**

Station ID	CAA03-SB04	
Sample ID	CAA03-SB04-1109A	CAA03-SB04-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	14.5-15'
Total Metals (mg/kg)		
Aluminum	**10,600**	**12,800**
Arsenic	**2.4**	**3.9**
Chromium	**13.7**	**23.8**
Cobalt	**3**	**4.1**
Iron	**11,100 J**	**12,300 J**

Station ID	CAA03-SB06
Sample ID	CAA03-SB06-1109
Sample Date	11/04/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**11,600**
Arsenic	**2.7**
Chromium	**16**
Cobalt	**2.6**
Iron	**9,950 J**

Station ID	CAS004-4HA06
Sample ID	CAS004-4-HA06-02-1199
Sample Date	11/12/99
Depth	0.5-1'
Total Metals (mg/kg)	
Arsenic	**4.2 L**
Chromium	**29.2**
Cobalt	**3.6 J**
Iron	**28,000 L**
Zinc	236

Station ID	CAA03-SB01-1109
Sample ID	CAA03-SB01-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**8,290**
Arsenic	**2.4**
Chromium	**12 K**
Cobalt	**2.7**
Iron	**8,040**

Station ID	CAA03-SB10
Sample ID	CAA03-SB10-1109
Sample Date	11/05/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	4,310
Arsenic	**0.71**
Chromium	**6**

Station ID	CAS04-SB05
Sample ID	CAS04-SB05-1109
Sample Date	11/03/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**20,700**
Arsenic	**5.7**
Chromium	**33.4**
Cobalt	**2.8**
Iron	**21,800 J**
Vanadium	**51.8**

Station ID	CAA03-SB09
Sample ID	CAA03-SB09-1109
Sample Date	11/05/09
Depth	0.5-2'
Total Metals (mg/kg)	
Aluminum	**22,600**
Arsenic	**12.7**
Chromium	**46.2**
Cobalt	**3.9**
Iron	**31,800**
Vanadium	**57**

Station ID	CAA03-SB05	
Sample ID	CAA03-SB05-1109A	CAA03-SB05-1109B
Sample Date	11/04/09	11/04/09
Depth	0.5-2'	15.1-15.5'
Total Metals (mg/kg)		
Aluminum	**10,300**	2,790
Arsenic	**1.7**	**3.7**
Chromium	**11.5**	**6.8**
Cobalt	**2.7**	0.68
Iron	**7,800 J**	2,850 J

COPCs	ESVs	Adjusted Residential Soil RSLs
Total Metals (mg/kg)		
Aluminum	pH < 5.5	7,700
Arsenic	18.0	0.61
Chromium	64	0.29
Cobalt	13	2.3
Manganese	220	180
Vanadium	130	39
Zinc	120	2,300

Legend

- Subsurface Soil Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; highest value is shown

N W E S

0 100 Feet

Figure 4-15
Site 4, Northwest - Subsurface Soil Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-16 - GW SAMPLES.MXD JCROCKETT 4/3/2014 2:25:00 PM

Legend

- Groundwater Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N
W E
S

0 100
Feet

Figure 4-16
Site 4, Groundwater Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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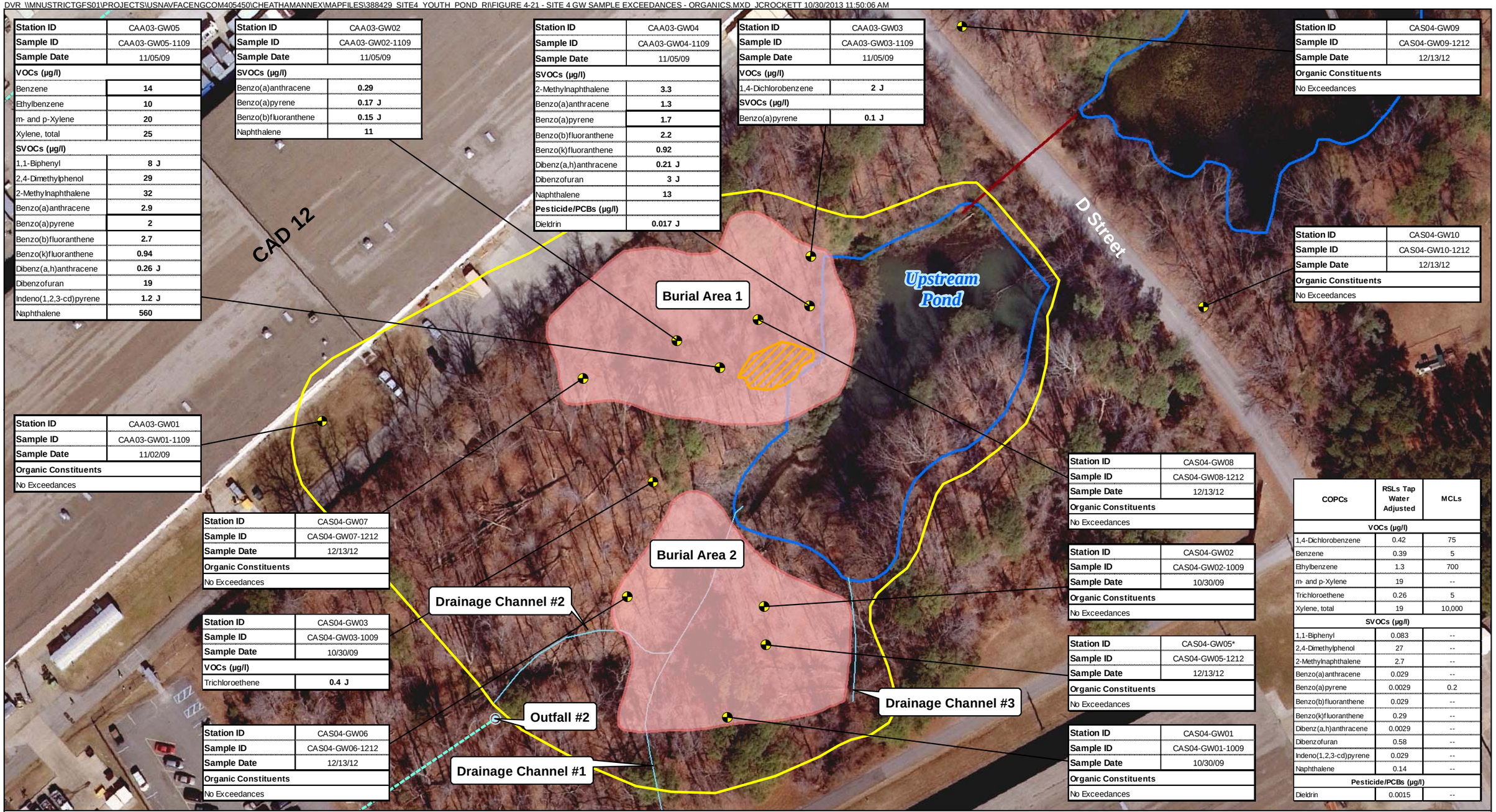
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-21 - SITE 4 GW SAMPLE EXCEEDANCES - ORGANICS.MXD JCROCKETT 10/30/2013 11:50:06 AM



Station ID	CAA03-GW05
Sample ID	CAA03-GW05-1109
Sample Date	11/05/09
VOCs (µg/l)	
Benzene	**14**
Ethylbenzene	**10**
m- and p-Xylene	**20**
Xylene, total	**25**
SVOCs (µg/l)	
1,1-Biphenyl	**8 J**
2,4-Dimethylphenol	**29**
2-Methylnaphthalene	**32**
Benzo(a)anthracene	**2.9**
Benzo(a)pyrene	**2**
Benzo(b)fluoranthene	**2.7**
Benzo(k)fluoranthene	**0.94**
Dibenz(a,h)anthracene	**0.26 J**
Dibenzofuran	**19**
Indeno(1,2,3-cd)pyrene	**1.2 J**
Naphthalene	**560**

Station ID	CAA03-GW02
Sample ID	CAA03-GW02-1109
Sample Date	11/05/09
SVOCs (µg/l)	
Benzo(a)anthracene	**0.29**
Benzo(a)pyrene	**0.17 J**
Benzo(b)fluoranthene	**0.15 J**
Naphthalene	**11**

Station ID	CAA03-GW04
Sample ID	CAA03-GW04-1109
Sample Date	11/05/09
SVOCs (µg/l)	
2-Methylnaphthalene	**3.3**
Benzo(a)anthracene	**1.3**
Benzo(a)pyrene	**1.7**
Benzo(b)fluoranthene	**2.2**
Benzo(k)fluoranthene	**0.92**
Dibenz(a,h)anthracene	**0.21 J**
Dibenzofuran	**3 J**
Naphthalene	**13**
Pesticide/PCBs (µg/l)	
Dieldrin	**0.017 J**

Station ID	CAA03-GW03
Sample ID	CAA03-GW03-1109
Sample Date	11/05/09
VOCs (µg/l)	
1,4-Dichlorobenzene	**2 J**
SVOCs (µg/l)	
Benzo(a)pyrene	**0.1 J**

Station ID	CAS04-GW09
Sample ID	CAS04-GW09-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW10
Sample ID	CAS04-GW10-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAA03-GW01
Sample ID	CAA03-GW01-1109
Sample Date	11/02/09
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW07
Sample ID	CAS04-GW07-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW03
Sample ID	CAS04-GW03-1009
Sample Date	10/30/09
VOCs (µg/l)	
Trichloroethene	**0.4 J**

Station ID	CAS04-GW06
Sample ID	CAS04-GW06-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW08
Sample ID	CAS04-GW08-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW02
Sample ID	CAS04-GW02-1009
Sample Date	10/30/09
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW05*
Sample ID	CAS04-GW05-1212
Sample Date	12/13/12
Organic Constituents	
No Exceedances	

Station ID	CAS04-GW01
Sample ID	CAS04-GW01-1009
Sample Date	10/30/09
Organic Constituents	
No Exceedances	

COPCs	RSLs Tap Water Adjusted	MCLs
VOCs (µg/l)		
1,4-Dichlorobenzene	0.42	75
Benzene	0.39	5
Ethylbenzene	1.3	700
m- and p-Xylene	19	--
Trichloroethene	0.26	5
Xylene, total	19	10,000
SVOCs (µg/l)		
1,1-Biphenyl	0.083	--
2,4-Dimethylphenol	27	--
2-Methylnaphthalene	2.7	--
Benzo(a)anthracene	0.029	--
Benzo(a)pyrene	0.0029	0.2
Benzo(b)fluoranthene	0.029	--
Benzo(k)fluoranthene	0.29	--
Dibenz(a,h)anthracene	0.0029	--
Dibenzofuran	0.58	--
Indeno(1,2,3-cd)pyrene	0.029	--
Naphthalene	0.14	--
Pesticide/PCBs (µg/l)		
Dieldrin	0.0015	--

Legend

- Groundwater Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Bold box indicates exceedance of MCLs
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Field duplicate collected; greater value is shown.

N W E S

0 60 Feet

Figure 4-17
Site 4, Groundwater Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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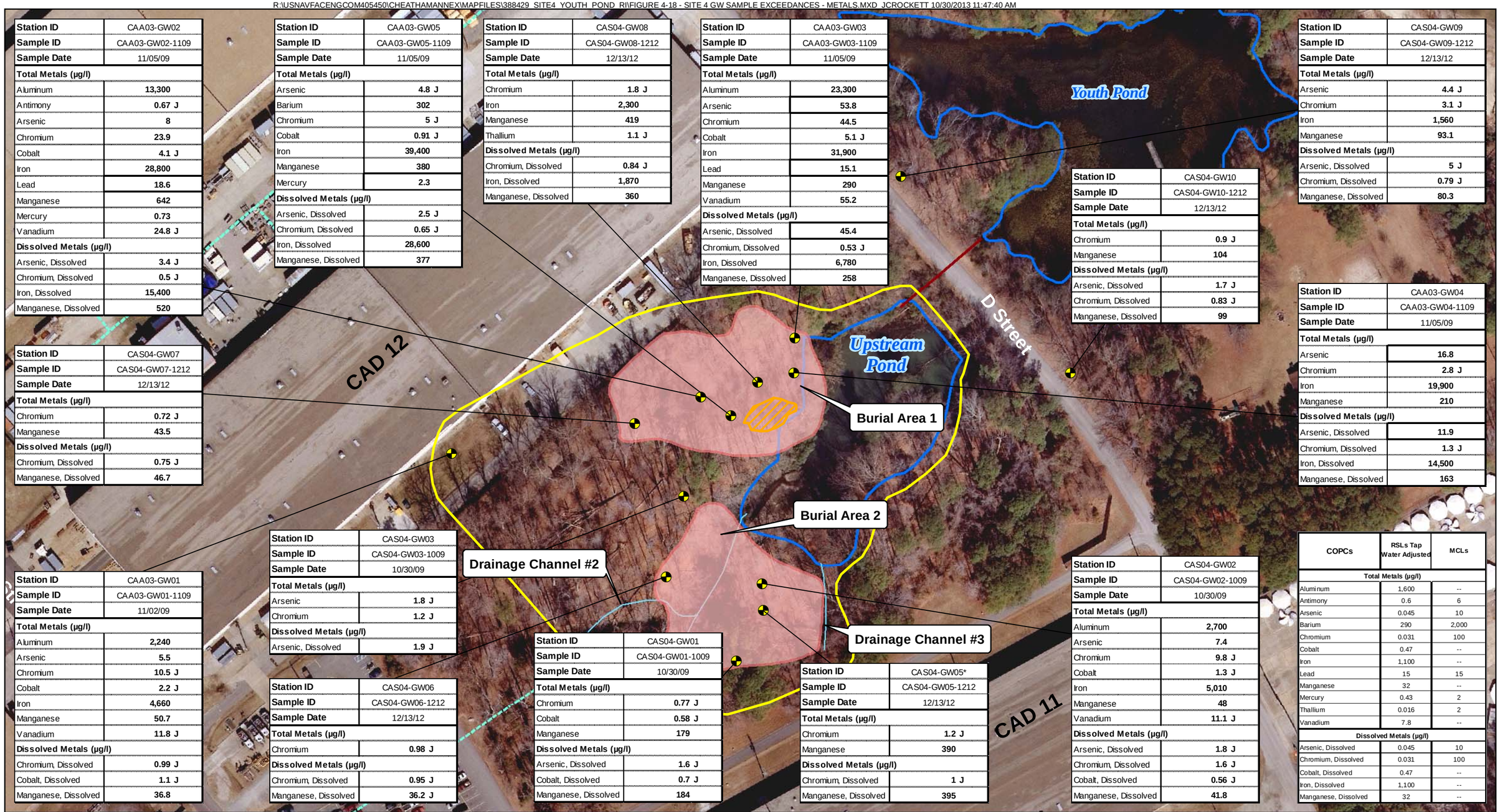
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-18 - SITE 4 GW SAMPLE EXCEEDANCES - METALS.MXD JCROCKETT 10/30/2013 11:47:40 AM



Station ID	CAA03-GW02
Sample ID	CAA03-GW02-1109
Sample Date	11/05/09
Total Metals (µg/l)	
Aluminum	**13,300**
Antimony	**0.67 J**
Arsenic	**8**
Chromium	**23.9**
Cobalt	**4.1 J**
Iron	**28,800**
Lead	**18.6**
Manganese	**642**
Mercury	**0.73**
Vanadium	**24.8 J**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**3.4 J**
Chromium, Dissolved	**0.5 J**
Iron, Dissolved	**15,400**
Manganese, Dissolved	**520**

Station ID	CAA03-GW05
Sample ID	CAA03-GW05-1109
Sample Date	11/05/09
Total Metals (µg/l)	
Arsenic	**4.8 J**
Barium	**302**
Chromium	**5 J**
Cobalt	**0.91 J**
Iron	**39,400**
Manganese	**380**
Mercury	**2.3**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**2.5 J**
Chromium, Dissolved	**0.65 J**
Iron, Dissolved	**28,600**
Manganese, Dissolved	**377**

Station ID	CAS04-GW08
Sample ID	CAS04-GW08-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Chromium	**1.8 J**
Iron	**2,300**
Manganese	**419**
Thallium	**1.1 J**
Dissolved Metals (µg/l)	
Chromium, Dissolved	**0.84 J**
Iron, Dissolved	**1,870**
Manganese, Dissolved	**360**

Station ID	CAA03-GW03
Sample ID	CAA03-GW03-1109
Sample Date	11/05/09
Total Metals (µg/l)	
Aluminum	**23,300**
Arsenic	**53.8**
Chromium	**44.5**
Cobalt	**5.1 J**
Iron	**31,900**
Lead	**15.1**
Manganese	**290**
Vanadium	**55.2**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**45.4**
Chromium, Dissolved	**0.53 J**
Iron, Dissolved	**6,780**
Manganese, Dissolved	**258**

Station ID	CAS04-GW09
Sample ID	CAS04-GW09-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Arsenic	**4.4 J**
Chromium	**3.1 J**
Iron	**1,560**
Manganese	**93.1**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**5 J**
Chromium, Dissolved	**0.79 J**
Manganese, Dissolved	**80.3**

Station ID	CAS04-GW10
Sample ID	CAS04-GW10-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Chromium	**0.9 J**
Manganese	**104**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.7 J**
Chromium, Dissolved	**0.83 J**
Manganese, Dissolved	**99**

Station ID	CAA03-GW04
Sample ID	CAA03-GW04-1109
Sample Date	11/05/09
Total Metals (µg/l)	
Arsenic	**16.8**
Chromium	**2.8 J**
Iron	**19,900**
Manganese	**210**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**11.9**
Chromium, Dissolved	**1.3 J**
Iron, Dissolved	**14,500**
Manganese, Dissolved	**163**

Station ID	CAS04-GW07
Sample ID	CAS04-GW07-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Chromium	**0.72 J**
Manganese	**43.5**
Dissolved Metals (µg/l)	
Chromium, Dissolved	**0.75 J**
Manganese, Dissolved	**46.7**

Station ID	CAA03-GW01
Sample ID	CAA03-GW01-1109
Sample Date	11/02/09
Total Metals (µg/l)	
Aluminum	**2,240**
Arsenic	**5.5**
Chromium	**10.5 J**
Cobalt	**2.2 J**
Iron	**4,660**
Manganese	**50.7**
Vanadium	**11.8 J**
Dissolved Metals (µg/l)	
Chromium, Dissolved	**0.99 J**
Cobalt, Dissolved	**1.1 J**
Manganese, Dissolved	**36.8**

Station ID	CAS04-GW03
Sample ID	CAS04-GW03-1009
Sample Date	10/30/09
Total Metals (µg/l)	
Arsenic	**1.8 J**
Chromium	**1.2 J**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.9 J**

Station ID	CAS04-GW06
Sample ID	CAS04-GW06-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Chromium	**0.98 J**
Dissolved Metals (µg/l)	
Chromium, Dissolved	**0.95 J**
Manganese, Dissolved	**36.2 J**

Station ID	CAS04-GW01
Sample ID	CAS04-GW01-1009
Sample Date	10/30/09
Total Metals (µg/l)	
Chromium	**0.77 J**
Cobalt	**0.58 J**
Manganese	**179**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.6 J**
Cobalt, Dissolved	**0.7 J**
Manganese, Dissolved	**184**

Station ID	CAS04-GW05*
Sample ID	CAS04-GW05-1212
Sample Date	12/13/12
Total Metals (µg/l)	
Chromium	**1.2 J**
Manganese	**390**
Dissolved Metals (µg/l)	
Chromium, Dissolved	**1 J**
Manganese, Dissolved	**395**

Station ID	CAS04-GW02
Sample ID	CAS04-GW02-1009
Sample Date	10/30/09
Total Metals (µg/l)	
Aluminum	**2,700**
Arsenic	**7.4**
Chromium	**9.8 J**
Cobalt	**1.3 J**
Iron	**5,010**
Manganese	**48**
Vanadium	**11.1 J**
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.8 J**
Chromium, Dissolved	**1.6 J**
Cobalt, Dissolved	**0.56 J**
Manganese, Dissolved	**41.8**

COPCs	RSLs Tap Water Adjusted	MCLs
Total Metals (µg/l)		
Aluminum	1,600	--
Antimony	0.6	6
Arsenic	0.045	10
Barium	290	2,000
Chromium	0.031	100
Cobalt	0.47	--
Iron	1,100	--
Lead	15	15
Manganese	32	--
Mercury	0.43	2
Thallium	0.016	2
Vanadium	7.8	--
Dissolved Metals (µg/l)		
Arsenic, Dissolved	0.045	10
Chromium, Dissolved	0.031	100
Cobalt, Dissolved	0.47	--
Iron, Dissolved	1,100	--
Manganese, Dissolved	32	--

Legend

- Groundwater Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Bold box indicates exceedance of MCLs
Bold text indicates exceedance of Adjusted Tapwater RSLs
*Field duplicate collected; greater value is shown.

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Figure 4-18
Site 4, Groundwater Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-19 - SD SAMPLES.MXD JCROCKETT 4/3/2014 2:26:35 PM

Legend

- Surface Sediment Sample
- Surface/Subsurface Sediment Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

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Figure 4-19
Site 4, Sediment Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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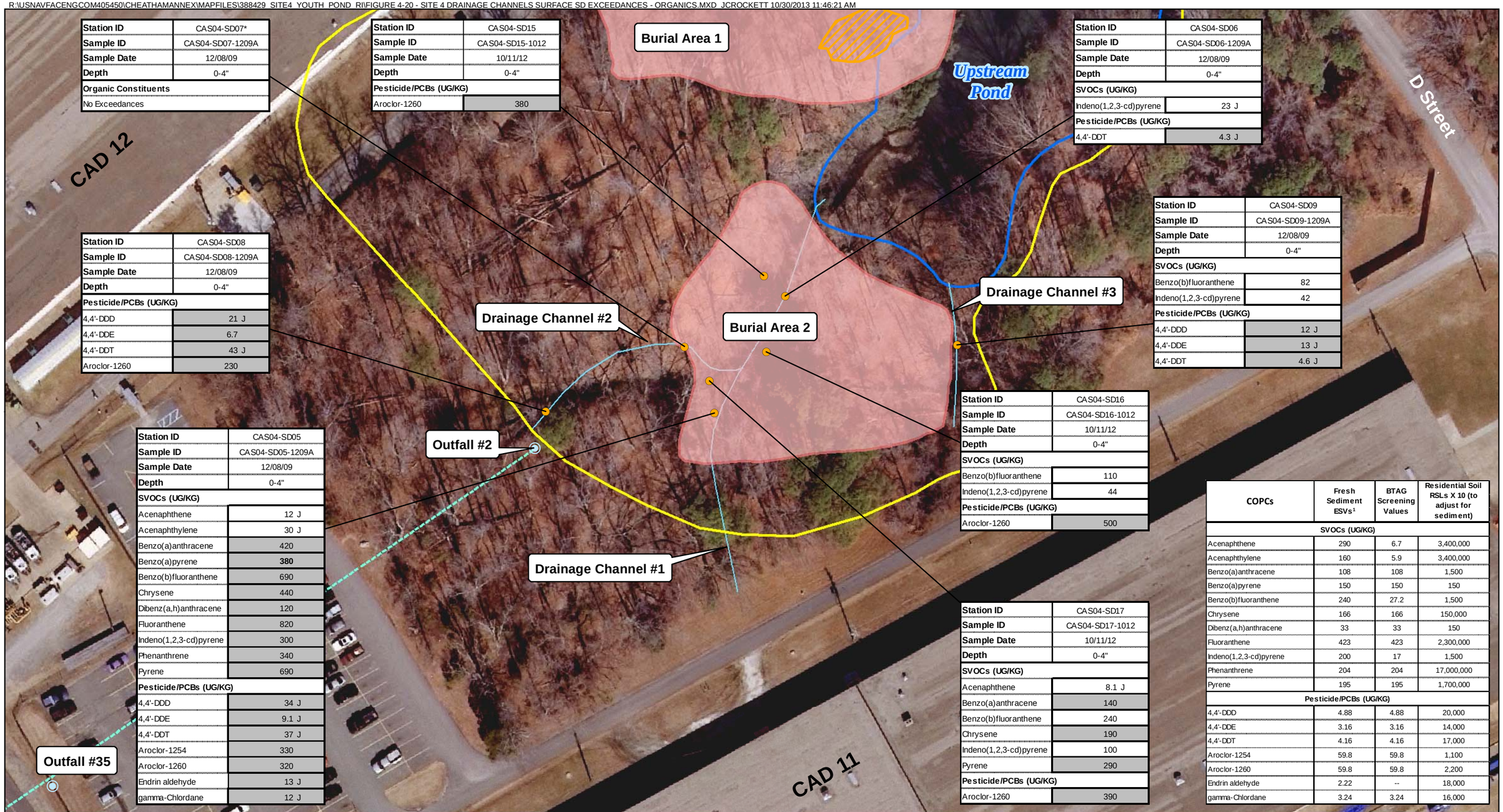
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-20 - SITE 4 DRAINAGE CHANNELS SURFACE SD EXCEEDANCES - ORGANICS.MXD JCROCKETT 10/30/2013 11:46:21 AM



Station ID	CAS04-SD07*
Sample ID	CAS04-SD07-1209A
Sample Date	12/08/09
Depth	0-4"
Organic Constituents	
No Exceedances	

Station ID	CAS04-SD15
Sample ID	CAS04-SD15-1012
Sample Date	10/11/12
Depth	0-4"
Pesticide/PCBs (UG/KG)	
Aroclor-1260	380

Station ID	CAS04-SD06
Sample ID	CAS04-SD06-1209A
Sample Date	12/08/09
Depth	0-4"
SVOCs (UG/KG)	
Indeno(1,2,3-cd)pyrene	23 J
Pesticide/PCBs (UG/KG)	
4,4'-DDT	4.3 J

Station ID	CAS04-SD08
Sample ID	CAS04-SD08-1209A
Sample Date	12/08/09
Depth	0-4"
Pesticide/PCBs (UG/KG)	
4,4'-DDD	21 J
4,4'-DDE	6.7
4,4'-DDT	43 J
Aroclor-1260	230

Station ID	CAS04-SD09
Sample ID	CAS04-SD09-1209A
Sample Date	12/08/09
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	82
Indeno(1,2,3-cd)pyrene	42
Pesticide/PCBs (UG/KG)	
4,4'-DDD	12 J
4,4'-DDE	13 J
4,4'-DDT	4.6 J

Station ID	CAS04-SD05
Sample ID	CAS04-SD05-1209A
Sample Date	12/08/09
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	12 J
Acenaphthylene	30 J
Benzo(a)anthracene	420
Benzo(a)pyrene	**380**
Benzo(b)fluoranthene	690
Chrysene	440
Dibenz(a,h)anthracene	120
Fluoranthene	820
Indeno(1,2,3-cd)pyrene	300
Phenanthrene	340
Pyrene	690
Pesticide/PCBs (UG/KG)	
4,4'-DDD	34 J
4,4'-DDE	9.1 J
4,4'-DDT	37 J
Aroclor-1254	330
Aroclor-1260	320
Endrin aldehyde	13 J
gamma-Chlordane	12 J

Station ID	CAS04-SD16
Sample ID	CAS04-SD16-1012
Sample Date	10/11/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	110
Indeno(1,2,3-cd)pyrene	44
Pesticide/PCBs (UG/KG)	
Aroclor-1260	500

Station ID	CAS04-SD17
Sample ID	CAS04-SD17-1012
Sample Date	10/11/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	8.1 J
Benzo(a)anthracene	140
Benzo(b)fluoranthene	240
Chrysene	190
Indeno(1,2,3-cd)pyrene	100
Pyrene	290
Pesticide/PCBs (UG/KG)	
Aroclor-1260	390

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (UG/KG)			
Acenaphthene	290	6.7	3,400,000
Acenaphthylene	160	5.9	3,400,000
Benzo(a)anthracene	108	108	1,500
Benzo(a)pyrene	150	150	150
Benzo(b)fluoranthene	240	27.2	1,500
Chrysene	166	166	150,000
Dibenz(a,h)anthracene	33	33	150
Fluoranthene	423	423	2,300,000
Indeno(1,2,3-cd)pyrene	200	17	1,500
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Pesticide/PCBs (UG/KG)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
4,4'-DDT	4.16	4.16	17,000
Aroclor-1254	59.8	59.8	1,100
Aroclor-1260	59.8	59.8	2,200
Endrin aldehyde	2.22	--	18,000
gamma-Chlordane	3.24	3.24	16,000

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

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Figure 4-20
Site 4, Drainage Channels - Surface Sediment Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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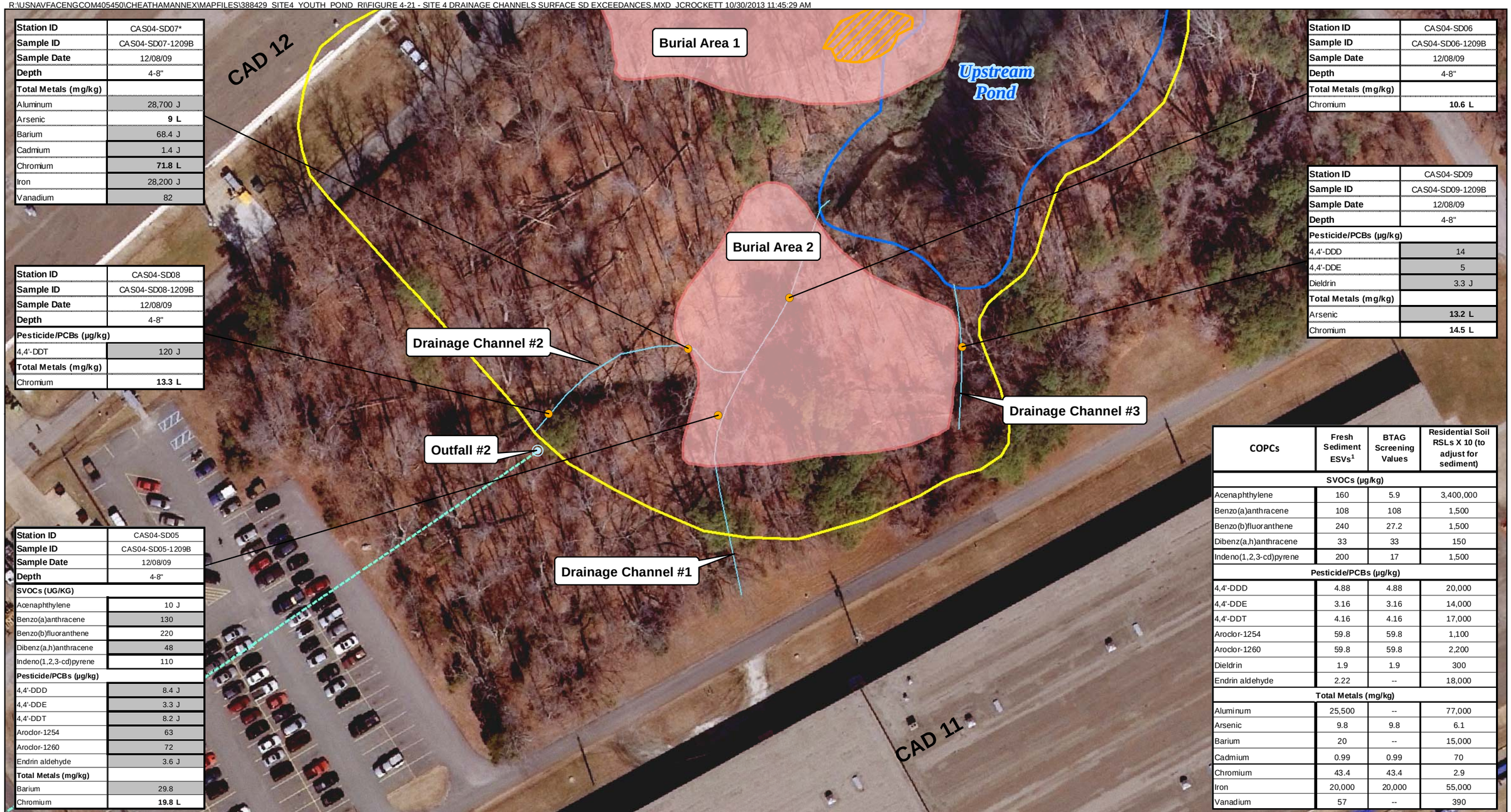
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-21 - SITE 4 DRAINAGE CHANNELS SURFACE SD EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:45:29 AM



Station ID	CAS04-SD07*
Sample ID	CAS04-SD07-1209B
Sample Date	12/08/09
Depth	4-8"
Total Metals (mg/kg)	
Aluminum	28,700 J
Arsenic	**9 L**
Barium	68.4 J
Cadmium	1.4 J
Chromium	**71.8 L**
Iron	28,200 J
Vanadium	82

Station ID	CAS04-SD08
Sample ID	CAS04-SD08-1209B
Sample Date	12/08/09
Depth	4-8"
Pesticide/PCBs (µg/kg)	
4,4'-DDT	120 J
Total Metals (mg/kg)	
Chromium	**13.3 L**

Station ID	CAS04-SD05
Sample ID	CAS04-SD05-1209B
Sample Date	12/08/09
Depth	4-8"
SVOCs (UG/KG)	
Acenaphthylene	10 J
Benzo(a)anthracene	130
Benzo(b)fluoranthene	220
Dibenz(a,h)anthracene	48
Indeno(1,2,3-cd)pyrene	110
Pesticide/PCBs (µg/kg)	
4,4'-DDD	8.4 J
4,4'-DDE	3.3 J
4,4'-DDT	8.2 J
Aroclor-1254	63
Aroclor-1260	72
Endrin aldehyde	3.6 J
Total Metals (mg/kg)	
Barium	29.8
Chromium	**19.8 L**

Station ID	CAS04-SD06
Sample ID	CAS04-SD06-1209B
Sample Date	12/08/09
Depth	4-8"
Total Metals (mg/kg)	
Chromium	**10.6 L**

Station ID	CAS04-SD09
Sample ID	CAS04-SD09-1209B
Sample Date	12/08/09
Depth	4-8"
Pesticide/PCBs (µg/kg)	
4,4'-DDD	14
4,4'-DDE	5
Dieldrin	3.3 J
Total Metals (mg/kg)	
Arsenic	**13.2 L**
Chromium	**14.5 L**

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (µg/kg)			
Acenaphthylene	160	5.9	3,400,000
Benzo(a)anthracene	108	108	1,500
Benzo(b)fluoranthene	240	27.2	1,500
Dibenz(a,h)anthracene	33	33	150
Indeno(1,2,3-cd)pyrene	200	17	1,500
Pesticide/PCBs (µg/kg)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
4,4'-DDT	4.16	4.16	17,000
Aroclor-1254	59.8	59.8	1,100
Aroclor-1260	59.8	59.8	2,200
Dieldrin	1.9	1.9	300
Endrin aldehyde	2.22	--	18,000
Total Metals (mg/kg)			
Aluminum	25,500	--	77,000
Arsenic	9.8	9.8	6.1
Barium	20	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Iron	20,000	20,000	55,000
Vanadium	57	--	390

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

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Figure 4-21
Site 4, Drainage Channels - Surface Sediment Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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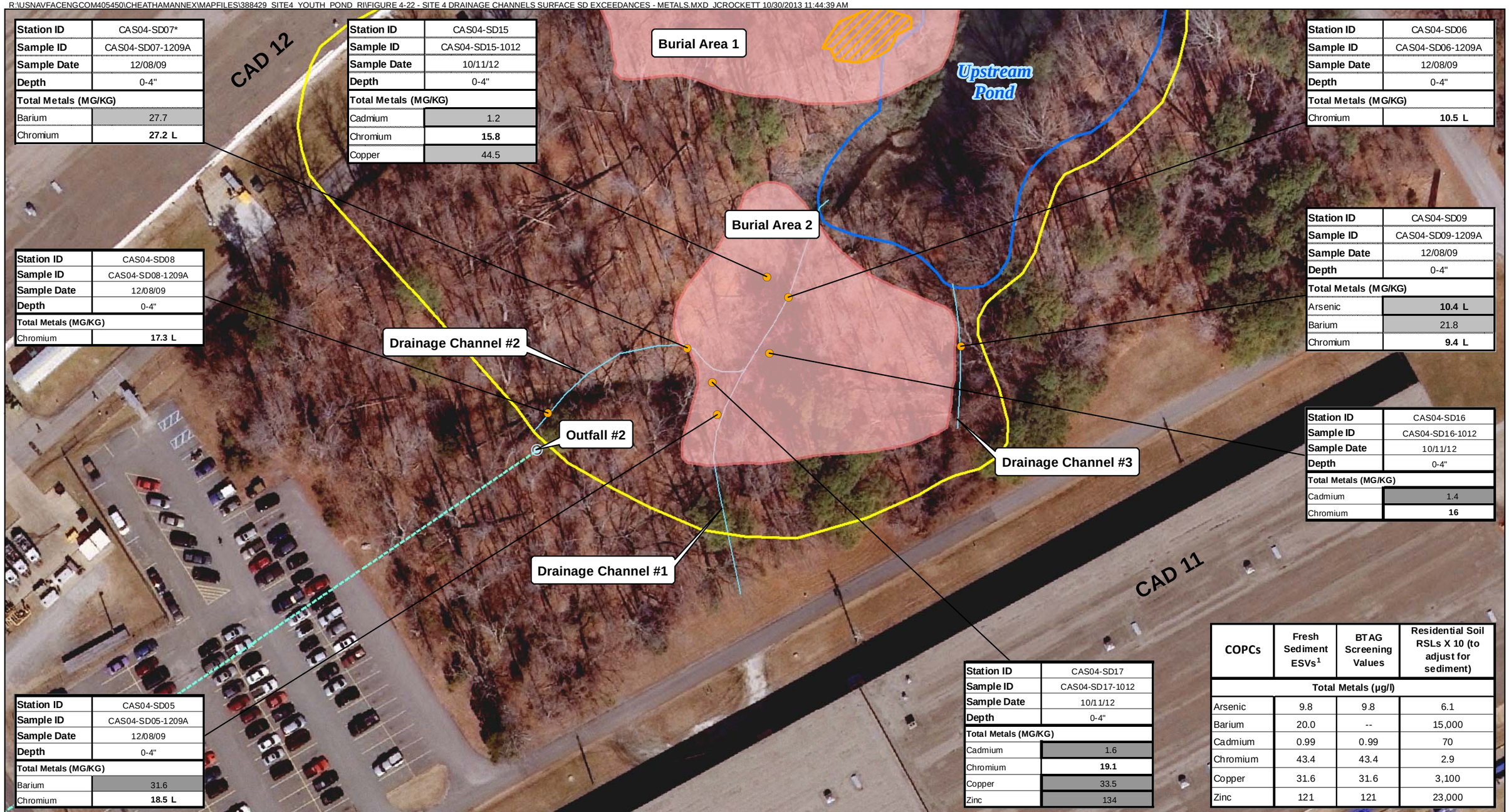
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-22 - SITE 4 DRAINAGE CHANNELS SURFACE SD EXCEEDANCES - METALS.MXD JCROCKETT 10/30/2013 11:44:39 AM



Station ID	CAS04-SD07*
Sample ID	CAS04-SD07-1209A
Sample Date	12/08/09
Depth	0-4"
Total Metals (MG/KG)	
Barium	27.7
Chromium	**27.2 L**

Station ID	CAS04-SD15
Sample ID	CAS04-SD15-1012
Sample Date	10/11/12
Depth	0-4"
Total Metals (MG/KG)	
Cadmium	1.2
Chromium	**15.8**
Copper	44.5

Station ID	CAS04-SD06
Sample ID	CAS04-SD06-1209A
Sample Date	12/08/09
Depth	0-4"
Total Metals (MG/KG)	
Chromium	**10.5 L**

Station ID	CAS04-SD08
Sample ID	CAS04-SD08-1209A
Sample Date	12/08/09
Depth	0-4"
Total Metals (MG/KG)	
Chromium	**17.3 L**

Station ID	CAS04-SD09
Sample ID	CAS04-SD09-1209A
Sample Date	12/08/09
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**10.4 L**
Barium	21.8
Chromium	**9.4 L**

Station ID	CAS04-SD16
Sample ID	CAS04-SD16-1012
Sample Date	10/11/12
Depth	0-4"
Total Metals (MG/KG)	
Cadmium	1.4
Chromium	**16**

Station ID	CAS04-SD05
Sample ID	CAS04-SD05-1209A
Sample Date	12/08/09
Depth	0-4"
Total Metals (MG/KG)	
Barium	31.6
Chromium	**18.5 L**

Station ID	CAS04-SD17
Sample ID	CAS04-SD17-1012
Sample Date	10/11/12
Depth	0-4"
Total Metals (MG/KG)	
Cadmium	1.6
Chromium	**19.1**
Copper	33.5
Zinc	134

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
Total Metals (µg/l)			
Arsenic	9.8	9.8	6.1
Barium	20.0	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Copper	31.6	31.6	3,100
Zinc	121	121	23,000

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

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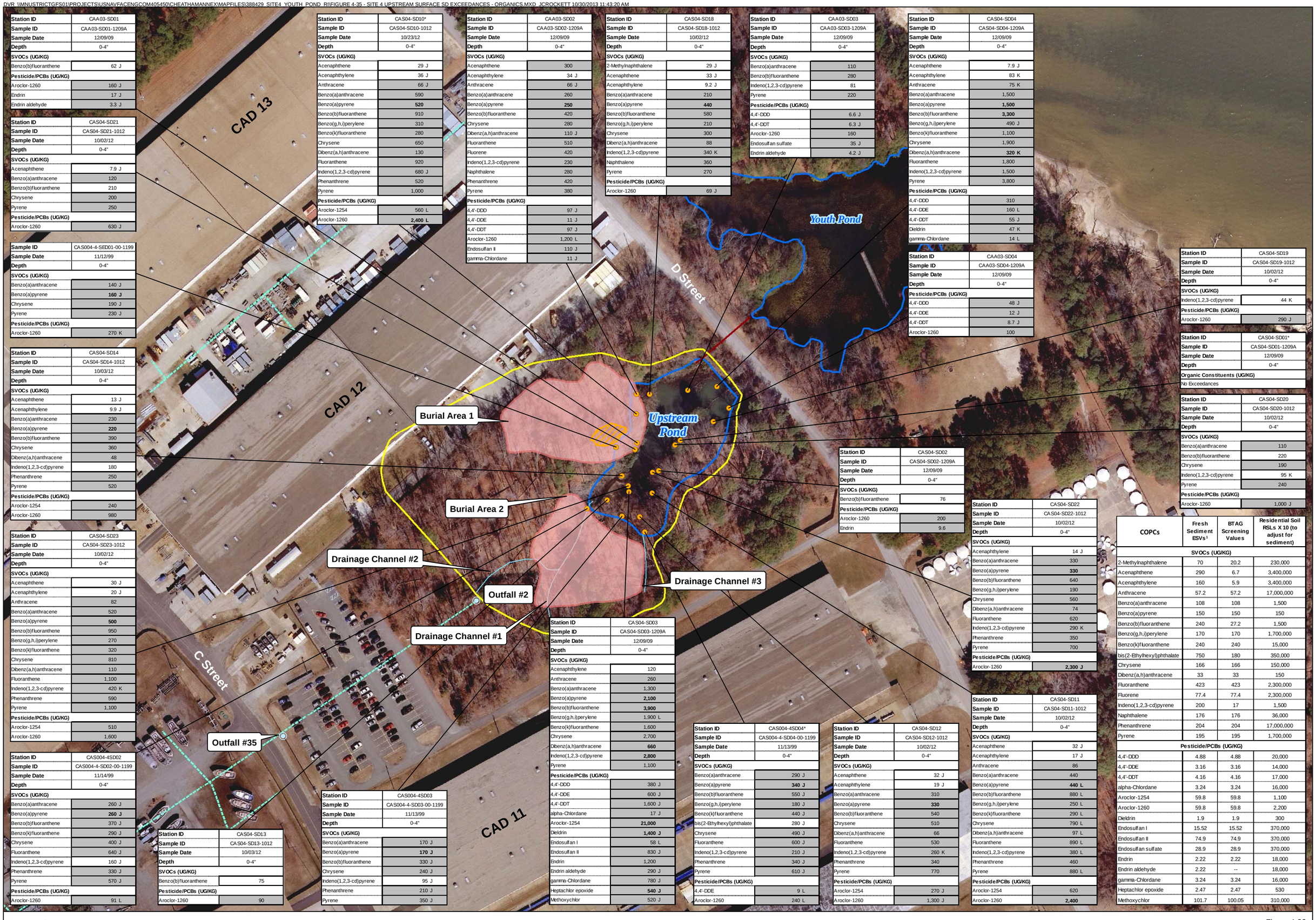
Figure 4-22
Site 4, Drainage Channels - Surface Sediment Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-35 - SITE 4 UPSTREAM SURFACE SD EXCEEDANCES - ORGANICS.MXD JCROCKETT 10/30/2013 11:43:20 AM



Station ID	CAA03-SD01
Sample ID	CAA03-SD01-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	62 J
Pesticide/PCBs (UG/KG)	
Aroclor-1260	160 J
Endrin	17 J
Endrin aldehyde	3.3 J

Station ID	CAS04-SD21
Sample ID	CAS04-SD21-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	7.9 J
Benzo(a)anthracene	120
Benzo(b)fluoranthene	210
Chrysene	200
Pyrene	250
Pesticide/PCBs (UG/KG)	
Aroclor-1260	630 J

Sample ID	CAS004-4-SED01-00-1199
Sample Date	11/12/99
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	140 J
Benzo(a)pyrene	**160 J**
Chrysene	190 J
Pyrene	230 J
Pesticide/PCBs (UG/KG)	
Aroclor-1260	270 K

Station ID	CAS04-SD14
Sample ID	CAS04-SD14-1012
Sample Date	10/03/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	13 J
Acenaphthylene	9.9 J
Benzo(a)anthracene	230
Benzo(a)pyrene	**220**
Benzo(b)fluoranthene	390
Chrysene	360
Dibenz(a,h)anthracene	48
Indeno(1,2,3-cd)pyrene	180
Phenanthrene	250
Pyrene	520
Pesticide/PCBs (UG/KG)	
Aroclor-1254	240
Aroclor-1260	980

Station ID	CAS04-SD23
Sample ID	CAS04-SD23-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	30 J
Acenaphthylene	20 J
Anthracene	82
Benzo(a)anthracene	520
Benzo(a)pyrene	**500**
Benzo(b)fluoranthene	950
Benzo(g,h,i)perylene	270
Benzo(k)fluoranthene	320
Chrysene	810
Dibenz(a,h)anthracene	110
Fluoranthene	1,100
Indeno(1,2,3-cd)pyrene	420 K
Phenanthrene	590
Pyrene	1,100
Pesticide/PCBs (UG/KG)	
Aroclor-1254	510
Aroclor-1260	1,600

Station ID	CAS004-4SD02
Sample ID	CAS004-4-SD02-00-1199
Sample Date	11/14/99
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	260 J
Benzo(a)pyrene	**260 J**
Benzo(b)fluoranthene	370 J
Benzo(k)fluoranthene	290 J
Chrysene	400 J
Fluoranthene	640 J
Indeno(1,2,3-cd)pyrene	160 J
Phenanthrene	330 J
Pyrene	570 J
Pesticide/PCBs (UG/KG)	
Aroclor-1260	91 L

Station ID	CAS04-SD13
Sample ID	CAS04-SD13-1012
Sample Date	10/03/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	75
Pesticide/PCBs (UG/KG)	
Aroclor-1260	90

Station ID	CAS04-SD10*
Sample ID	CAS04-SD10-1012
Sample Date	10/23/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	29 J
Acenaphthylene	36 J
Anthracene	66 J
Benzo(a)anthracene	590
Benzo(a)pyrene	**520**
Benzo(b)fluoranthene	910
Benzo(g,h,i)perylene	310
Benzo(k)fluoranthene	280
Chrysene	650
Dibenz(a,h)anthracene	130
Fluoranthene	920
Indeno(1,2,3-cd)pyrene	680 J
Phenanthrene	520
Pyrene	1,000
Pesticide/PCBs (UG/KG)	
Aroclor-1254	560 L
Aroclor-1260	**2,400 L**

Station ID	CAA03-SD02
Sample ID	CAA03-SD02-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	300
Acenaphthylene	34 J
Anthracene	66 J
Benzo(a)anthracene	260
Benzo(a)pyrene	**250**
Benzo(b)fluoranthene	420
Chrysene	280
Dibenz(a,h)anthracene	110 J
Fluoranthene	510
Fluorene	420
Indeno(1,2,3-cd)pyrene	230
Naphthalene	280
Phenanthrene	420
Pyrene	380
Pesticide/PCBs (UG/KG)	
4,4'-DDD	97 J
4,4'-DDE	11 J
4,4'-DDT	97 J
Aroclor-1260	1,200 L
Endosulfan II	110 J
gamma-Chlordane	11 J

Station ID	CAS04-SD18
Sample ID	CAS04-SD18-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
2-Methylnaphthalene	29 J
Acenaphthene	33 J
Acenaphthylene	9.2 J
Benzo(a)anthracene	210
Benzo(a)pyrene	**440**
Benzo(b)fluoranthene	580
Benzo(g,h,i)perylene	210
Chrysene	300
Dibenz(a,h)anthracene	88
Indeno(1,2,3-cd)pyrene	340 K
Naphthalene	360
Pyrene	270
Pesticide/PCBs (UG/KG)	
Aroclor-1260	69 J

Station ID	CAA03-SD03
Sample ID	CAA03-SD03-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	110
Benzo(b)fluoranthene	280
Indeno(1,2,3-cd)pyrene	81
Pyrene	220
Pesticide/PCBs (UG/KG)	
4,4'-DDD	6.6 J
4,4'-DDT	6.3 J
Aroclor-1260	160
Endosulfan sulfate	35 J
Endrin aldehyde	4.2 J

Station ID	CAS04-SD04
Sample ID	CAS04-SD04-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	7.9 J
Acenaphthylene	83 K
Anthracene	75 K
Benzo(a)anthracene	1,500
Benzo(a)pyrene	**1,500**
Benzo(b)fluoranthene	**3,300**
Benzo(g,h,i)perylene	490 J
Benzo(k)fluoranthene	1,100
Chrysene	1,900
Dibenz(a,h)anthracene	**320 K**
Fluoranthene	1,800
Indeno(1,2,3-cd)pyrene	1,500
Pyrene	3,800
Pesticide/PCBs (UG/KG)	
4,4'-DDD	310
4,4'-DDE	160 L
4,4'-DDT	55 J
Dieldrin	47 K
gamma-Chlordane	14 L

Station ID	CAA03-SD04
Sample ID	CAA03-SD04-1209A
Sample Date	12/09/09
Depth	0-4"
Pesticide/PCBs (UG/KG)	
4,4'-DDD	48 J
4,4'-DDE	12 J
4,4'-DDT	8.7 J
Aroclor-1260	100

Station ID	CAS04-SD19
Sample ID	CAS04-SD19-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Indeno(1,2,3-cd)pyrene	44 K
Pesticide/PCBs (UG/KG)	
Aroclor-1260	290 J

Station ID	CAS04-SD01*
Sample ID	CAS04-SD01-1209A
Sample Date	12/09/09
Depth	0-4"
Organic Constituents (UG/KG)	
No Exceedances	

Station ID	CAS04-SD20
Sample ID	CAS04-SD20-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	110
Benzo(b)fluoranthene	220
Chrysene	190
Indeno(1,2,3-cd)pyrene	95 K
Pyrene	240
Pesticide/PCBs (UG/KG)	
Aroclor-1260	1,000 J

Station ID	CAS04-SD02
Sample ID	CAS04-SD02-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	76
Pesticide/PCBs (UG/KG)	
Aroclor-1260	200
Endrin	9.6

Station ID	CAS04-SD22
Sample ID	CAS04-SD22-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthylene	14 J
Benzo(a)anthracene	330
Benzo(a)pyrene	**330**
Benzo(b)fluoranthene	640
Benzo(g,h,i)perylene	190
Chrysene	560
Dibenz(a,h)anthracene	74
Fluoranthene	620
Indeno(1,2,3-cd)pyrene	290 K
Phenanthrene	350
Pyrene	700
Pesticide/PCBs (UG/KG)	
Aroclor-1260	**2,300 J**

Station ID	CAS04-SD11
Sample ID	CAS04-SD11-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	32 J
Acenaphthylene	17 J
Anthracene	86
Benzo(a)anthracene	440
Benzo(a)pyrene	**440 L**
Benzo(b)fluoranthene	880 L
Benzo(g,h,i)perylene	250 L
Benzo(k)fluoranthene	290 L
Chrysene	790 L
Dibenz(a,h)anthracene	97 L
Fluoranthene	890 L
Indeno(1,2,3-cd)pyrene	380 L
Phenanthrene	460
Pyrene	880 L
Pesticide/PCBs (UG/KG)	
Aroclor-1254	620
Aroclor-1260	**2,400**

Station ID	CAS04-SD03
Sample ID	CAS04-SD03-1209A
Sample Date	12/09/09
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthylene	120
Anthracene	260
Benzo(a)anthracene	1,300
Benzo(a)pyrene	**2,100**
Benzo(b)fluoranthene	**3,900**
Benzo(g,h,i)perylene	1,900 L
Benzo(k)fluoranthene	1,600
Chrysene	2,700
Dibenz(a,h)anthracene	**660**
Indeno(1,2,3-cd)pyrene	**2,800**
Pyrene	1,100
Pesticide/PCBs (UG/KG)	
4,4'-DDD	380 J
4,4'-DDE	600 J
4,4'-DDT	1,600 J
alpha-Chlordane	17 J
Aroclor-1254	**21,000**
Dieldrin	**1,400 J**
Endosulfan I	58 L
Endosulfan II	830 J
Endrin	1,200
Endrin aldehyde	290 J
gamma-Chlordane	780 J
Heptachlor epoxide	**540 J**
Methoxychlor	520 J

Station ID	CAS004-4SD03
Sample ID	CAS004-4-SD03-00-1199
Sample Date	11/13/99
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	170 J
Benzo(a)pyrene	**170 J**
Benzo(b)fluoranthene	330 J
Chrysene	240 J
Indeno(1,2,3-cd)pyrene	95 J
Phenanthrene	210 J
Pyrene	350 J

Station ID	CAS004-4SD04*
Sample ID	CAS004-4-SD04-00-1199
Sample Date	11/13/99
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	290 J
Benzo(a)pyrene	**340 J**
Benzo(b)fluoranthene	550 J
Benzo(g,h,i)perylene	180 J
Benzo(k)fluoranthene	440 J
bis(2-Ethylhexyl)phthalate	280 J
Chrysene	490 J
Fluoranthene	600 J
Indeno(1,2,3-cd)pyrene	210 J
Phenanthrene	340 J
Pyrene	610 J
Pesticide/PCBs (UG/KG)	
4,4'-DDE	9 L
Aroclor-1260	240 L

Station ID	CAS04-SD12
Sample ID	CAS04-SD12-1012
Sample Date	10/02/12
Depth	0-4"
SVOCs (UG/KG)	
Acenaphthene	32 J
Acenaphthylene	19 J
Benzo(a)anthracene	310
Benzo(a)pyrene	**330**
Benzo(b)fluoranthene	540
Chrysene	510
Dibenz(a,h)anthracene	66
Fluoranthene	530
Indeno(1,2,3-cd)pyrene	260 K
Phenanthrene	340
Pyrene	770
Pesticide/PCBs (UG/KG)	
Aroclor-1254	270 J
Aroclor-1260	1,300 J

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (UG/KG)			
2-Methylnaphthalene	70	20.2	230,000
Acenaphthene	290	6.7	3,400,000
Acenaphthylene	160	5.9	3,400,000
Anthracene	57.2	57.2	17,000,000
Benzo(a)anthracene	108	108	1,500
Benzo(a)pyrene	150	150	150
Benzo(b)fluoranthene	240	27.2	1,500
Benzo(g,h,i)perylene	170	170	1,700,000
Benzo(k)fluoranthene	240	240	15,000
bis(2-Ethylhexyl)phthalate	750	180	350,000
Chrysene	166	166	150,000
Dibenz(a,h)anthracene	33	33	150
Fluoranthene	423	423	2,300,000
Fluorene	77.4	77.4	2,300,000
Indeno(1,2,3-cd)pyrene	200	17	1,500
Naphthalene	176	176	36,000
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Pesticide/PCBs (UG/KG)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
4,4'-DDT	4.16	4.16	17,000
alpha-Chlordane	3.24	3.24	16,000
Aroclor-1254	59.8	59.8	1,100
Aroclor-1260	59.8	59.8	2,200
Dieldrin	1.9	1.9	300
Endosulfan I	15.52	15.52	370,000
Endosulfan II	74.9	74.9	370,000
Endosulfan sulfate	28.9	28.9	370,000
Endrin	2.22	2.22	18,000
Endrin aldehyde	2.22	--	18,000
gamma-Chlordane	3.24	3.24	16,000
Heptachlor epoxide	2.47	2.47	530
Methoxychlor	101.7	100.05	310,000

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

N W E S

0 100 Feet

Figure 4-23
Site 4, Upstream Pond - Surface Sediment Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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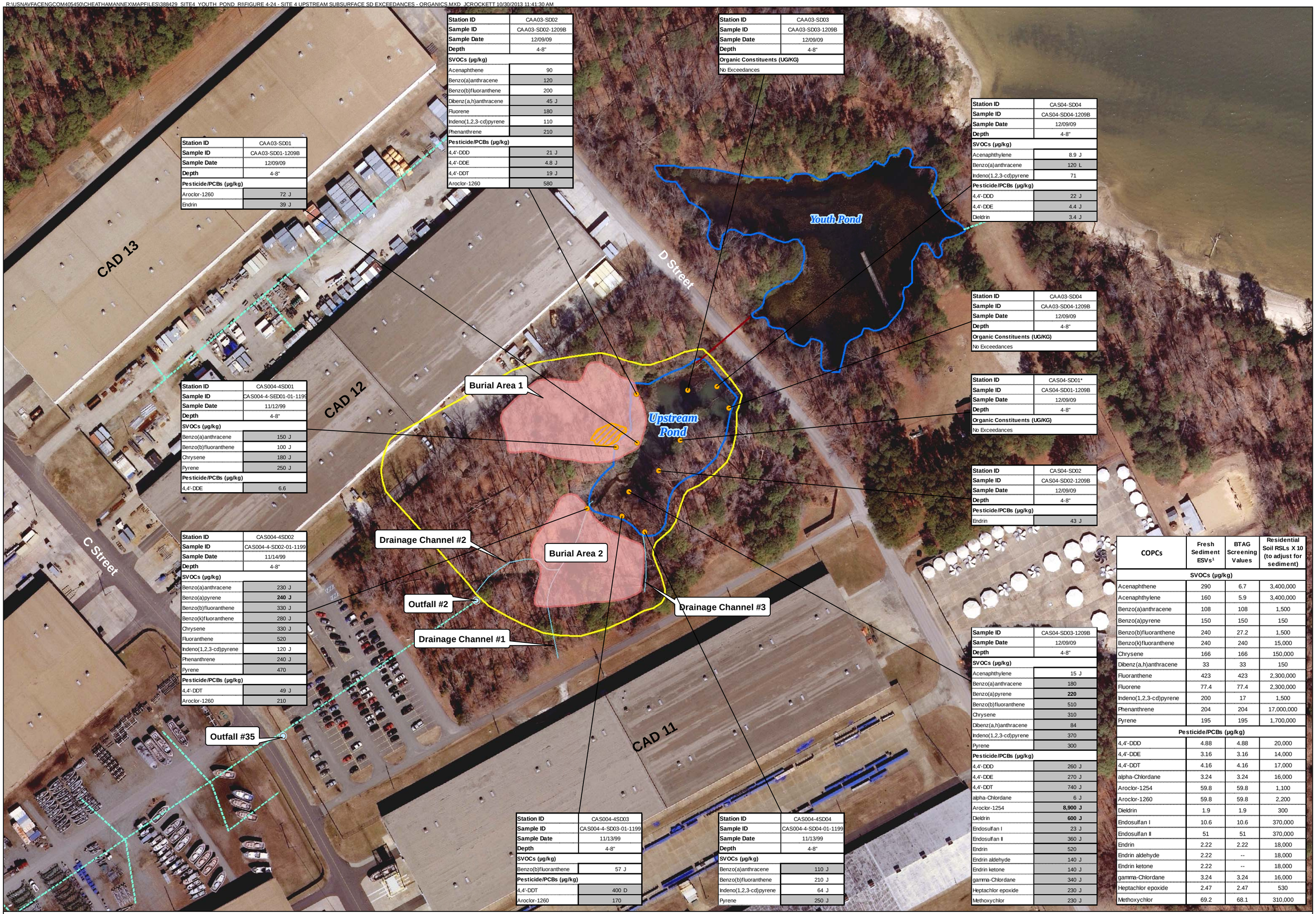
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-24 - SITE 4 UPSTREAM SUBSURFACE SD EXCEEDANCES - ORGANICS.MXD JCROCKETT 10/30/2013 11:41:30 AM



Station ID	CAA03-SD01
Sample ID	CAA03-SD01-1209B
Sample Date	12/09/09
Depth	4-8"
Pesticide/PCBs (µg/kg)	
Aroclor-1260	72 J
Endrin	39 J

Station ID	CAA03-SD02
Sample ID	CAA03-SD02-1209B
Sample Date	12/09/09
Depth	4-8"
SVOCs (µg/kg)	
Acenaphthene	90
Benzo(a)anthracene	120
Benzo(b)fluoranthene	200
Dibenz(a,h)anthracene	45 J
Fluorene	180
Indeno(1,2,3-cd)pyrene	110
Phenanthrene	210
Pesticide/PCBs (µg/kg)	
4,4'-DDD	21 J
4,4'-DDE	4.8 J
4,4'-DDT	19 J
Aroclor-1260	580

Station ID	CAA03-SD03
Sample ID	CAA03-SD03-1209B
Sample Date	12/09/09
Depth	4-8"
Organic Constituents (UG/KG)	
No Exceedances	

Station ID	CAS004-4SD01
Sample ID	CAS004-4-SED01-01-1199
Sample Date	11/12/99
Depth	4-8"
SVOCs (µg/kg)	
Benzo(a)anthracene	150 J
Benzo(b)fluoranthene	100 J
Chrysene	180 J
Pyrene	250 J
Pesticide/PCBs (µg/kg)	
4,4'-DDE	6.6

Station ID	CAS004-4SD02
Sample ID	CAS004-4-SD02-01-1199
Sample Date	11/14/99
Depth	4-8"
SVOCs (µg/kg)	
Benzo(a)anthracene	230 J
Benzo(a)pyrene	**240 J**
Benzo(b)fluoranthene	330 J
Benzo(k)fluoranthene	280 J
Chrysene	330 J
Fluoranthene	520
Indeno(1,2,3-cd)pyrene	120 J
Phenanthrene	240 J
Pyrene	470
Pesticide/PCBs (µg/kg)	
4,4'-DDT	49 J
Aroclor-1260	210

Station ID	CAS004-4SD03
Sample ID	CAS004-4-SD03-01-1199
Sample Date	11/13/99
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	57 J
Pesticide/PCBs (µg/kg)	
4,4'-DDT	400 D
Aroclor-1260	170

Station ID	CAS004-4SD04
Sample ID	CAS004-4-SD04-01-1199
Sample Date	11/13/99
Depth	4-8"
SVOCs (µg/kg)	
Benzo(a)anthracene	110 J
Benzo(b)fluoranthene	210 J
Indeno(1,2,3-cd)pyrene	64 J
Pyrene	250 J

Station ID	CAS04-SD04
Sample ID	CAS04-SD04-1209B
Sample Date	12/09/09
Depth	4-8"
SVOCs (µg/kg)	
Acenaphthylene	8.9 J
Benzo(a)anthracene	120 L
Indeno(1,2,3-cd)pyrene	71
Pesticide/PCBs (µg/kg)	
4,4'-DDD	22 J
4,4'-DDE	4.4 J
Dieldrin	3.4 J

Station ID	CAA03-SD04
Sample ID	CAA03-SD04-1209B
Sample Date	12/09/09
Depth	4-8"
Organic Constituents (UG/KG)	
No Exceedances	

Station ID	CAS04-SD01*
Sample ID	CAS04-SD01-1209B
Sample Date	12/09/09
Depth	4-8"
Organic Constituents (UG/KG)	
No Exceedances	

Station ID	CAS04-SD02
Sample ID	CAS04-SD02-1209B
Sample Date	12/09/09
Depth	4-8"
Pesticide/PCBs (µg/kg)	
Endrin	43 J

Sample ID	CAS04-SD03-1209B
Sample Date	12/09/09
Depth	4-8"
SVOCs (µg/kg)	
Acenaphthylene	15 J
Benzo(a)anthracene	180
Benzo(a)pyrene	**220**
Benzo(b)fluoranthene	510
Chrysene	310
Dibenz(a,h)anthracene	84
Indeno(1,2,3-cd)pyrene	370
Pyrene	300
Pesticide/PCBs (µg/kg)	
4,4'-DDD	260 J
4,4'-DDE	270 J
4,4'-DDT	740 J
alpha-Chlordane	6 J
Aroclor-1254	**8,900 J**
Dieldrin	**600 J**
Endosulfan I	23 J
Endosulfan II	360 J
Endrin	520
Endrin aldehyde	140 J
Endrin ketone	140 J
gamma-Chlordane	340 J
Heptachlor epoxide	230 J
Methoxychlor	230 J

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (µg/kg)			
Acenaphthene	290	6.7	3,400,000
Acenaphthylene	160	5.9	3,400,000
Benzo(a)anthracene	108	108	1,500
Benzo(a)pyrene	150	150	150
Benzo(b)fluoranthene	240	27.2	1,500
Benzo(k)fluoranthene	240	240	15,000
Chrysene	166	166	150,000
Dibenz(a,h)anthracene	33	33	150
Fluoranthene	423	423	2,300,000
Fluorene	77.4	77.4	2,300,000
Indeno(1,2,3-cd)pyrene	200	17	1,500
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Pesticide/PCBs (µg/kg)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
4,4'-DDT	4.16	4.16	17,000
alpha-Chlordane	3.24	3.24	16,000
Aroclor-1254	59.8	59.8	1,100
Aroclor-1260	59.8	59.8	2,200
Dieldrin	1.9	1.9	300
Endosulfan I	10.6	10.6	370,000
Endosulfan II	51	51	370,000
Endrin	2.22	2.22	18,000
Endrin aldehyde	2.22	--	18,000
Endrin ketone	2.22	--	18,000
gamma-Chlordane	3.24	3.24	16,000
Heptachlor epoxide	2.47	2.47	530
Methoxychlor	69.2	68.1	310,000

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Extent of Buried Debris
- Surface Debris Pile
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

N W E S

0 100 Feet

Figure 4-24
Site 4, Upstream Pond - Subsurface Sediment Exceedance Results (Organics)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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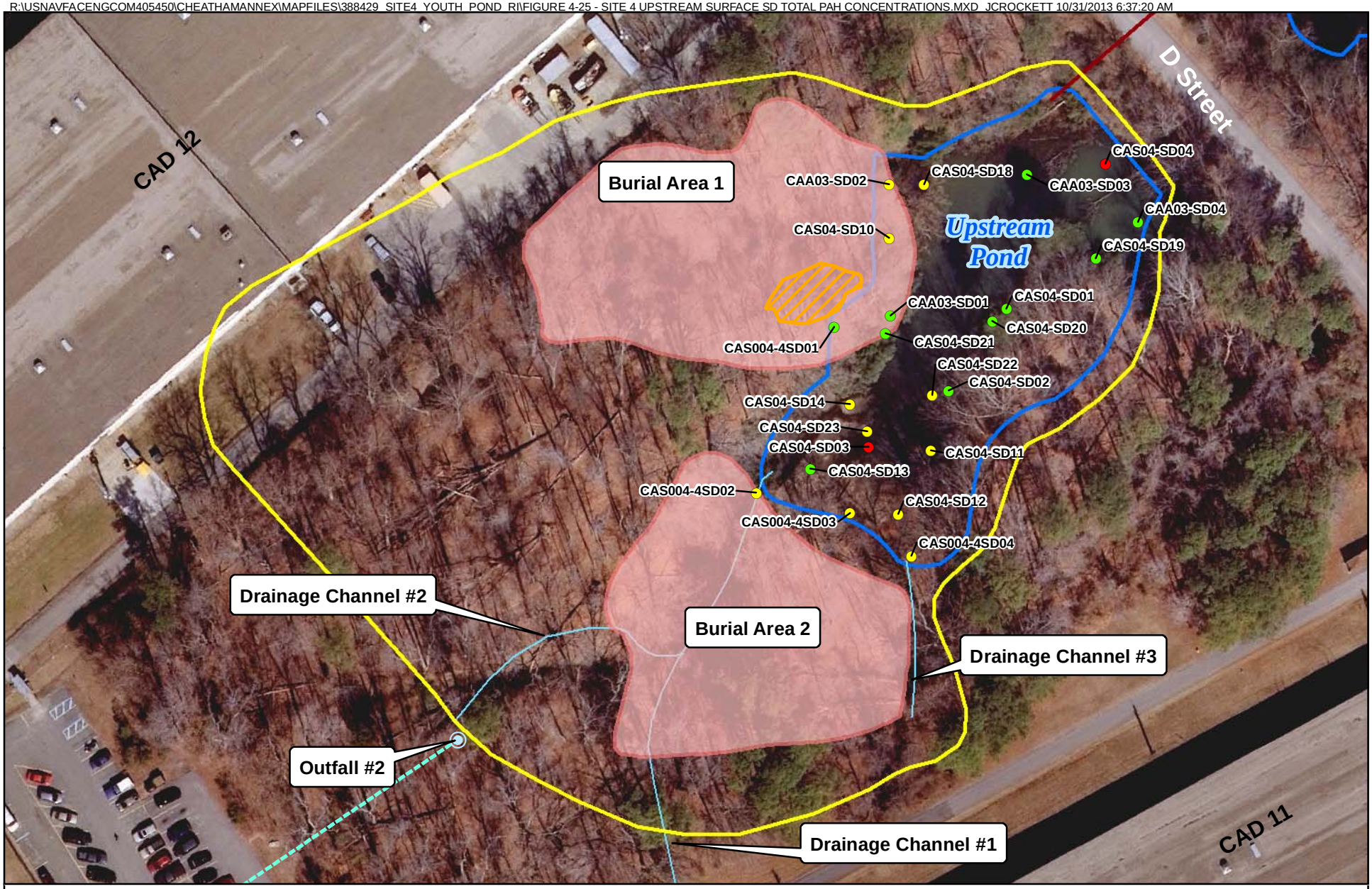
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-25 - SITE 4 UPSTREAM SURFACE SD TOTAL PAH CONCENTRATIONS.MXD JCROCKETT 10/31/2013 6:37:20 AM



Legend

Total PAH Concentrations

- <1,000 µg/kg
- 1,000-10,000 µg/kg
- >10,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure 4-25
Site 4, Upstream Pond - Surface Sediment Total PAH Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-26 - SITE 4 UPSTREAM SUBSURFACE SDTOTAL PAH CONCENTRATIONS.MXD JCROCKETT 10/30/2013 11:18:05 AM

Legend

Total PAH Concentration

- <1,000 µg/kg
- 1,000-10,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure 4-26
Site 4, Upstream Pond - Subsurface Sediment Total PAH Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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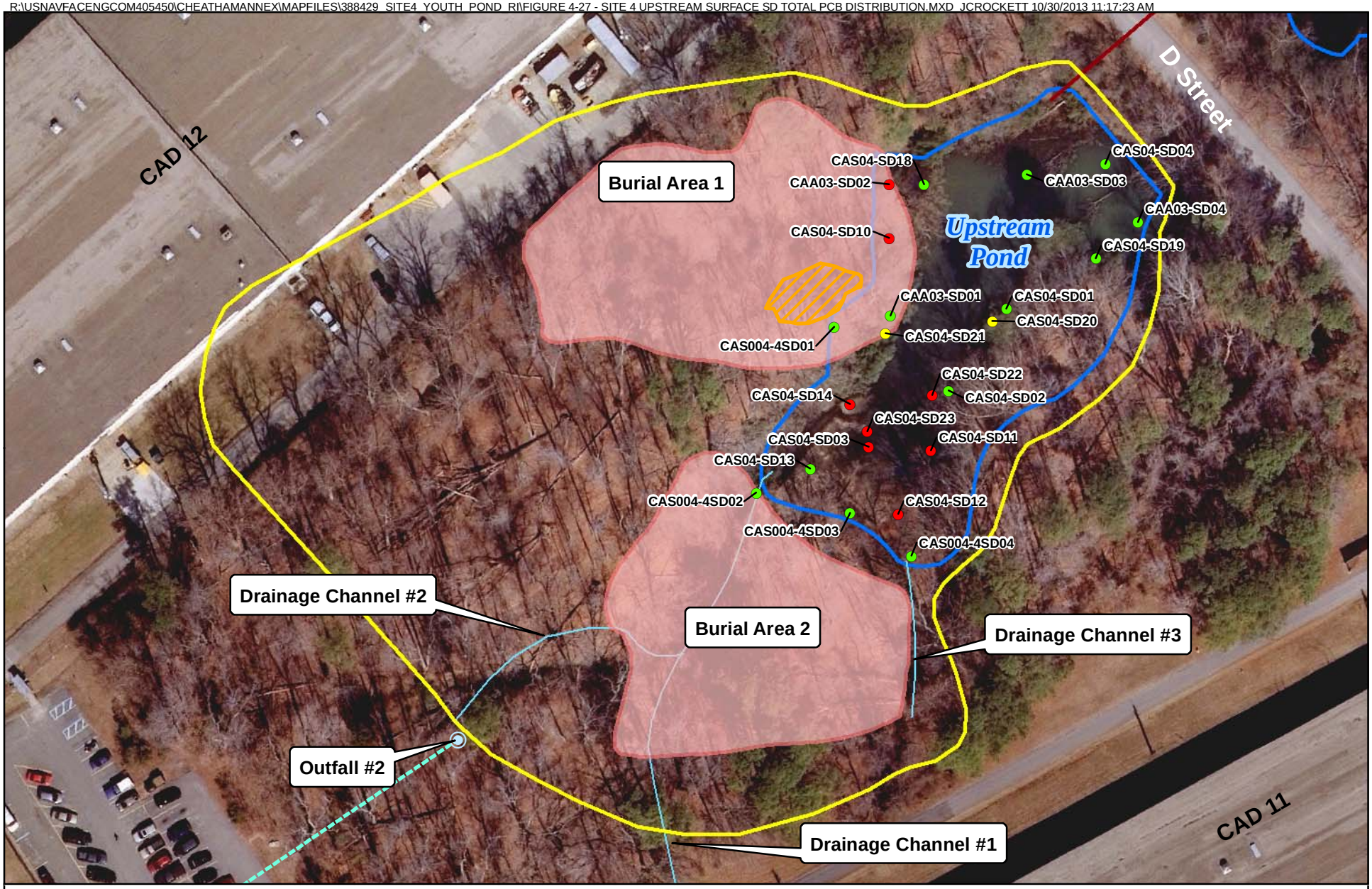
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-27 - SITE 4 UPSTREAM SURFACE SD TOTAL PCB DISTRIBUTION.MXD JCROCKETT 10/30/2013 11:17:23 AM



Legend

Total PCB Concentrations

- <500 µg/kg
- 500-1,000 µg/kg
- >1,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure 4-27
Site 4, Upstream Pond - Surface Sediment Total PCB Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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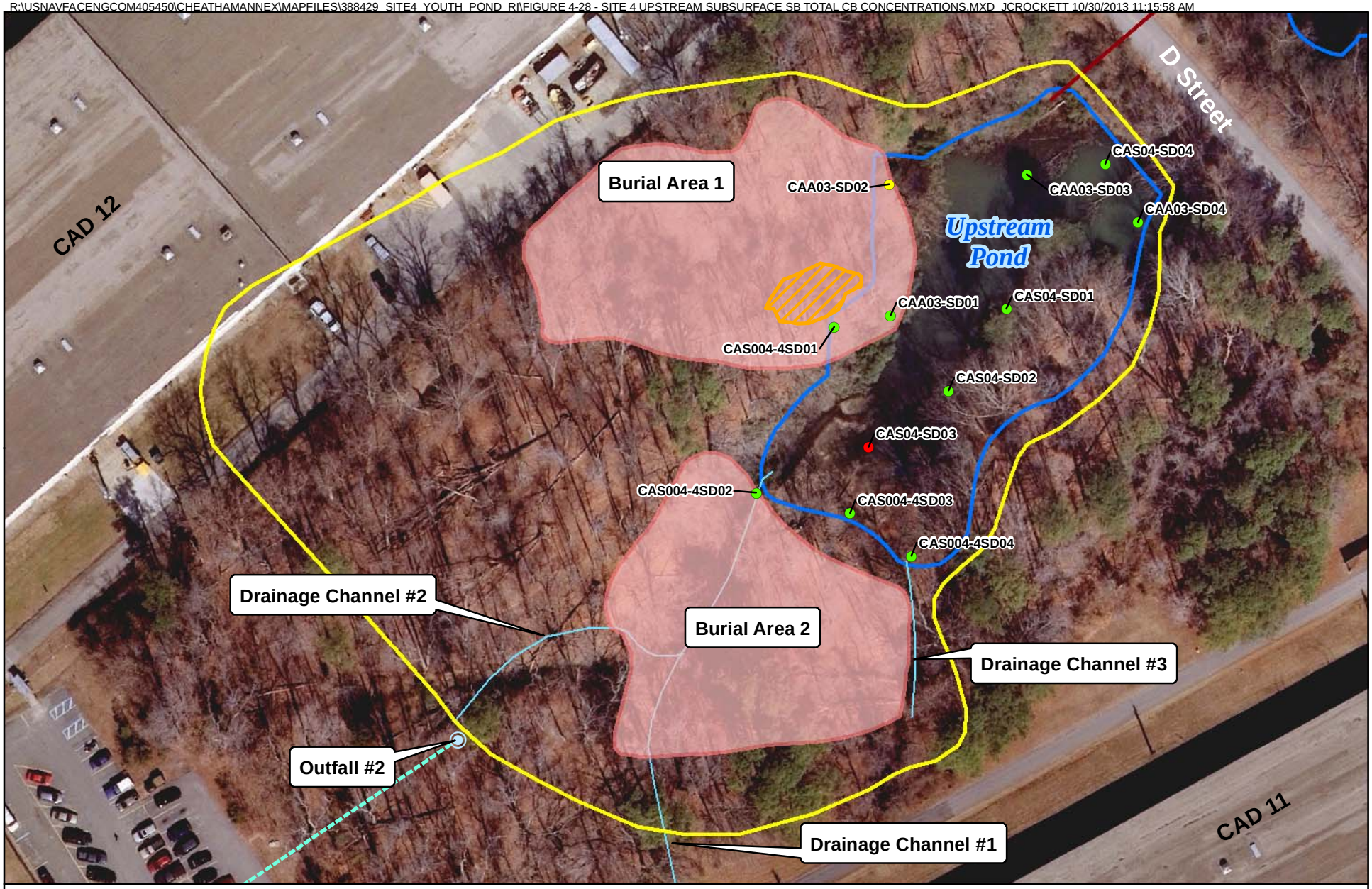
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-28 - SITE 4 UPSTREAM SUBSURFACE SB TOTAL CB CONCENTRATIONS.MXD JCROCKETT 10/30/2013 11:15:58 AM



Legend

Total PCB Concentrations

- <500 µg/kg
- 500-1,000 µg/kg
- >1,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure 4-28
Site 4, Upstream Pond - Subsurface Sediment Total PCB Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-29 - SITE 4 UPSTREAM SURFACE SD EXCEEDANCES - METALS.MXD JCROCKETT 10/30/2013 11:40:36 AM

Station ID	CAA03-SD01
Sample ID	CAA03-SD01-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**17.9 K**
Barium	56
Chromium	**43.1 K**
Iron	24,700 J

Station ID	CAS04-SD21
Sample ID	CAS04-SD21-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**7.3**
Barium	34.5
Cadmium	2.5
Chromium	**18.8**
Copper	68.4
Zinc	178

Station ID	CAS004-4SD01
Sample ID	CAS004-4-SED01-00-1199
Sample Date	11/12/99
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**12.2 L**
Barium	71.7 J
Cadmium	5.7
Chromium	**35.8**
Lead	52.3
Nickel	23.6
Zinc	147

Station ID	CAS04-SD14
Sample ID	CAS04-SD14-1012
Sample Date	10/03/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**14.3**
Barium	46
Cadmium	5.3
Chromium	**24.9**
Copper	63.4
Iron	25,200
Lead	41.2
Zinc	240

Station ID	CAS04-SD23
Sample ID	CAS04-SD23-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**18**
Barium	56.1
Cadmium	5.2
Chromium	**29.7**
Copper	85.2
Iron	28,900
Lead	46.3
Zinc	298

Station ID	CAS004-4SD02
Sample ID	CAS004-4-SD02-00-1199
Sample Date	11/14/99
Depth	0-4"
Total Metals (MG/KG)	
Barium	27.1 J
Cadmium	3.2
Chromium	**17.9**
Copper	62.7 J
Zinc	145

Station ID	CAS04-SD10*
Sample ID	CAS04-SD10-1012
Sample Date	10/23/12
Depth	0-4"
Total Metals (MG/KG)	
Aluminum	30,900
Arsenic	**42.2**
Barium	103
Cadmium	9.6
Chromium	**57**
Copper	197
Iron	44,000
Lead	85
Mercury	0.19
Nickel	27.2
Vanadium	73.4
Zinc	626

Station ID	CAS04-SD13
Sample ID	CAS04-SD13-1012
Sample Date	10/03/12
Depth	0-4"
Total Metals (MG/KG)	
Chromium	**5.5**

Station ID	CAA03-SD02
Sample ID	CAA03-SD02-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Antimony	2.2 L
Arsenic	**43.6 L**
Barium	118
Cadmium	2.9
Chromium	**29.2 L**
Copper	85.3 J
Iron	23,900
Lead	41.8
Zinc	207

Station ID	CAS04-SD03
Sample ID	CAS04-SD03-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**8.6 K**
Barium	80.8
Cadmium	4.7
Chromium	**49.7 K**
Copper	142
Iron	25,900 J
Lead	417
Mercury	0.62
Silver	6.1
Zinc	475 K

Station ID	CAS004-4SD03
Sample ID	CAS004-4-SD03-00-1199
Sample Date	11/13/99
Depth	0-4"
Total Metals (MG/KG)	
Barium	24.9 J
Cadmium	2.9
Chromium	**17.2**
Copper	65.3 J
Zinc	130

Station ID	CAS04-SD18
Sample ID	CAS04-SD18-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**111**
Barium	78.6
Chromium	**23.9**
Lead	42.6
Nickel	26.3

Station ID	CAS004-4SD04*
Sample ID	CAS004-4-SD04-00-1199
Sample Date	11/13/99
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**8.8**
Barium	27.5 J
Chromium	**9.5**
Copper	33.5 J
Zinc	228

Station ID	CAS04-SD12
Sample ID	CAS04-SD12-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**26.6**
Barium	37.8
Cadmium	1.2
Chromium	**14.5**
Zinc	424

Station ID	CAA03-SD03
Sample ID	CAA03-SD03-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**6.8 K**
Barium	21.6
Chromium	**12.7 K**

Station ID	CAA03-SD04
Sample ID	CAA03-SD04-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Barium	80.1
Chromium	**8.9 K**
Lead	230

Station ID	CAA03-SD04
Sample ID	CAA03-SD04-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**7.4 K**
Barium	80.1
Chromium	**8.9 K**
Lead	230

Station ID	CAS04-SD19
Sample ID	CAS04-SD19-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**20.1**
Barium	74.7
Cadmium	2.1
Chromium	**32.6**
Copper	41.7
Iron	24,600
Lead	44
Zinc	244

Station ID	CAS04-SD01*
Sample ID	CAS04-SD01-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Chromium	**11.1 K**

Station ID	CAS04-SD20
Sample ID	CAS04-SD20-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**18.1**
Barium	76.7
Cadmium	3.3
Chromium	**31.4**
Copper	85.6
Iron	24,500
Lead	76.7
Zinc	354

Station ID	CAS04-SD02
Sample ID	CAS04-SD02-1209A
Sample Date	12/09/09
Depth	0-4"
Total Metals (MG/KG)	
Barium	25.3
Chromium	**9.6 K**

Station ID	CAS04-SD22
Sample ID	CAS04-SD22-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**19.1**
Barium	62.8
Cadmium	5.9
Chromium	**33.9**
Copper	125
Iron	30,200
Lead	53.7
Zinc	388

Station ID	CAS04-SD11
Sample ID	CAS04-SD11-1012
Sample Date	10/02/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**19**
Barium	51.8
Cadmium	7.2
Chromium	**28.8**
Copper	106 K
Iron	27,300
Lead	49.1 L
Zinc	405

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
Total Metals (MG/KG)			
Aluminum	25,500	--	77,000
Antimony	3.00	2.00	31
Arsenic	9.79	9.80	6.1
Barium	20.0	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Copper	31.6	31.6	3,100
Iron	20,000	20,000	55,000
Lead	35.8	35.8	4,000
Mercury	0.18	0.18	23
Nickel	22.7	22.7	1,500
Silver	1	1	390
Vanadium	57	--	390
Zinc	121	121	23,000

Legend

- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

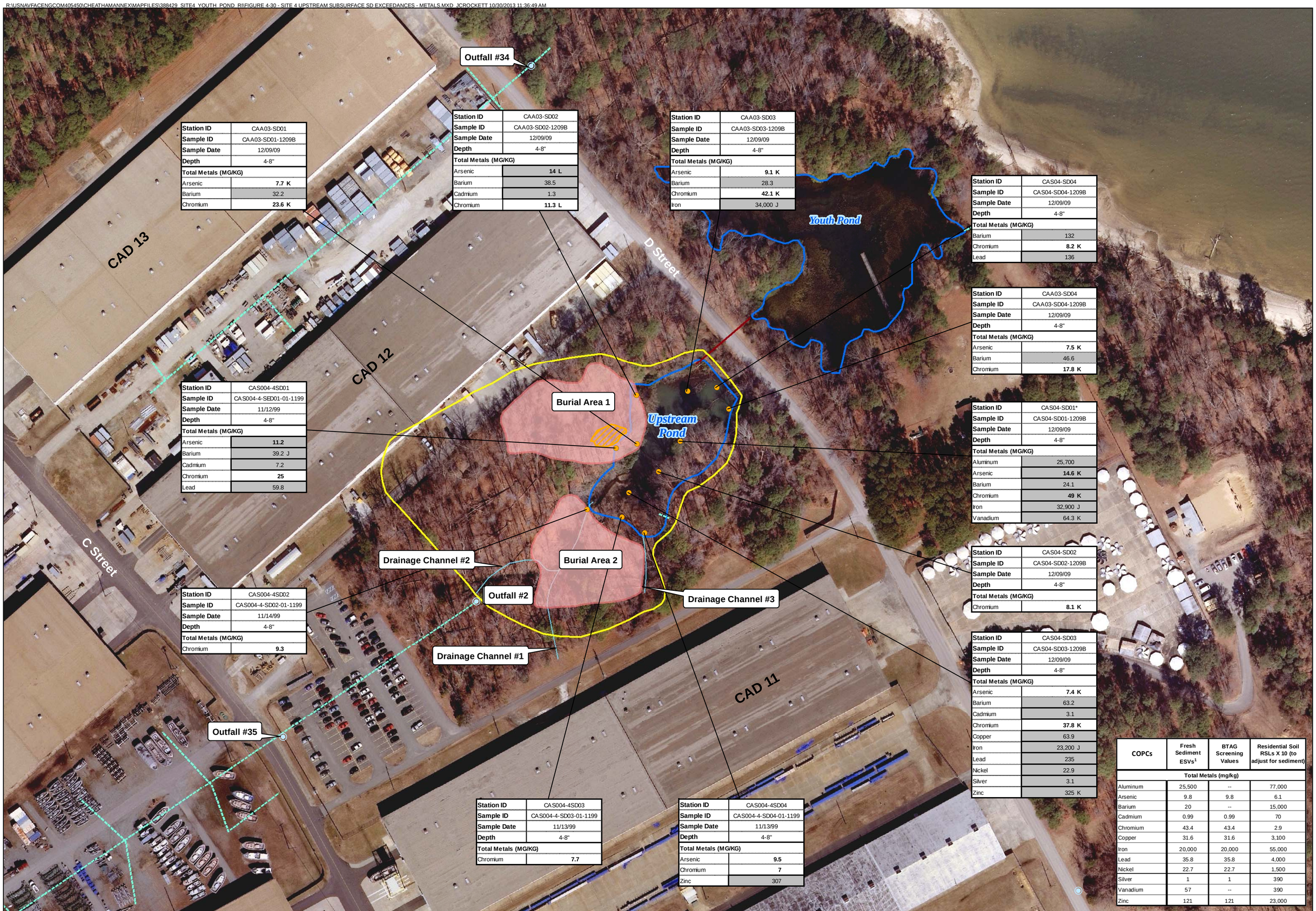
N W E S

0 100 Feet

Figure 4-29
Site 4, Upstream Pond - Surface Sediment Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-30 - SITE 4 UPSTREAM SUBSURFACE SD EXCEEDANCES - METALS.MXD JCROCKETT 10/30/2013 11:36:49 AM



Station ID	CAA03-SD01
Sample ID	CAA03-SD01-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**7.7 K**
Barium	32.2
Chromium	**23.6 K**

Station ID	CAA03-SD02
Sample ID	CAA03-SD02-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**14 L**
Barium	38.5
Cadmium	1.3
Chromium	**11.3 L**

Station ID	CAA03-SD03
Sample ID	CAA03-SD03-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**9.1 K**
Barium	28.3
Chromium	**42.1 K**
Iron	34,000 J

Station ID	CAS04-SD04
Sample ID	CAS04-SD04-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Barium	132
Chromium	**8.2 K**
Lead	136

Station ID	CAA03-SD04
Sample ID	CAA03-SD04-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**7.5 K**
Barium	46.6
Chromium	**17.8 K**

Station ID	CAS004-4SD01
Sample ID	CAS004-4-SED01-01-1199
Sample Date	11/12/99
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**11.2**
Barium	39.2 J
Cadmium	7.2
Chromium	**25**
Lead	59.8

Station ID	CAS04-SD01*
Sample ID	CAS04-SD01-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Aluminum	25,700
Arsenic	**14.6 K**
Barium	24.1
Chromium	**49 K**
Iron	32,900 J
Vanadium	64.3 K

Station ID	CAS04-SD02
Sample ID	CAS04-SD02-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Chromium	**8.1 K**

Station ID	CAS004-4SD02
Sample ID	CAS004-4-SD02-01-1199
Sample Date	11/14/99
Depth	4-8"
Total Metals (MG/KG)	
Chromium	**9.3**

Station ID	CAS04-SD03
Sample ID	CAS04-SD03-1209B
Sample Date	12/09/09
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**7.4 K**
Barium	63.2
Cadmium	3.1
Chromium	**37.8 K**
Copper	63.9
Iron	23,200 J
Lead	235
Nickel	22.9
Silver	3.1
Zinc	325 K

Station ID	CAS004-4SD03
Sample ID	CAS004-4-SD03-01-1199
Sample Date	11/13/99
Depth	4-8"
Total Metals (MG/KG)	
Chromium	**7.7**

Station ID	CAS004-4SD04
Sample ID	CAS004-4-SD04-01-1199
Sample Date	11/13/99
Depth	4-8"
Total Metals (MG/KG)	
Arsenic	**9.5**
Chromium	**7**
Zinc	307

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
Total Metals (mg/kg)			
Aluminum	25,500	--	77,000
Arsenic	9.8	9.8	6.1
Barium	20	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Copper	31.6	31.6	3,100
Iron	20,000	20,000	55,000
Lead	35.8	35.8	4,000
Nickel	22.7	22.7	1,500
Silver	1	1	390
Vanadium	57	--	390
Zinc	121	121	23,000

Legend

- Sediment Sample Location
- Outfall
- Test Pit Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSL
Bold box indicates exceedance of BTAG
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 53,510
*Field duplicate collected; highest value is shown

N W E S

0 100 Feet

Figure 4-30
Site 4, Upstream Pond - Subsurface Sediment Exceedance Results (Metals)
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-31 - SW SAMPLES.MXD JCROCKETT 4/3/2014 2:27:45 PM

Legend

- Surface Water Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

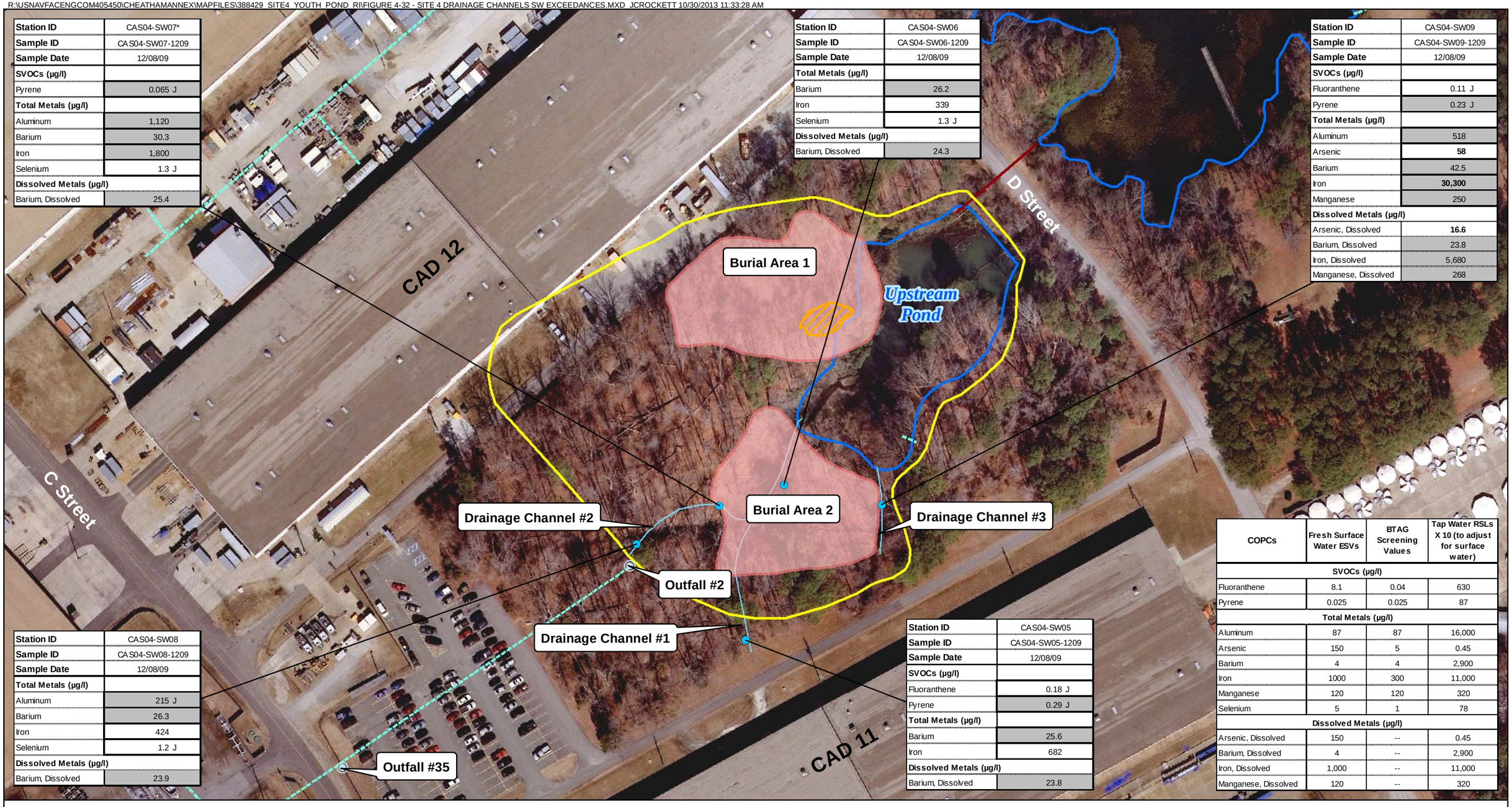
N
W E
S

0 100
Feet

Figure 4-31
Site 4, Surface Water Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-32 - SITE 4 DRAINAGE CHANNELS SW EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:33:28 AM



Station ID	CAS04-SW07*
Sample ID	CAS04-SW07-1209
Sample Date	12/08/09
SVOCs (µg/l)	
Pyrene	0.065 J
Total Metals (µg/l)	
Aluminum	1,120
Barium	30.3
Iron	1,800
Selenium	1.3 J
Dissolved Metals (µg/l)	
Barium, Dissolved	25.4

Station ID	CAS04-SW06
Sample ID	CAS04-SW06-1209
Sample Date	12/08/09
Total Metals (µg/l)	
Barium	26.2
Iron	339
Selenium	1.3 J
Dissolved Metals (µg/l)	
Barium, Dissolved	24.3

Station ID	CAS04-SW09
Sample ID	CAS04-SW09-1209
Sample Date	12/08/09
SVOCs (µg/l)	
Fluoranthene	0.11 J
Pyrene	0.23 J
Total Metals (µg/l)	
Aluminum	518
Arsenic	**58**
Barium	42.5
Iron	**30,300**
Manganese	250
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**16.6**
Barium, Dissolved	23.8
Iron, Dissolved	5,680
Manganese, Dissolved	268

Station ID	CAS04-SW08
Sample ID	CAS04-SW08-1209
Sample Date	12/08/09
Total Metals (µg/l)	
Aluminum	215 J
Barium	26.3
Iron	424
Selenium	1.2 J
Dissolved Metals (µg/l)	
Barium, Dissolved	23.9

Station ID	CAS04-SW05
Sample ID	CAS04-SW05-1209
Sample Date	12/08/09
SVOCs (µg/l)	
Fluoranthene	0.18 J
Pyrene	0.29 J
Total Metals (µg/l)	
Barium	25.6
Iron	682
Dissolved Metals (µg/l)	
Barium, Dissolved	23.8

COPCs	Fresh Surface Water ESVs	BTAG Screening Values	Tap Water RSLs X 10 (to adjust for surface water)
SVOCs (µg/l)			
Fluoranthene	8.1	0.04	630
Pyrene	0.025	0.025	87
Total Metals (µg/l)			
Aluminum	87	87	16,000
Arsenic	150	5	0.45
Barium	4	4	2,900
Iron	1000	300	11,000
Manganese	120	120	320
Selenium	5	1	78
Dissolved Metals (µg/l)			
Arsenic, Dissolved	150	--	0.45
Barium, Dissolved	4	--	2,900
Iron, Dissolved	1,000	--	11,000
Manganese, Dissolved	120	--	320

Legend

- Surface Water Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Tap Water X 10 RSLs
Bold box indicates exceedance of BTAG
*Field duplicate collected; highest value is shown.

N W E S

0 100 Feet

Figure 4-32
Site 4, Drainage Channels - Surface Water Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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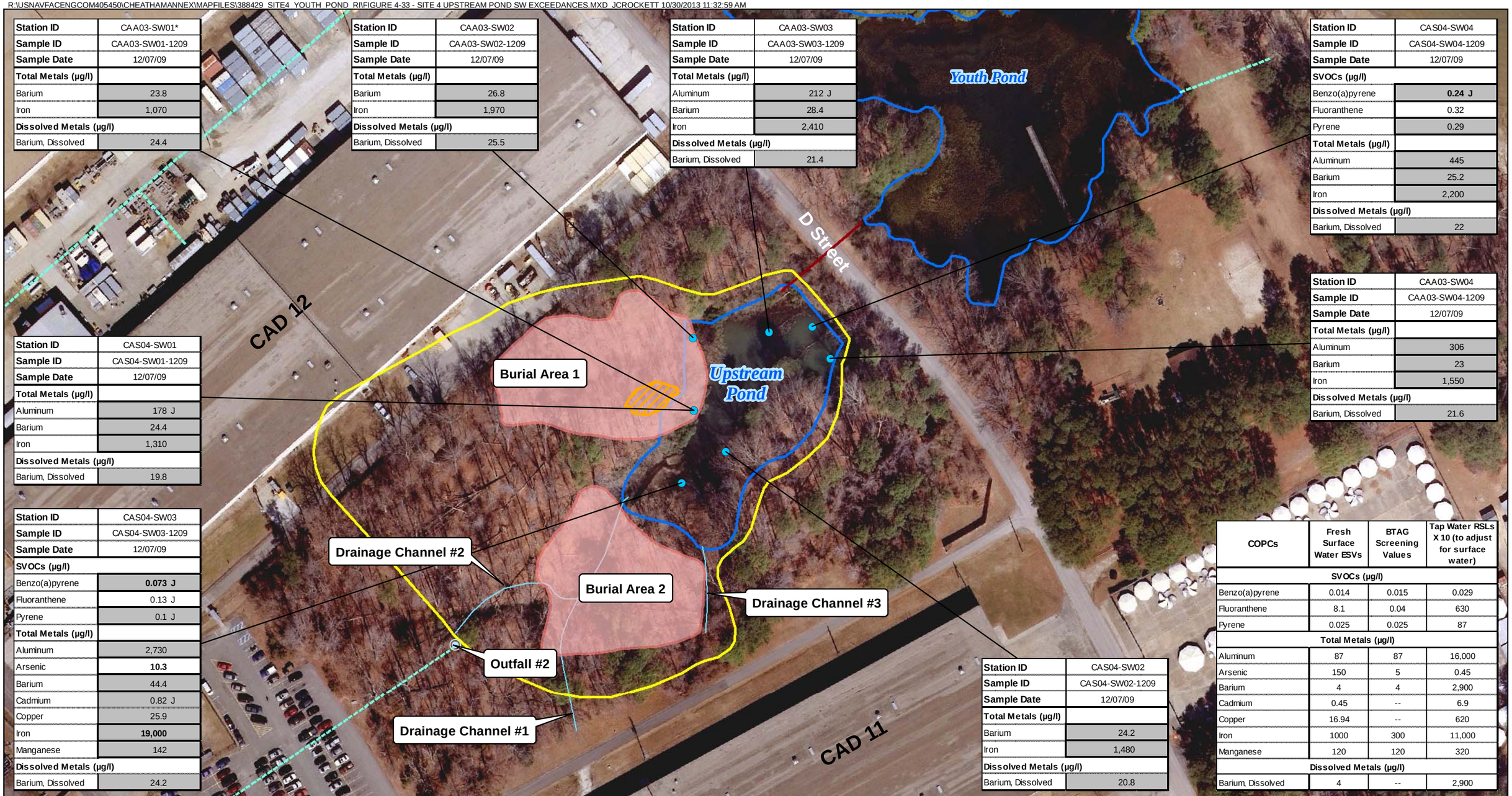
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-33 - SITE 4 UPSTREAM POND SW EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:32:59 AM



Station ID	CAA03-SW01*
Sample ID	CAA03-SW01-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Barium	23.8
Iron	1,070
Dissolved Metals (µg/l)	
Barium, Dissolved	24.4

Station ID	CAA03-SW02
Sample ID	CAA03-SW02-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Barium	26.8
Iron	1,970
Dissolved Metals (µg/l)	
Barium, Dissolved	25.5

Station ID	CAA03-SW03
Sample ID	CAA03-SW03-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Aluminum	212 J
Barium	28.4
Iron	2,410
Dissolved Metals (µg/l)	
Barium, Dissolved	21.4

Station ID	CAS04-SW04
Sample ID	CAS04-SW04-1209
Sample Date	12/07/09
SVOCs (µg/l)	
Benzo(a)pyrene	**0.24 J**
Fluoranthene	0.32
Pyrene	0.29
Total Metals (µg/l)	
Aluminum	445
Barium	25.2
Iron	2,200
Dissolved Metals (µg/l)	
Barium, Dissolved	22

Station ID	CAA03-SW04
Sample ID	CAA03-SW04-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Aluminum	306
Barium	23
Iron	1,550
Dissolved Metals (µg/l)	
Barium, Dissolved	21.6

Station ID	CAS04-SW01
Sample ID	CAS04-SW01-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Aluminum	178 J
Barium	24.4
Iron	1,310
Dissolved Metals (µg/l)	
Barium, Dissolved	19.8

Station ID	CAS04-SW03
Sample ID	CAS04-SW03-1209
Sample Date	12/07/09
SVOCs (µg/l)	
Benzo(a)pyrene	**0.073 J**
Fluoranthene	0.13 J
Pyrene	0.1 J
Total Metals (µg/l)	
Aluminum	2,730
Arsenic	**10.3**
Barium	44.4
Cadmium	0.82 J
Copper	25.9
Iron	**19,000**
Manganese	142
Dissolved Metals (µg/l)	
Barium, Dissolved	24.2

Station ID	CAS04-SW02
Sample ID	CAS04-SW02-1209
Sample Date	12/07/09
Total Metals (µg/l)	
Barium	24.2
Iron	1,480
Dissolved Metals (µg/l)	
Barium, Dissolved	20.8

COPCs	Fresh Surface Water ESVs	BTAG Screening Values	Tap Water RSLs X 10 (to adjust for surface water)
SVOCs (µg/l)			
Benzo(a)pyrene	0.014	0.015	0.029
Fluoranthene	8.1	0.04	630
Pyrene	0.025	0.025	87
Total Metals (µg/l)			
Aluminum	87	87	16,000
Arsenic	150	5	0.45
Barium	4	4	2,900
Cadmium	0.45	--	6.9
Copper	16.94	--	620
Iron	1000	300	11,000
Manganese	120	120	320
Dissolved Metals (µg/l)			
Barium, Dissolved	4	--	2,900

Legend

- Surface Water Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold text indicates exceedance of Adjusted Tap Water X 10 RSLs
Bold box indicates exceedance of BTAG
*Field duplicate collected; highest value is shown.

N
W E
S

0 100
Feet

Figure 4-33
Site 4, Upstream Pond - Surface Water Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-34 - SF SAMPLES.MXD JCROCKETT 4/3/2014 2:28:28 PM

Legend

- Surface Feature Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

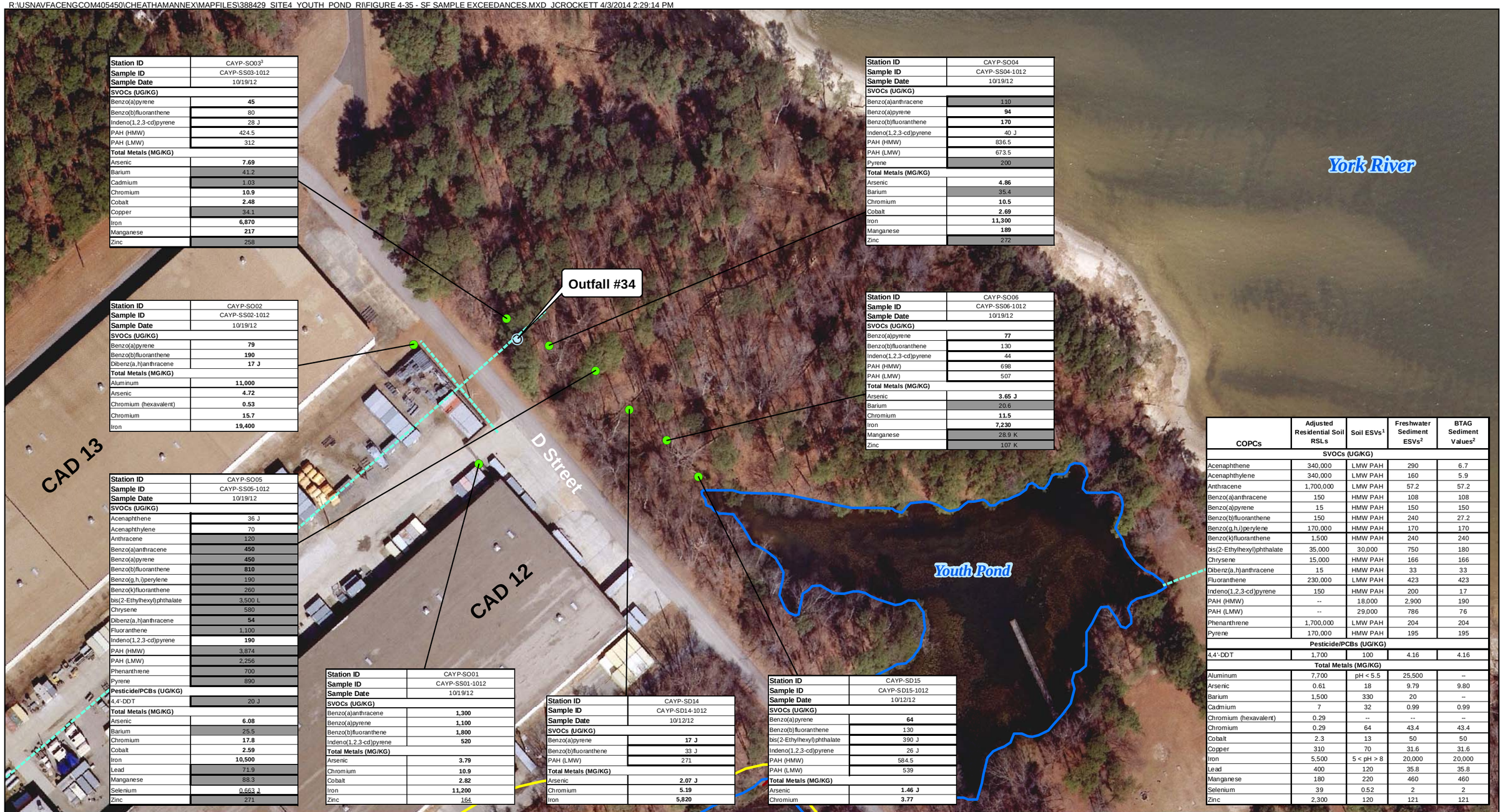
N
W E
S

0 100
Feet

Figure 4-34
Youth Pond, Surface Feature Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-35 - SF SAMPLE EXCEEDANCES.MXD JCROCKETT 4/3/2014 2:29:14 PM



Station ID	CAYP-SO03[3]
Sample ID	CAYP-SS03-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Benzo(a)pyrene	**45**
Benzo(b)fluoranthene	80
Indeno(1,2,3-cd)pyrene	28 J
PAH (HMW)	424.5
PAH (LMW)	312
Total Metals (MG/KG)	
Arsenic	**7.69**
Barium	41.2
Cadmium	1.03
Chromium	**10.9**
Cobalt	**2.48**
Copper	34.1
Iron	**6,870**
Manganese	**217**
Zinc	258

Station ID	CAYP-SO04
Sample ID	CAYP-SS04-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Benzo(a)anthracene	110
Benzo(a)pyrene	**94**
Benzo(b)fluoranthene	**170**
Indeno(1,2,3-cd)pyrene	40 J
PAH (HMW)	836.5
PAH (LMW)	673.5
Pyrene	200
Total Metals (MG/KG)	
Arsenic	**4.86**
Barium	35.4
Chromium	**10.5**
Cobalt	**2.69**
Iron	**11,300**
Manganese	**189**
Zinc	272

Station ID	CAYP-SO02
Sample ID	CAYP-SS02-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Benzo(a)pyrene	**79**
Benzo(b)fluoranthene	**190**
Dibenz(a,h)anthracene	**17 J**
Total Metals (MG/KG)	
Aluminum	**11,000**
Arsenic	**4.72**
Chromium (hexavalent)	**0.53**
Chromium	**15.7**
Iron	**19,400**

Station ID	CAYP-SO06
Sample ID	CAYP-SS06-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Benzo(a)pyrene	**77**
Benzo(b)fluoranthene	130
Indeno(1,2,3-cd)pyrene	44
PAH (HMW)	698
PAH (LMW)	507
Total Metals (MG/KG)	
Arsenic	**3.65 J**
Barium	20.6
Chromium	**11.5**
Iron	**7,230**
Manganese	28.9 K
Zinc	107 K

Station ID	CAYP-SO05
Sample ID	CAYP-SS05-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Acenaphthene	36 J
Acenaphthylene	70
Anthracene	120
Benzo(a)anthracene	**450**
Benzo(a)pyrene	**450**
Benzo(b)fluoranthene	**810**
Benzo(g,h,i)perylene	190
Benzo(k)fluoranthene	260
bis(2-Ethylhexyl)phthalate	3,500 L
Chrysene	580
Dibenz(a,h)anthracene	**54**
Fluoranthene	1,100
Indeno(1,2,3-cd)pyrene	**190**
PAH (HMW)	3,874
PAH (LMW)	2,256
Phenanthrene	700
Pyrene	890
Pesticide/PCBs (UG/KG)	
4,4'-DDT	20 J
Total Metals (MG/KG)	
Arsenic	**6.08**
Barium	25.5
Chromium	**17.8**
Cobalt	**2.59**
Iron	**10,500**
Lead	71.9
Manganese	88.3
Selenium	0.663 J
Zinc	271

Station ID	CAYP-SO01
Sample ID	CAYP-SS01-1012
Sample Date	10/19/12
SVOCs (UG/KG)	
Benzo(a)anthracene	**1,300**
Benzo(a)pyrene	**1,100**
Benzo(b)fluoranthene	**1,800**
Indeno(1,2,3-cd)pyrene	**520**
Total Metals (MG/KG)	
Arsenic	**3.79**
Chromium	**10.9**
Cobalt	**2.82**
Iron	**11,200**
Zinc	164

Station ID	CAYP-SD14
Sample ID	CAYP-SD14-1012
Sample Date	10/12/12
SVOCs (UG/KG)	
Benzo(a)pyrene	**17 J**
Benzo(b)fluoranthene	33 J
PAH (LMW)	271
Total Metals (MG/KG)	
Arsenic	**2.07 J**
Chromium	**5.19**
Iron	**5,820**

Station ID	CAYP-SD15
Sample ID	CAYP-SD15-1012
Sample Date	10/12/12
SVOCs (UG/KG)	
Benzo(a)pyrene	**64**
Benzo(b)fluoranthene	130
bis(2-Ethylhexyl)phthalate	390 J
Indeno(1,2,3-cd)pyrene	26 J
PAH (HMW)	584.5
PAH (LMW)	539
Total Metals (MG/KG)	
Arsenic	**1.46 J**
Chromium	**3.77**

COPCs	Adjusted Residential Soil RSLs	Soil ESVs[1]	Freshwater Sediment ESVs[2]	BTAG Sediment Values[2]
SVOCs (UG/KG)				
Acenaphthene	340,000	LMW PAH	290	6.7
Acenaphthylene	340,000	LMW PAH	160	5.9
Anthracene	1,700,000	LMW PAH	57.2	57.2
Benzo(a)anthracene	150	HMW PAH	108	108
Benzo(a)pyrene	15	HMW PAH	150	150
Benzo(b)fluoranthene	150	HMW PAH	240	27.2
Benzo(g,h,i)perylene	170,000	HMW PAH	170	170
Benzo(k)fluoranthene	1,500	HMW PAH	240	240
bis(2-Ethylhexyl)phthalate	35,000	30,000	750	180
Chrysene	15,000	HMW PAH	166	166
Dibenz(a,h)anthracene	15	HMW PAH	33	33
Fluoranthene	230,000	LMW PAH	423	423
Indeno(1,2,3-cd)pyrene	150	HMW PAH	200	17
PAH (HMW)	--	18,000	2,900	190
PAH (LMW)	--	29,000	786	76
Phenanthrene	1,700,000	LMW PAH	204	204
Pyrene	170,000	HMW PAH	195	195
Pesticide/PCBs (UG/KG)				
4,4'-DDT	1,700	100	4.16	4.16
Total Metals (MG/KG)				
Aluminum	7,700	pH < 5.5	25,500	--
Arsenic	0.61	18	9.79	9.80
Barium	1,500	330	20	--
Cadmium	7	32	0.99	0.99
Chromium (hexavalent)	0.29	--	--	--
Chromium	0.29	64	43.4	43.4
Cobalt	2.3	13	50	50
Copper	310	70	31.6	31.6
Iron	5,500	5 < pH > 8	20,000	20,000
Lead	400	120	35.8	35.8
Manganese	180	220	460	460
Selenium	39	0.52	2	2
Zinc	2,300	120	121	121

Legend

- Surface Feature Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

Notes:

Shading indicates exceedance of SD ESVs

Bold text indicates exceedance of Adjusted Residential Soil RSL

Bold box indicates exceedance of BTAG

Underline text indicates exceedance of Soil ESV

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

[1]Only samples from locations CAYP-SS01, CAYP-SS02, CAYP-SS03, CAYP-SS04, CAYP-SS05, CAYP-SS06, and CAYP-SD14 are screened against the Soil ESVs

[2]Only samples from locations CAYP-SS03, CAYP-SS04, CAYP-SS05, CAYP-SS06, CAYP-SD14 and CAYP-SD15 are screened against the sediment ESVs andBTAG sediment values

Sediment ESVs assume 1% TOC

*Field duplicate collected; the greatest value is shown

N W E S

0 100 Feet

Figure 4-35
Youth Pond, Surface Features Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-36 - SD SAMPLES.MXD JCROCKETT 4/3/2014 2:29:49 PM

Legend

- Sediment Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

N
W E
S

0 100
Feet

Figure 4-36
Youth Pond, Sediment Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-37 YOUTH POND SURFACE SD EXCEEDANCES.MXD JCROCKETT 4/3/2014 2:30:32 PM

Station ID	CAYP-SD13
Sample ID	CAYP-SD13-1012
Sample Date	10/12/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	140
Benzo(b)fluoranthene	320
Chrysene	270
Fluoranthene	430
Indeno(1,2,3-cd)pyrene	62 J
Phenanthrene	300
Pyrene	400
Total Metals (MG/KG)	
Arsenic	**191**
Barium	79.5
Chromium	**22.6**
Cyanide	0.25 J
Iron	44,200
Lead	54.6
Zinc	229

Station ID	CAYP-SWSD01
Sample ID	CAYP-SD01-1012
Sample Date	10/12/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	170 K
Benzo(a)pyrene	**160 K**
Benzo(b)fluoranthene	310 K
bis(2-Ethylhexyl)phthala	590 J
Chrysene	230 K
Indeno(1,2,3-cd)pyrene	92 J
Phenanthrene	240 K
Pyrene	340 K
Total Metals (MG/KG)	
Chromium	**7.54**
Zinc	160

Station ID	CAYP-SWSD02
Sample ID	CAYP-SD02-1012
Sample Date	10/22/12
Depth	0-4"
Total Metals (MG/KG)	
Arsenic	**12.3**
Barium	89.5
Chromium	**23.1**
Cyanide	0.33 J
Lead	40.4
Zinc	131

Station ID	CAYP-SD08
Sample ID	CAYP-SD08-1012
Sample Date	10/12/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	89
Pesticide/PCBs (UG/KG)	
4,4'-DDD	65 L
4,4'-DDE	93 L
Aroclor-1260	100 J
Total Metals (MG/KG)	
Arsenic	**11.5**
Barium	26.2
Chromium	**12.5**

Station ID	CAYP-SD09
Sample ID	CAYP-SD09-1012
Sample Date	10/22/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	96 J
Total Metals (MG/KG)	
Arsenic	**14.7**
Barium	101
Chromium	**23.1**
Iron	28,800 J
Thallium	**1.1 J**

Station ID	CAYP-SD10
Sample ID	CAYP-SD10-1012
Sample Date	10/22/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	110 L
Benzo(b)fluoranthene	160 L
Total Metals (MG/KG)	
Arsenic	**20.4**
Barium	108
Cadmium	1.13
Chromium	**34.7**
Iron	29,500 J
Lead	41.9
Selenium	2.53 J
Zinc	162

Station ID	CAYP-SD07
Sample ID	CAYP-SD07-1012
Sample Date	10/22/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	110 J
Total Metals (MG/KG)	
Arsenic	**12.5**
Barium	74
Cadmium	1.5
Chromium	**25**
Lead	46.8
Zinc	300

Station ID	CAYP-SWSD03
Sample ID	CAYP-SD03-1012
Sample Date	10/11/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	130
Pesticide/PCBs (UG/KG)	
Aroclor-1260	140 J
Total Metals (MG/KG)	
Antimony	2.84 J
Arsenic	**8.77 J**
Barium	20.4
Chromium	**8.27**
Copper	87.2
Zinc	137

Station ID	CAYP-SWSD05
Sample ID	CAYP-SD05-1112
Sample Date	11/09/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(a)anthracene	140 L
Benzo(b)fluoranthene	240 L
Chrysene	170 L
Indeno(1,2,3-cd)pyrene	75 L
Pyrene	280 L
Pesticide/PCBs (UG/KG)	
4,4'-DDD	110 L
4,4'-DDT	3,300 L
Total Metals (MG/KG)	
Antimony	2.4 J
Arsenic	**265**
Barium	100
Cadmium	2.7
Chromium	**24.7**
Iron	40,500 J
Lead	77.2
Mercury	0.787
Selenium	3.97 J
Thallium	**1.86 J**
Zinc	470

Station ID	CAYP-SWSD06
Sample ID	CAYP-SD06-1112
Sample Date	11/09/12
Depth	0-4"
SVOCs (UG/KG)	
Benzo(b)fluoranthene	45 J
Pesticide/PCBs (UG/KG)	
Aroclor-1260	70 J
Total Metals (MG/KG)	
Chromium	**8.52**

Station ID	CAYP-SD12*
Sample ID	CAYP-SD12-1012
Sample Date	10/22/12
Depth	0-4"
Total Metals (MG/KG)	
Antimony	3.72 J
Arsenic	**14 J**
Barium	75.3
Chromium	**25.7**
Selenium	6.48 J

Station ID	CAYP-SWSD04
Sample ID	CAYP-SD04-1112
Sample Date	11/09/12
Depth	0-4"
Pesticide/PCBs (UG/KG)	
4,4'-DDD	30 L
Total Metals (MG/KG)	
Arsenic	**45**
Barium	38.2
Chromium	**12.8**
Thallium	**0.841 J**

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (UG/KG)			
Benzo(a)anthracene	108	108	1,500
Benzo(a)pyrene	150	150	150
Benzo(b)fluoranthene	240	27.2	1,500
bis(2-Ethylhexyl)phthalate	750	180	350,000
Chrysene	166	166	150,000
Fluoranthene	423	423	2,300,000
Indeno(1,2,3-cd)pyrene	200	17	1,500
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Pesticide/PCBs (UG/KG)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
4,4'-DDT	4.16	4.16	17,000
Aroclor-1260	59.8	59.8	2,200
Total Metals (MG/KG)			
Antimony	3.00	2.00	31
Arsenic	9.79	9.80	6.1
Barium	20.0	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Copper	31.6	31.6	3,100
Cyanide	--	0.1	22
Iron	20,000	20,000	55,000
Lead	35.8	35.8	4,000
Mercury	0.18	0.18	23
Selenium	2	2	390
Thallium	--	--	0.78
Zinc	121	121	23,000

Legend

- Surface Sediment Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

Shading indicates exceedance of ESVs
Bold box indicates exceedance of BTAG
Bold text indicates exceedance of Adjusted Residential Soil RSLs
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 36,412 mg/kg for all samples included in table
*Feild duplicates collected; greater value shown

N W E S

0 100 Feet

Figure 4-37
Youth Pond, Surface Sediment Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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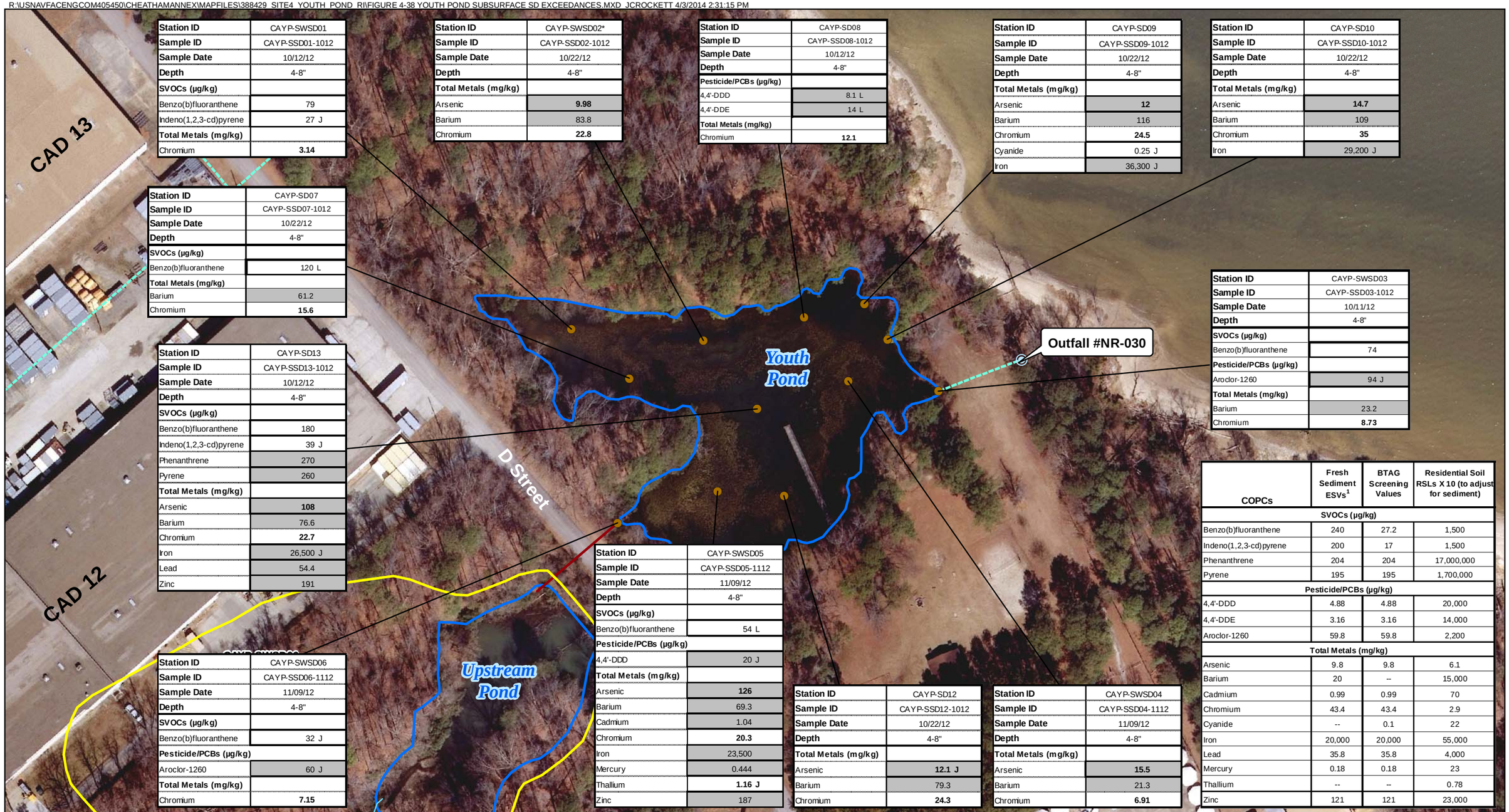
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-38 YOUTH POND SUBSURFACE SD EXCEEDANCES.MXD JCROCKETT 4/3/2014 2:31:15 PM



Station ID	CAYP-SWSD01
Sample ID	CAYP-SSD01-1012
Sample Date	10/12/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	79
Indeno(1,2,3-cd)pyrene	27 J
Total Metals (mg/kg)	
Chromium	**3.14**

Station ID	CAYP-SWSD02*
Sample ID	CAYP-SSD02-1012
Sample Date	10/22/12
Depth	4-8"
Total Metals (mg/kg)	
Arsenic	**9.98**
Barium	83.8
Chromium	**22.8**

Station ID	CAYP-SD08
Sample ID	CAYP-SSD08-1012
Sample Date	10/12/12
Depth	4-8"
Pesticide/PCBs (µg/kg)	
4,4'-DDD	8.1 L
4,4'-DDE	14 L
Total Metals (mg/kg)	
Chromium	**12.1**

Station ID	CAYP-SD09
Sample ID	CAYP-SSD09-1012
Sample Date	10/22/12
Depth	4-8"
Total Metals (mg/kg)	
Arsenic	**12**
Barium	116
Chromium	**24.5**
Cyanide	0.25 J
Iron	36,300 J

Station ID	CAYP-SD10
Sample ID	CAYP-SSD10-1012
Sample Date	10/22/12
Depth	4-8"
Total Metals (mg/kg)	
Arsenic	**14.7**
Barium	109
Chromium	**35**
Iron	29,200 J

Station ID	CAYP-SD07
Sample ID	CAYP-SSD07-1012
Sample Date	10/22/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	120 L
Total Metals (mg/kg)	
Barium	61.2
Chromium	**15.6**

Station ID	CAYP-SWSD03
Sample ID	CAYP-SSD03-1012
Sample Date	10/11/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	74
Pesticide/PCBs (µg/kg)	
Aroclor-1260	94 J
Total Metals (mg/kg)	
Barium	23.2
Chromium	**8.73**

Station ID	CAYP-SD13
Sample ID	CAYP-SSD13-1012
Sample Date	10/12/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	180
Indeno(1,2,3-cd)pyrene	39 J
Phenanthrene	270
Pyrene	260
Total Metals (mg/kg)	
Arsenic	**108**
Barium	76.6
Chromium	**22.7**
Iron	26,500 J
Lead	54.4
Zinc	191

Station ID	CAYP-SWSD05
Sample ID	CAYP-SSD05-1112
Sample Date	11/09/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	54 L
Pesticide/PCBs (µg/kg)	
4,4'-DDD	20 J
Total Metals (mg/kg)	
Arsenic	**126**
Barium	69.3
Cadmium	1.04
Chromium	**20.3**
Iron	23,500
Mercury	0.444
Thallium	**1.16 J**
Zinc	187

Station ID	CAYP-SWSD06
Sample ID	CAYP-SSD06-1112
Sample Date	11/09/12
Depth	4-8"
SVOCs (µg/kg)	
Benzo(b)fluoranthene	32 J
Pesticide/PCBs (µg/kg)	
Aroclor-1260	60 J
Total Metals (mg/kg)	
Chromium	**7.15**

Station ID	CAYP-SD12
Sample ID	CAYP-SSD12-1012
Sample Date	10/22/12
Depth	4-8"
Total Metals (mg/kg)	
Arsenic	**12.1 J**
Barium	79.3
Chromium	**24.3**

Station ID	CAYP-SWSD04
Sample ID	CAYP-SSD04-1112
Sample Date	11/09/12
Depth	4-8"
Total Metals (mg/kg)	
Arsenic	**15.5**
Barium	21.3
Chromium	**6.91**

COPCs	Fresh Sediment ESVs[1]	BTAG Screening Values	Residential Soil RSLs X 10 (to adjust for sediment)
SVOCs (µg/kg)			
Benzo(b)fluoranthene	240	27.2	1,500
Indeno(1,2,3-cd)pyrene	200	17	1,500
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Pesticide/PCBs (µg/kg)			
4,4'-DDD	4.88	4.88	20,000
4,4'-DDE	3.16	3.16	14,000
Aroclor-1260	59.8	59.8	2,200
Total Metals (mg/kg)			
Arsenic	9.8	9.8	6.1
Barium	20	--	15,000
Cadmium	0.99	0.99	70
Chromium	43.4	43.4	2.9
Cyanide	--	0.1	22
Iron	20,000	20,000	55,000
Lead	35.8	35.8	4,000
Mercury	0.18	0.18	23
Thallium	--	--	0.78
Zinc	121	121	23,000

Legend

- Subsurface Sediment Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

Shading indicates exceedance of ESVs
Bold box indicates exceedance of BTAG
Bold text indicates exceedance of Adjusted Residential Soil RSLs
[1]Fresh sediment EqP criteria was used when no ESV existed. EqP was determined based on the mean TOC of 36,412 mg/kg for all samples included in table
*Feild duplicates collected; greater value shown

N W E S

0 100 Feet

Figure 4-38
Youth Pond, Subsurface Sediment Exceendance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-39 YOUTH POND SURFACE SEDIMENT TOTAL PCB DIST MAP.MXD JCROCKETT 4/3/2014 2:31:51 PM

Legend

Total PAH Concentrations

- <100 µg/kg
- 100-1,000 µg/kg
- >1,000 µg/kg

- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

N
W E
S

0 100
Feet

Figure 4-39
Youth Pond, Surface Sediment Total SVOC Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-40 YOUTH POND SURFACE SEDIMENT TOTAL PCB DIST MAP.MXD JCROCKETT 4/3/2014 2:32:28 PM

Legend

Total PCB Concentrations

- >100 µg/kg
- 100-1,000 µg/kg
- >1,000 µg/kg

Outfall
Culvert
Drainage Channels
Storm Water Line
Water Body
Site 4 Boundary

N
W E
S

0 100
Feet

Figure 4-40
Youth Pond, Surface Sediment Total PCB Distribution Map
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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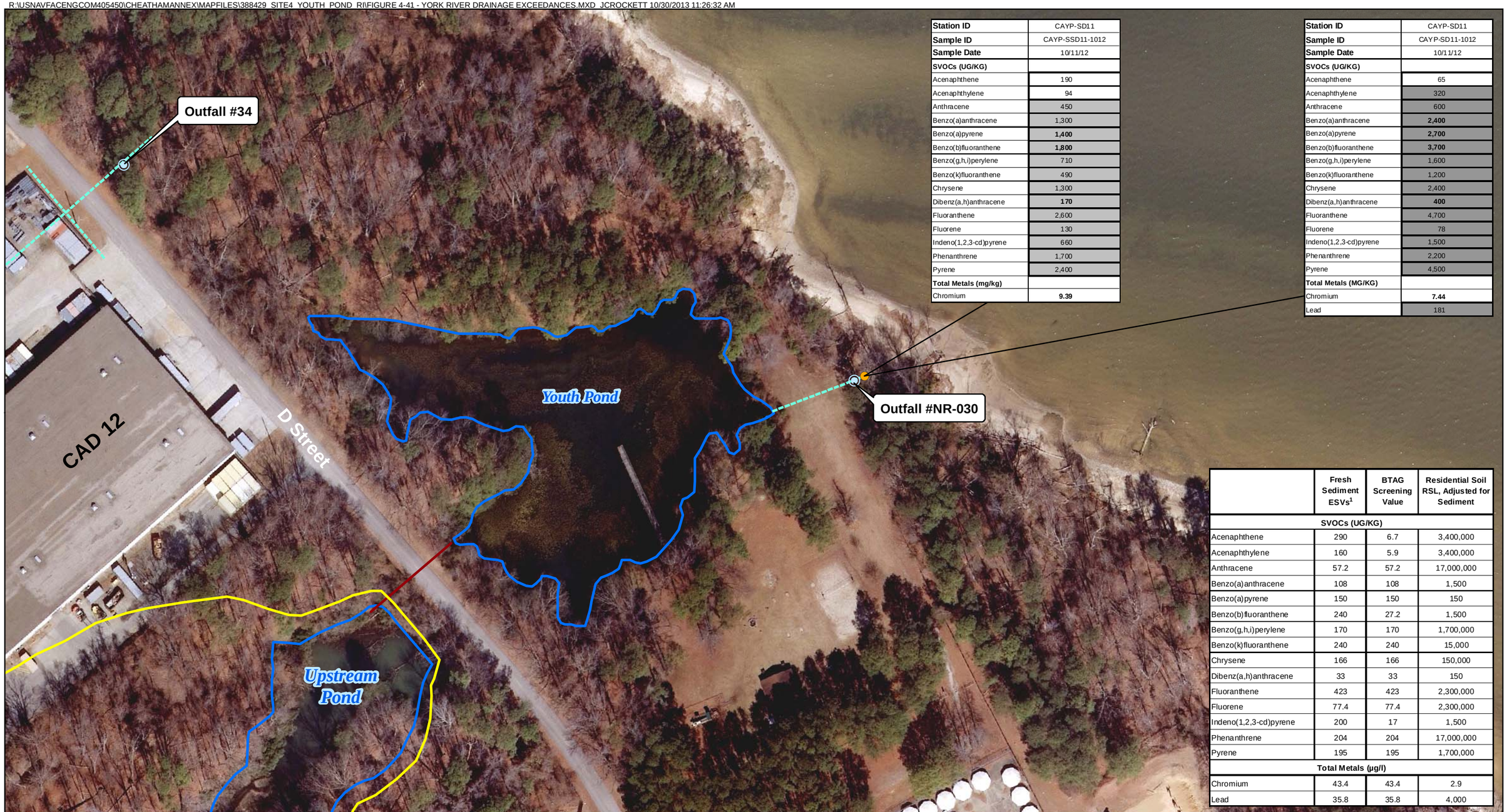
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-41 - YORK RIVER DRAINAGE EXCEEDANCES.MXD JCROCKETT 10/30/2013 11:26:32 AM



Station ID	CAYP-SD11
Sample ID	CAYP-SSD11-1012
Sample Date	10/11/12
SVOCs (UG/KG)	
Acenaphthene	190
Acenaphthylene	94
Anthracene	450
Benzo(a)anthracene	1,300
Benzo(a)pyrene	**1,400**
Benzo(b)fluoranthene	**1,800**
Benzo(g,h,i)perylene	710
Benzo(k)fluoranthene	490
Chrysene	1,300
Dibenz(a,h)anthracene	**170**
Fluoranthene	2,600
Fluorene	130
Indeno(1,2,3-cd)pyrene	660
Phenanthrene	1,700
Pyrene	2,400
Total Metals (mg/kg)	
Chromium	**9.39**

Station ID	CAYP-SD11
Sample ID	CAYP-SD11-1012
Sample Date	10/11/12
SVOCs (UG/KG)	
Acenaphthene	65
Acenaphthylene	320
Anthracene	600
Benzo(a)anthracene	**2,400**
Benzo(a)pyrene	**2,700**
Benzo(b)fluoranthene	**3,700**
Benzo(g,h,i)perylene	1,600
Benzo(k)fluoranthene	1,200
Chrysene	2,400
Dibenz(a,h)anthracene	**400**
Fluoranthene	4,700
Fluorene	78
Indeno(1,2,3-cd)pyrene	1,500
Phenanthrene	2,200
Pyrene	4,500
Total Metals (MG/KG)	
Chromium	**7.44**
Lead	181

	Fresh Sediment ESVs[1]	BTAG Screening Value	Residential Soil RSL, Adjusted for Sediment
SVOCs (UG/KG)			
Acenaphthene	290	6.7	3,400,000
Acenaphthylene	160	5.9	3,400,000
Anthracene	57.2	57.2	17,000,000
Benzo(a)anthracene	108	108	1,500
Benzo(a)pyrene	150	150	150
Benzo(b)fluoranthene	240	27.2	1,500
Benzo(g,h,i)perylene	170	170	1,700,000
Benzo(k)fluoranthene	240	240	15,000
Chrysene	166	166	150,000
Dibenz(a,h)anthracene	33	33	150
Fluoranthene	423	423	2,300,000
Fluorene	77.4	77.4	2,300,000
Indeno(1,2,3-cd)pyrene	200	17	1,500
Phenanthrene	204	204	17,000,000
Pyrene	195	195	1,700,000
Total Metals (µg/l)			
Chromium	43.4	43.4	2.9
Lead	35.8	35.8	4,000

Legend

- Sediment Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

N
W E
S

0 100
Feet

Figure 4-41
Youth Pond, York River Drainage Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-42 - SW SAMPLES.MXD JCROCKETT 4/3/2014 2:33:08 PM

Legend

- Surface Water Sample
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body
- Site 4 Boundary

Notes:
Shading indicates exceedance of SD ESVs
Bold box indicates exceedance of BTAG
Bold text indicates exceedance of Adjusted Residential Soil X 10 RSLs

N
W E
S

0 100
Feet

Figure 4-42
Youth Pond, Surface Water Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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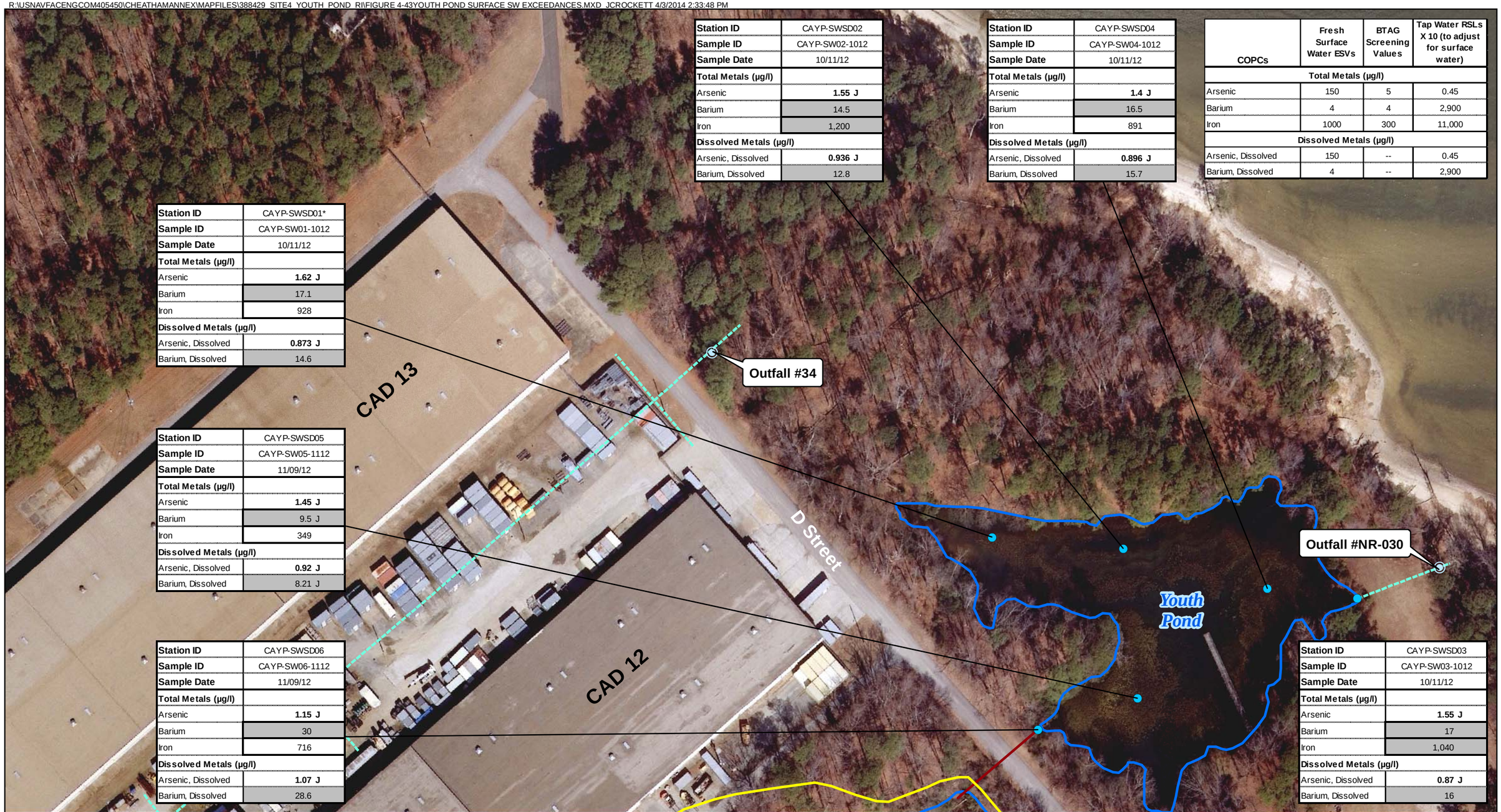
R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-43YOUTH POND SURFACE SW EXCEEDANCES.MXD JCROCKETT 4/3/2014 2:33:48 PM



Station ID	CAYP-SWSD02
Sample ID	CAYP-SW02-1012
Sample Date	10/11/12
Total Metals (µg/l)	
Arsenic	**1.55 J**
Barium	14.5
Iron	1,200
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**0.936 J**
Barium, Dissolved	12.8

Station ID	CAYP-SWSD04
Sample ID	CAYP-SW04-1012
Sample Date	10/11/12
Total Metals (µg/l)	
Arsenic	**1.4 J**
Barium	16.5
Iron	891
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**0.896 J**
Barium, Dissolved	15.7

COPCs	Fresh Surface Water ESVs	BTAG Screening Values	Tap Water RSLs X 10 (to adjust for surface water)
Total Metals (µg/l)			
Arsenic	150	5	0.45
Barium	4	4	2,900
Iron	1000	300	11,000
Dissolved Metals (µg/l)			
Arsenic, Dissolved	150	--	0.45
Barium, Dissolved	4	--	2,900

Station ID	CAYP-SWSD01*
Sample ID	CAYP-SW01-1012
Sample Date	10/11/12
Total Metals (µg/l)	
Arsenic	**1.62 J**
Barium	17.1
Iron	928
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**0.873 J**
Barium, Dissolved	14.6

Station ID	CAYP-SWSD05
Sample ID	CAYP-SW05-1112
Sample Date	11/09/12
Total Metals (µg/l)	
Arsenic	**1.45 J**
Barium	9.5 J
Iron	349
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**0.92 J**
Barium, Dissolved	8.21 J

Station ID	CAYP-SWSD06
Sample ID	CAYP-SW06-1112
Sample Date	11/09/12
Total Metals (µg/l)	
Arsenic	**1.15 J**
Barium	30
Iron	716
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**1.07 J**
Barium, Dissolved	28.6

Station ID	CAYP-SWSD03
Sample ID	CAYP-SW03-1012
Sample Date	10/11/12
Total Metals (µg/l)	
Arsenic	**1.55 J**
Barium	17
Iron	1,040
Dissolved Metals (µg/l)	
Arsenic, Dissolved	**0.87 J**
Barium, Dissolved	16

Legend

- Surfacewater Sample
- Site 4 Boundary
- Outfall
- Culvert
- Drainage Channels
- Storm Water Line
- Water Body

Shading indicates exceedance of ESVs
Bold box indicates exceedance of BTAG
Bold text indicates exceedance of Adjusted Residential Soil RSLs
*Feild duplicates collected; greater value shown

N
W E
S

0 100
Feet

Figure 4-43
Youth Pond, Surface Water Exceedance Results
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

Organic Constituents

No VOCs, SVOCs, pesticides, PCBs or explosives constituents were detected in Youth Pond surface water (**Figure 4-43**).

Total Metals

Three total metals and two dissolved metals (**Figure 4-43**) were detected in Youth Pond surface water at concentrations exceeding adjusted tap water RSLs, BTAG Region III screening values, and/or ESVs.

- Total and dissolved arsenic were detected in several samples at concentrations above the adjusted tap water RSL (0.45 µg/L), at maximum concentrations of 1.62 µg/L and 1.07 µg/L, respectively. No BTAG Region III screening value or ESV exceedances were identified. However, these concentrations do not exceed the reference pond calculated surface water 95 percent UTLs for total and dissolved arsenic (8.81 µg/L and 6.47 µg/L, respectively) and are likely attributable to background conditions.
- Total iron was detected in several samples at concentrations above the BTAG Region III screening value (300 µg/L) and ESV (1,000 µg/L), at a maximum concentration of 1,200 µg/L. However, this concentration does not exceed the reference pond calculated surface water 95 percent UTL (2,410 µg/L) and is likely attributable to background conditions.
- Total barium was detected in all surface water samples above the BTAG Region III screening value/ESV (4 µg/L), at a maximum concentration of 30 µg/L. Dissolved barium was detected in all surface water samples above the ESV (4.00 µg/L; no BTAG Region III screening value exists), at a maximum concentration of 28.6 µg/L. With the exception of the maximum-detected concentrations (both detected in CAYP-SW06), the total and dissolved barium concentrations did not exceed the reference pond calculated surface water 95 percent UTLs for total and dissolved barium (26.6 µg/L and 27.7 µg/L, respectively).

4.3.4 Animal Tissue

Three adult frog tissue and six fish tissue samples (**Table 4-8**) were collected to support the HHRA and/or BERA.

4.3.4.1. Frog Tissue

Three adult frog tissue samples (CAYP-TS01 through CAYP-TS03) were collected from within the vicinity of Youth Pond. Each tissue sample was composed of several individual frogs in order to have sufficient mass for lab analyses. Further evaluation of these samples is included in **Section 7**; however, PCBs and metals were detected in the samples.

4.3.4.2. Fish Tissue

Six fish tissue samples (CAYP-TS04-WB through CAYP-TS07-WB and CAYP-TS08-WB/O) were collected from within Youth Pond. Each tissue sample was composed of several fish in order to have sufficient mass for lab analyses. Further evaluation of these samples is included in **Section 7**; however, PCBs and metals were detected in the samples.

SECTION 5

Human Health Risk Assessment

5.1 Human Health Risk Assessment Overview

This section summarizes the HHRA for Site 4 and Youth Pond (see **Appendix J** for the complete HHRA), for which the primary objective was to assess the potential current and future health risks from exposure to contamination associated with soil, surface water, sediment, fish tissue, and groundwater at the site. All analytical data used for the HHRA were validated, considered to be representative of current conditions, and determined to be useable for this risk assessment. **Table J-1** in **Appendix J** lists the samples used to support the HHRA. The analytical data, some of which were evaluated in the risk assessment, are included in **Appendix I**.

The risk assessment evaluated carcinogenic risks and non-carcinogenic hazards to potential receptors at Site 4 and Youth Pond under a reasonable maximum exposure (RME) scenario, which is consistent with the methodologies provided in USEPA Superfund risk assessment guidance documents (USEPA, 1989, 2001, 2004, 2009) and the Chief of Naval Operations guidance document (CNO, 2001). The RME scenario is the maximum exposure that is reasonably expected to occur at a site (USEPA, 1989). When the RME risk exceeded regulatory target risk levels (USEPA, 1994), the central tendency exposure (CTE) scenario was evaluated. The CTE risk is the risk to individuals who have average or typical exposure to environmental media. A summary of the baseline HHRA results for Site 4 and Youth Pond is presented in **Table 5-1**, with cumulative risks from all exposure pathways for each receptor presented in **Table 5-2**.

To assess baseline risks based on unrestricted land use, residential use was assumed for exposure to site media in accordance with USEPA guidance (USEPA, 2004). However, this assumption for hypothetical residential site use is not reflective of any such planned future site use, but merely represents a conservative exposure scenario to assess baseline risks. In reality, Site 4 and Youth Pond are unlikely locations for residential use. The RI study areas are composed of two burial areas, Upstream Pond, and Youth Pond. The historical uses of Upstream Pond and Youth Pond are unknown; however, Youth Pond it is currently used by military personnel and their families for recreational activities (primarily fishing), though it is not open to the general public. There is no designated use of Upstream Pond and based on its location and depth is likely unused. Following identification of PCBs within Youth Pond sediment during the 2000 Pond Study, as a conservative measure, a catch-and-release fishing restriction was implemented in 2000, but was not based on biota sampling or an HHRA.

The CSM for human exposures presents an overview of site conditions, potential sources of contamination, potential contaminant-migration pathways, and potential exposure pathways at the site. **Figure J-1** in **Appendix J** presents the CSM for human exposures developed for Site 4 and Youth Pond. The CSM is discussed further in **Appendix J**.

Based on the different media and areas evaluated in the RI, and the different potential exposures to the different media within the different areas, the data were evaluated in the HHRA in the following data groupings:

- Surface soil within the fenced area of Youth Pond/Site 4; including the surface soil samples collected closest to the CAD 12 Building within the fence line surrounding the CAD area buildings
- Surface soil outside the fenced area of Site 4; including the surface soil samples collected outside the fence line surrounding the CAD area buildings and the wooded area of Site 4 around Upstream Pond
- Upstream Pond surface water
- Upstream Pond sediment
- Surface water in drainage channels to Upstream Pond
- Sediment in drainage channels to Upstream Pond
- Youth Pond surface water

- Youth Pond sediment
- Sediment and surface soil in the surface drainage feature parallel to D Street leading to Youth Pond; outside the fence line surrounding the CAD area buildings
- Fish tissue from Youth Pond and Upstream Pond
- Surface and subsurface soil from inside and outside the fenced area of Site 4/Youth Pond
- Surface and subsurface soil within the fenced area of Youth Pond/Site 4; including the surface and subsurface soil samples collected closest to the CAD 12 Building within the fence line surrounding the CAD area buildings
- Shallow aquifer groundwater

The samples associated with each of these data groupings are identified in **Table J-1**.

5.2 Other Human Health Risk Assessment Considerations

5.2.1 Assessment of Soil Data

The analytical data for surface and subsurface soil samples were evaluated as four data sets for the HHRA. Surface soil samples were evaluated as two data sets to assess potential risks associated with surface soil exposure – within the fenced area of Youth Pond/Site 4 and outside the fenced area of Site 4. The two remaining data sets consisted of the combined analytical results for surface and subsurface soil and include the soil across the Site 4 and Youth Pond areas and soil within the fenced area of Site 4 and the Youth Pond. The rationale for evaluating surface and subsurface soil analytical results together as a data set is because, in the future, subsurface soil could be excavated, placed on the surface, and comingled with surface soil. Using this approach is conservative and ensures that potential soil exposures include the maximum concentrations of any constituents detected in either surface or subsurface soil samples. Therefore, analytical results for subsurface soil samples were not used independently to assess human health risks.

5.2.2 Assessment of Groundwater Data

Although groundwater beneath the site is not currently used as a potable water supply, it was conservatively assumed that shallow groundwater could be used as a residential potable water supply. In addition to selected organic compounds, groundwater samples were analyzed for both total and dissolved metals. The total and dissolved concentrations of aluminum, iron, and manganese were compared for each monitoring well to determine if there were significant differences (an order of magnitude or greater) between the two in any of the wells. As no significant differences were noted between total and dissolved concentrations for all three of these indicator metals in any of the wells, the total metals data were used to evaluate risks associated with exposure to groundwater.

5.2.3 Assessment of Surface Water

The analytical data for surface water were evaluated as three data sets for the HHRA. The surface water data sets include Upstream Pond, the drainage channels to Upstream Pond, and Youth Pond.

5.2.4 Assessment of Sediment

The analytical data for sediment were evaluated as four data sets for the HHRA. The sediment data sets include Upstream Pond, the drainage channels to Upstream Pond, Youth Pond, and the surface drainage features leading to Youth Pond (surface soil and sediment).

5.2.5 Assessment of Fish Tissue

Fish tissue samples to support the RI were collected from both Youth Pond and Upstream Pond and were combined into one data set.

5.2.6 Assessment of Vapor Intrusion

The vapor intrusion pathway was evaluated using a multiple lines of evidence (MLE) approach. Lines of evidence used as part of the evaluation included, but were not limited to,: comparison of shallow groundwater VOC data to

the vapor intrusion screening level concentrations, qualitative and semi-quantitative evaluation of soil VOC data, depth to groundwater data, groundwater flow direction information, contaminant biodegradation potential, contaminant release history, and building construction size and building use information.

5.3 Potential Receptors and Exposure Scenarios

5.3.1 Current Conditions and Use

Site 4 is composed of two burial areas and is approximately 4 acres in size; the site is located west of D Street, between CAD Buildings 11 and 12. Upstream Pond lies within the boundaries of Site 4.

Youth Pond is a freshwater, surface water body approximately 2.5 acres in size located in the northeastern portion of CAX. Several drainage pathways from the surrounding area combine into two separate drainages, which ultimately discharge into Youth Pond. One drainage pathway flows under D Street and connects Site 4 (including Upstream Pond) to Youth Pond, and the other pathway receives combined drainage from stormwater drains located within the CAD area, Outfall #34, and an unnamed drainage channel. Surface water overflow from Youth Pond discharges through a culvert into the York River. The historical use of Youth Pond is unknown; however, it is currently used by military personnel and their families for recreational activities (primarily fishing), though it is not open to the general public. Following the identification of PCBs within Youth Pond sediment during the 2000 Pond Study, as a conservative measure, a catch-and-release fishing restriction was implemented in 2000. There is no designated use of Upstream Pond and based on its location and depth is likely unused. While Site 4, Upstream Pond, and Youth Pond are located within the restricted CAD area, access is not restricted to CAX visitors.

Potential current human receptors include industrial workers in the CAD area, maintenance workers, and visitors/recreational users in the wooded areas around Youth Pond and Upstream Pond. The industrial workers could be exposed to surface soil within the fenced area of the site. The maintenance workers and visitors/recreational users may be exposed to surface soil in the wooded area outside the fence line, and also to surface water and sediment in the ponds and the drainage channels that discharge to the ponds. In addition, the recreational users may ingest fish caught in the ponds, primarily Youth Pond; however, fish from both ponds were combined for the HHRA, as a fish may reside in both ponds at different times. Again, it should be noted that a catch-and-release fishing restriction was implemented for Youth Pond in 2000.

Based on current site conditions, the following receptors, potentially complete exposure pathways, and exposure groupings were quantitatively evaluated in the HHRA for potential current exposure:

For current site use:

- Recreator/visitor adult and child:
  - Site 4/Upstream Pond: Incidental ingestion of and dermal contact with surface soil outside the fenced area of Site 4 (no COPCs identified for emissions from surface soil to air); incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and the drainage channels to Upstream Pond; ingestion of fish from Youth and Upstream Ponds.
  - Youth Pond: Incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in surface drainage features leading to Youth Pond; ingestion of fish from Youth and Upstream Ponds.
- Maintenance worker:
  - Site 4/Upstream Pond: Incidental ingestion of and dermal contact with surface soil outside the fenced area of Site 4 (no COPCs identified for emissions from surface soil to air); incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channels to Upstream Pond.
  - Youth Pond: Incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in surface drainage features leading to Youth Pond.

- Industrial worker:
  - Site 4: Incidental ingestion, dermal contact, and inhalation of emissions from surface soil within the fenced area of Site 4/Youth Pond.

5.3.2 Future Land Use

At the time this report was prepared, there was no planned future land use different from current use and there were no current plans for development within the boundaries of CAX Site 4 and Youth Pond; however, future site land use is unknown. The Navy's objective for the site is to achieve unrestricted use. Therefore, baseline risks associated with exposure to site media were evaluated for unrestricted future land use, which assumes residential use as the most conservative case.

Potential future industrial and residential uses of the site were evaluated, with receptors consisting of future residents and construction workers in addition to the current receptors. The future land use scenario assumes that construction or excavation activities may take place anywhere at the site, resulting in exposure to both surface and subsurface soil. Therefore, future exposure to soil includes exposure to surface and subsurface soil across the site. It was also assumed that a construction worker may perform activities only within the fenced area of the site, and therefore, exposure to surface and subsurface soil in this area alone was also evaluated for a construction worker.

Although groundwater beneath the site is not currently used as a potable water supply, it was conservatively assumed that shallow groundwater could be used as a residential potable water supply. Therefore, future residential potable use of groundwater was considered a potential future exposure pathway. Additionally, due to the relatively shallow depth to groundwater, it was assumed that future construction workers may be exposed to groundwater during excavation activities.

In addition, it was assumed that there is the potential for vapor intrusion of volatile constituents in groundwater and soil into site buildings. Future residents and current and future industrial workers could be exposed to volatile constituents in groundwater and soil through vapor intrusion into a building and inhalation of indoor air.

The following receptors, potentially complete exposure pathways, and exposure groupings were quantitatively evaluated for the HHRA for future industrial and residential land use scenarios:

- Recreator/visitor adult and child:
  - Site 4/Upstream Pond: Incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and within the Youth Pond surface features; incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channels to Upstream Pond; ingestion of fish from Youth and Upstream Ponds.
  - Youth Pond: Incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in surface drainage features leading to Youth Pond; ingestion of fish from Youth and Upstream Ponds.
- Maintenance worker:
  - Site 4/Upstream Pond: Incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil from inside and outside the fenced area of Site 4 and Youth Pond; incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channels to Upstream Pond.
  - Youth Pond: Incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in surface drainage features leading to Youth Pond.

- Industrial worker:
  - Site 4: Incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil from inside and outside the fenced area of Site 4 and Youth Pond; inhalation of VOCs in indoor air from vapor intrusion from shallow groundwater and soil (qualitative evaluation only).
- Resident adult and child:
  - Site 4/Upstream Pond: Incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil from inside and outside the fenced area of Site 4 and Youth Pond ; ingestion of groundwater, and dermal contact and inhalation of volatiles (adult only) from groundwater while showering; inhalation of VOCs in indoor air from vapor intrusion from shallow groundwater and soil (qualitative evaluation only).
- Construction worker:
  - Site 4/Youth Pond: Incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil from inside and outside the fenced area of Site 4 and Youth Pond; dermal contact with groundwater and inhalation of volatile emissions from groundwater in an open excavation.
  - Site 4/Youth Pond current industrial area: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil within fenced industrial area of site.

The COPCs identified for soil, surface water, sediment, fish, and groundwater at Site 4/Youth Pond, as shown in **Table J-2** in **Appendix J,** were used to calculate the RME and CTE non-carcinogenic hazards and carcinogenic risks. The RME non-carcinogenic hazards and carcinogenic risks are presented by receptor in **Table J-3** in **Appendix J**, and the CTE results are summarized in **Table J-4** in **Appendix J**. The risk calculations are presented in **Tables 7.1.RME** through **7.12.RME** and **7.1.CTE** through **7.10.CTE** in **Appendix K**. CTE risks were calculated only when the RME hazards exceeded the non-carcinogenic target hazard index (HI) of 1, or the RME carcinogenic risks exceeded the acceptable risk range of 1×10^{-6} to 1×10^{-4}. **Tables 9.1.RME** through **9.12.RME** and **9.1.CTE** through **9.10.CTE** in **Appendix K** summarize the estimated hazards and risks for each receptor. The RME non-carcinogenic hazards and carcinogenic risks are summarized in **Tables 5-1** and **5-2**.

5.4 Human Health Risk Assessment Findings

The HHRA was conducted to evaluate the current and future potential human health risks associated with exposure to surface and subsurface soil, surface water, sediment, fish, and groundwater at Site 4 and Youth Pond based on potential, but in some cases unlikely and conservative, receptor populations and exposure scenarios, assuming no additional remedial action is implemented at the site. Findings of the HHRA for the receptor populations are summarized as follows.

Tables 5-1 and **5-2, and Tables J-3** and **J-4** in **Appendix J**, and **Tables 9.1.RME** through **9.12.RME** and **9.1.CTE** through **9.10.CTE** in **Appendix K** summarize the RME and CTE potential hazards and risks to each receptor. **Tables 10.1.RME** through **10.10.RME and Tables 10.1.CTE** through **10.3.CTE** in **Appendix K** present the constituents of concern (COCs) for the receptor scenarios. The COCs are identified for the scenarios with potentially unacceptable risks. The COCs are those COPCs that contribute an HI greater than 0.1 to a cumulative target organ HI that exceeds 1 or a carcinogenic risk greater than 1×10^{-6} to a cumulative carcinogenic risk that exceeds 1×10^{-4}. Risk estimates are summarized as follows.

Current and Future Industrial Worker

- Current exposure to surface soil within the fenced area of Site 4/Youth Pond and future exposure to surface and subsurface soil within and outside of the fenced area of Site 4/Youth Pond.
- HI (RME) for current scenario is within regulatory target hazard levels.
- HI (RME) for future scenario is within regulatory target hazard levels.

- Excess Lifetime Cancer Risk (ELCR) (RME) for current scenario exceeds the regulatory target risk range. The carcinogenic risk is primarily associated with the PAHs detected in only one sample, CAA03-SS06-1109, adjacent to CAD Building 12.
- ELCR (RME) for future scenario exceeds the regulatory target risk range. The carcinogenic risk is primarily associated with the PAHs detected in two samples, CAA03-SS06-1109 and CAS004-4HA06-00-1199.
- ELCR (CTE) for current and future scenarios do not exceed the target risk range.
- The Adult Lead Model (ALM) showed there would be no adverse effects above regulatory target levels associated with exposure to lead in surface soil within the fenced area of Site 4/Youth Pond or combined surface and subsurface soil across Site 4/Youth Pond areas. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by industrial workers at this location.
- The COCs for surface soil within the fenced area of Site 4/Youth Pond are carcinogenic PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene), dieldrin, and arsenic.
- The COCs for combined surface and subsurface soil across the site are carcinogenic PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene), dieldrin, and arsenic.
- Results of the MLE evaluation indicate there are no significant impacts to current industrial workers from the vapor intrusion pathway. However, the potential for vapor intrusion impacts to future industrial workers cannot be ruled out given the concentrations of naphthalene in soil and groundwater should building additions or new buildings be constructed. COPCs are not identified and future risks are not quantified because defensible methods for quantifying vapor intrusion risks using soil data are not available.

Current and Future Adult and Child Visitor/Recreational User

- Current exposure to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channels to Upstream Pond, and ingestion of fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in surface drainage features leading to Youth Pond, and ingestion fish from Youth and Upstream Ponds).
- Future exposure to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channels to Upstream Pond, and fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, sediment/surface soil in surface drainage features leading to Youth Pond, and fish from Youth and Upstream Ponds).
  - Total HIs (RME) for current and future scenarios for adult and child for either the Site 4 and Upstream Pond exposure grouping or the Youth Pond exposure grouping exceed target regulatory levels associated with fish ingestion (primarily dioxin-like PCBs in fish tissue), and primarily the composite fish tissue sample from the fish collected from Upstream Pond.
  - Total ELCR (RME) for current and future scenarios for adult and child for exposure to the Youth Pond exposure grouping are within regulatory target levels.
  - Total ELCR (RME) for current and future scenarios for adult and child for exposure to the Site 4/ Upstream Pond exposure grouping exceed target regulatory levels primarily associated with fish ingestion (primarily dioxin-like PCBs in fish tissue), and primarily the composite fish tissue sample from the fish collected from Upstream Pond. For the future child scenario, exposure to surface and subsurface soil inside and outside the fence line also contributes to the risk exceeding regulatory levels, primarily associated with

carcinogenic PAHs, and a smaller contribution from arsenic. The carcinogenic risk associated with exposure to soil is associated with the PAHs detected in two samples, CAA03-SS06-1109 and CAS004-4HA06-00-1199.

- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond, and in soil from inside and outside the fenced area. Conservative evaluation of lead using the ALM and the Integrated Exposure Uptake Biokinetic (IEUBK) model indicated no risks above target regulatory levels associated with exposure to lead in either sediment or soil. There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level, and this sample is a surface soil sample from within the fenced, industrial area of the site. The next-highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and recreational exposure to lead at this location alone could potentially result in unacceptable risks, it is unlikely a future recreator would actually be exposed to lead in soil at this concentration. As this sample was collected from within the developed, fenced area of the site, future use of this area would require considerable re-working and re-grading of the area and the soil, such that the soil would be mixed, resulting in the isolated, more-concentrated lead soil to be mixed with soil having much lower lead concentrations, producing a soil with lead concentrations more similar to the mean concentration used in the IEUBK model and that demonstrated no adverse effects for exposure to soil.
- Total HIs (CTE) for current and future scenarios for adult for exposure to the Youth Pond exposure grouping or the Site 4/Upstream Pond exposure grouping and current and future scenarios for child for exposure to the Youth Pond exposure grouping, and future scenario for child exposure to the Site 4/Upstream Pond exposure grouping are below regulatory target levels.
- Total HI (CTE) for the current scenario for child exposure to the Site 4/Upstream Pond exposure grouping exceeds regulatory target level.
- Total ELCR (CTE) for current and future scenarios for adult and child for exposure to Youth Pond exposure grouping or Site 4/Upstream Pond exposure grouping are within the regulatory target risk range.
- The COCs for fish tissue are Aroclor-1254, Aroclor-1260, dioxin-like PCBs, and chromium (assuming all chromium is hexavalent chromium). However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium is not considered a COC for fish tissue.
- The COCs for combined surface and subsurface soil across the site are carcinogenic PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene), dieldrin, and arsenic.

Current and Future Maintenance Worker

- Current exposure to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channels to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in surface drainage features leading to Youth Pond)
- Future exposure to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channels to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, sediment/surface soil in surface drainage features leading to Youth Pond).
  - The HIs and ELCRs (RME) for current and future scenarios for both exposure groupings are within regulatory target levels.
  - Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond, and in soil from inside and outside the fenced area. Conservative evaluation of lead using the ALM indicated no risks

above target regulatory levels associated with exposure to lead in either sediment or soil. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by maintenance workers at this location.

Future Construction Worker

- Exposure to combined surface and subsurface soil from inside and outside the fenced area, or within the fenced area of Site 4/Youth Pond, and to shallow groundwater in an excavation through dermal contact and inhalation of volatile emissions.
  - Total HIs (RME) for both soil inside and outside the fenced area and shallow groundwater, and soil within the fenced area and groundwater exceed the regulatory target HI. HIs from either soil exposure grouping are below the target HI. The hazard is associated with inhalation of naphthalene, with a smaller contribution due to inhalation of 1,1-biphenyl, from groundwater associated with sample CAA03-GW05-1109.
  - Total ELCR (RME) for soil inside and outside the fenced area and groundwater is within the regulatory target risk range.
  - Total ELCR (RME) for soil within the fenced area of Site 4/Youth Pond and groundwater exceeds the target risk range, associated with carcinogenic PAHs in soil.
  - Lead was identified as a COPC in soil from inside and outside the fenced area, and within the fenced area of Site 4/Youth Pond. The ALM showed there would be no adverse effects above regulatory levels associated with exposure to lead in soil for a future construction worker. There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by construction workers at this location
  - Total HI (CTE) for soil inside and outside the fenced area and shallow groundwater, and from soil within the fenced area of Site 4/Youth Pond and shallow groundwater exceeds the target HI, associated with shallow groundwater.
  - Total ELCR (CTE) for soil within the fenced area of Site 4/Youth Pond and shallow groundwater exceeds the target risk range, associated with soil.
  - The COCs for groundwater are naphthalene and 1,1-biphenyl.
  - The COCs for soil within the fenced area of the site are carcinogenic PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene).

Future Resident (adult and child)

- Exposure to surface and subsurface soil inside and outside fenced area and to groundwater.
  - Total (RME) HI for exposure to soil and groundwater for adult and child residents exceeds the regulatory target HI.
  - The HI (RME) for adult exposure to soil alone does not exceed the regulatory target HI.
  - The HI (RME) for child exposure to soil exceeds the target level. The COC for exposure to soil alone is arsenic. However, if groundwater is used as a potable water supply and the child resident is exposed to both soil and groundwater, aluminum, iron, and thallium would be additional COCs, as they would contribute to target organ HIs above 1.
  - The HI (RME) for adult and child exposed to groundwater exceeds the target HI, associated with dibenzofuran, naphthalene, aluminum, arsenic, iron, manganese, and thallium. Thallium was only

detected in one of the 14 groundwater samples, CAS04-GW08-1212. The hazard associated with dibenzofuran and naphthalene is primarily associated sample CAA03-GW05-1109.

- The HI (CTE) for the child exposure to soil does not exceed the target HI.
- The HI (CTE) for the adult exposure to groundwater exceeds the regulatory target HI; however, none of the target organ HIs exceed 1. Child HI (CTE) associated with exposure to groundwater exceeds the target HI.
- Cumulative ELCR (RME) associated with exposure to soil and groundwater for lifetime resident exceeds the regulatory target risk range, primarily associated with carcinogenic PAHs in soil and groundwater.
- The ELCR (RME) associated with exposure to soil alone exceeds the target risk range, and is associated with carcinogenic PAHs with smaller contributions from Aroclor-1242, Aroclor-1260, dieldrin, arsenic, and hexavalent chromium. The carcinogenic risk associated with the PAHs is associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199. The carcinogenic risk associated with dieldrin is also associated with CAA03-SS06-1109. The carcinogenic risk associated with the Aroclors is primarily associated with two samples from the same boring, CAS004-4-HA05-01-1199 and CAS004-4HA05-00-1199, with a smaller contribution from sample CAS004-4HA04-00-1199. The risk associated with exposure to arsenic is associated with sample CAS04-SS13-1012, which had a concentration over an order of magnitude higher than the next highest detection of arsenic.
- The ELCR (RME) associated with exposure to groundwater exceeds the target risk range due primarily to PAHs, arsenic and chromium, with smaller contributions from benzene, ethylbenzene, 1,1-biphenyl, and dieldrin. Carcinogenic risk from PAHs is associated with samples CAA03-GW05-1109 and CAA03-GW04-1109. Benzene, ethylbenzene, and 1,1-biphenyl were only detected in sample CAA03-GW05-1109; therefore, carcinogenic risk for these constituents is associated with this sample.
- The ELCR (CTE) associated with exposure to soil or groundwater for a lifetime resident exceeds the regulatory target risk range.
- Benzene, ethylbenzene, and naphthalene were identified as COPCs for vapor intrusion from groundwater to indoor air. Risks associated with vapor intrusion were not quantified; however, it is unlikely there would be any unacceptable risks associated with this pathway, as discussed in Section J.7.1.
- Lead was identified as a COPC for soil and groundwater, and was therefore evaluated using the IEUBK model. The model showed there would be no adverse effects exceeding regulatory levels associated with exposure to lead for a future resident. There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level, and this sample is a surface soil sample from within the fenced, industrial area of the site. The next-highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and residential exposure to lead at this location alone would most likely result in unacceptable risks, it is unlikely a future resident would actually be exposed to lead in soil at this concentration. As this sample was collected from within the developed, fenced area of the site, future use of this area would require considerable re-working and re-grading of the area and the soil, such that the soil would be mixed, resulting in the isolated, more-concentrated lead soil to be mixed with soil having much lower lead concentrations, producing a soil with lead concentrations more similar to the mean concentration used in the IEUBK model and that demonstrated no adverse effects with future child residential exposure to soil.
- The COCs for groundwater are dibenzofuran, naphthalene, 1,1-biphenyl, aluminum, arsenic, iron, manganese, and thallium.

TABLE 5-1

Human Health Risk Assessment Summary

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Risk Scenario	Exposure Groupings																									
	Surface Soil				Combined Surface and Subsurfac Soil				Surface Water						Sediment						Sediment/Surface Soil		Fish		Groundwater	
	Within Fenced Area of Youth Pond/Site 4		Outside Fenced Area of Site 4		Inside and Outside Fenced Area		Within Fenced Area of Youth Pond/Site 4		Youth Pond		Upstream Pond		Drainage Channel to Upstream Pond		Drainage Channel to Upstream Pond		Youth Pond		Upstream Pond		Drainage Ditches to Youth Pond outside Fenced Area		Youth and Upstream Pond Fish Tissue			
	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI	ELCR	HI
Current Industrial Worker	1E-03 CTE ELCR=1E-04	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Current Visitor/Recreational User (Adult)	NA	NA	1E-05	0.09	NA	NA	NA	NA	1E-07	0.0009	2E-05	0.009	5E-06	0.04	1E-05	0.02	2E-05	0.08	7E-06	0.02	2E-06	0.009	1E-04 CTE ELCR=2E-05	3 CTE HI=1	NA	NA
Current Visitor/Recreational User (Child)	NA	NA	6E-05	0.8	NA	NA	NA	NA	1E-07	0.004	5E-05	0.04	5E-06	0.2	2E-05	0.06	3E-05	0.4	9E-06	0.08	3E-06	0.06	9E-05	6 CTE HI=1	NA	NA
Current Maintenance Worker	NA	NA	2E-05	0.1	NA	NA	NA	NA	3E-07	0.002	2E-05	0.02	1E-05	0.08	4E-06	0.01	6E-06	0.03	3E-06	0.007	7E-07	0.003	NA	NA	NA	NA
Future Visitor/Recreational User (Adult)	NA	NA	NA	NA	4E-05	0.06	NA	NA	1E-07	0.0009	2E-05	0.009	5E-06	0.04	1E-05	0.02	2E-05	0.08	7E-06	0.02	2E-06	0.009	1E-04 CTE ELCR=2E-05	3 CTE HI=1	NA	NA
Future Visitor/Recreational User (Child)	NA	NA	NA	NA	4E-04 CTE ELCR=8E-05	0.5	NA	NA	1E-07	0.004	5E-05	0.04	5E-06	0.2	2E-05	0.06	3E-05	0.4	9E-06	0.08	4E-06	0.06	9E-05	6 CTE HI=1	NA	NA
Future Construction Worker	NA	NA	NA	NA	1E-05	0.4	2E-04 CTE ELCR=1E-	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8E-05	34 CTE HI=17
Future Industrial Worker	NA	NA	NA	NA	2E-04 CTE ELCR=2E-05	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Future Maintenance Worker	NA	NA	NA	NA	5E-05	0.06	NA	NA	3E-07	0.002	2E-05	0.02	1E-05	0.08	4E-06	0.01	6E-06	0.03	3E-06	0.007	7E-07	0.003	NA	NA	NA	NA
Future Resident (Adult)	NA	NA	NA	NA	(b)	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	(b)	10 CTE HI=4
Future Resident (Child)	NA	NA	NA	NA	(b)	4 CTE HI=1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	(b)	20 CTE HI=13
Future Resident (Child/Adult)	NA	NA	NA	NA	3E-03 CTE ELCR=8E-04	(c)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1E-02 CTE ELCR=5E-	(c)

Notes:

ELCR = Excess lifetime cancer risk (CR). The range of regulatory target carcinogenic risk is 1×10^{-6} to 1×10^{-4} (one in one million to one in ten thousand)

HI = hazard index. A target organ hazard index of less than 1 indicates hazard within regulatory target noncarcinogenic risk level.

Unless otherwise indicated, the risk and HI are based on RME.

NA = Pathway not applicable for receptor.

40 CFR 300.430(e)(2)(i)(A)(2) identifies the regulatory target carcinogenic risk range.

40 CFR 300.430(e)(2)(i)(A)(1) identifies the regulatory target noncarcinogenic risk level.

(a) Under current land use conditions, receptors would be exposed to surface soil only. Under future land use conditions, it was assumed that soil-moving activities associated with construction for future site development would result in subsurface soil being mixed with the current surface soil and placed on the ground surface.

(b) Carcinogenic risks were not calculated individually for an adult or child resident, but were calculated for a lifetime child/adult resident in accordance with USEPA guidance.

(c) HI was not calculated for a future lifetime child/adult resident, but was calculated individually for an adult or child resident in accordance with USEPA guidance.

Shaded cell indicates a cancer risk or non-cancer hazard exceedance of the cancer risk or non-cancer hazard target.

TABLE 5-2

Human Health Risk Assessment Summary - Cumulative Risk Estimates

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Exposure Media	Cumulative Risk Estimates (a)	
		ELCR	HI
Current Industrial Worker	Surface soil within the fenced area of Site 4/Youth Pond	1E-03 CTE ELCR=1E-04	0.3
Current Visitor/Recreational User (Adult)	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingest fish from Youth and Upstream Pond)	1E-04	3 CTE HI=1
	Upstream Pond Exposure Grouping (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond, and ingest fish from Youth Pond and Upstream Pond)	2E-04 CTE ELCR=2E-05	3 CTE HI=1
Current Visitor/Recreational User (Child)	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingest fish from Youth and Upstream Pond)	1E-04	7 CTE HI=1
	Upstream Pond Exposure Grouping (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond, and ingest fish from Youth Pond and Upstream Pond)	2E-04 CTE ELCR=6E-05	8 CTE HI=2
Current Maintenance Worker	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond)	7E-06	0.04
	Upstream Pond Exposure Grouping (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond)	5E-05	0.2
Future Visitor/Recreational User (Adult)	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingest fish from Youth and Upstream Pond)	1E-04	3 CTE HI=0.9
	Upstream Pond Exposure Grouping (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond, and fish from Youth Pond and Upstream Pond)	2E-04 CTE ELCR=2E-05	3 CTE HI=0.9
Current Visitor/Recreational User (Child)	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingest fish from Youth and Upstream Pond)	1E-04	7 CTE HI=1
	Upstream Pond Exposure Grouping (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond, and fish from Youth Pond and Upstream Pond)	6E-04 CTE ELCR=1E-04	7 CTE HI=1
Future Construction Worker	Surface and subsurface soil inside and outside fenced area and groundwater	9E-05	34 CTE HI=17
	Surface and subsurface soil within fenced area and groundwater	3E-04 CTE ELCR=2E-04	34 CTE HI=17
Future Industrial Worker	Surface and subsurface soil within and outside of the fenced area of Site 4/Youth Pond	2E-04 CTE ELCR=2E-05	0.3
Future Maintenance Worker	Youth Pond Exposure Grouping (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond)	7E-06	0.04
	Upstream Pond Exposure Grouping (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond)	8E-05	0.2
Future Resident (Adult)	Surface and subsurface soil inside and outside fenced area and groundwater	(b)	11 CTE HI=4
Future Resident (Child)	Surface and subsurface soil inside and outside fenced area and groundwater	(b)	24 CTE HI=14
Future Resident (Child/Adult)	Surface and subsurface soil inside and outside fenced area and groundwater	1E-02 CTE ELCR=5E-03	(c)

Notes:

ELCR = Excess lifetime cancer risk (CR). The range of regulatory target carcinogenic risk is 1×10^{-6} to 1×10^{-4}

HI = hazard index. A target organ hazard index of less than 1 indicates hazard within regulatory target noncarcinogenic risk level.

Unless otherwise indicated, the risk and HI are based on RME.

NA = Pathway not applicable for receptor.

40 CFR 300.430(e)(2)(i)(A)(2) identifies the acceptable carcinogenic risk range.

40 CFR 300.430(e)(2)(i)(A)(1) identifies the acceptable noncarcinogenic risk level.

(a) If a receptor would be exposed through multiple routes, risk estimates were combined across the exposure routes.

(b) Carcinogenic risks were not calculated individually for an adult or child resident, but were calculated for a lifetime child/adult resident in accordance with USEPA guidance.

(c) HI was not calculated for a future lifetime child/adult resident, but was calculated individually for an adult or child resident in accordance with USEPA guidance.

Shaded cell indicates a cancer risk or non-cancer hazard exceedance of the cancer risk or non-cancer hazard target.

- The COCs for soil are carcinogenic PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene), Aroclor-1242, Aroclor-1260, dieldrin, arsenic, aluminum, chromium (assuming all detected chromium is hexavalent chromium), iron, and thallium; however, if groundwater is not used as potable water supply, aluminum, iron, and thallium would not be COCs for soil.
- Given the concentrations of naphthalene in soil and groundwater, the potential for future vapor intrusion cannot be ruled out should building additions or new buildings be constructed. COPCs are not identified and future risks are not quantified because defensible methods for quantifying vapor intrusion risks using soil data are not available.

In summary, there are no COCs (or unacceptable risks) for exposure to surface water or sediment in any of the exposure groupings evaluated in the HHRA. The human health COCs identified for soil groupings, groundwater, and fish tissue are:

- Surface soil within the fenced area of Youth Pond/Site 4: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and arsenic.
- Surface soil from outside the fenced area of Site 4: none.
- Surface and subsurface soil from inside the fenced area of Site 4/Youth Pond: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- Surface and subsurface soil from inside and outside the fenced area of the site: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor-1260, dieldrin, arsenic, aluminum, chromium, iron, and thallium; however, if groundwater is not used as potable water supply, aluminum, iron, and thallium would not be soil COCs.
- Groundwater: benzene, ethylbenzene, naphthalene, 1,1-biphenyl, dibenzofuran, benzo(a)pyrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, aluminum, arsenic, chromium (assuming all detected chromium is hexavalent chromium), iron, manganese, and thallium.
- Fish from Youth Pond and Upstream Pond: dioxin-like PCBs, Aroclor-1254, Aroclor-1260, and chromium (assuming all detected chromium is hexavalent chromium). However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium is not considered a COC for fish tissue.

SECTION 6

Ecological Risk Assessment

This section summarizes the results of the BERA that was conducted for Site 4 and Youth Pond. The complete BERA is contained in **Appendix L**.

6.1 Introduction

This BERA was conducted in accordance with the *Navy Policy for Conducting Ecological Risk Assessments* (CNO, 1999) and the Navy guidance for implementing this ERA policy (NAVFAC, 2003; 2012), and considers data collected as part of previous evaluations of Site 4 and data collected specifically for this RI. This ERA is completed through Step 7 of the 8-step ERA process (USEPA, 1997). The results of this BERA will be used to determine the scope of any Step 8 (risk management) activities that may be required for site media to address any unacceptable risks to ecological receptors. Step 8 activities, if needed, will be conducted as part of a future evaluation.

The most recent previous ecological risk evaluation of Site 4 was conducted as part of the SI report (CH2M HILL, 2011a) and consisted of an ecological risk screening, constituting a SERA and an abbreviated version of BERA Step 3A. The results of the SI ecological risk screening were used to develop the SAP for this RI (CH2M HILL, 2012a; 2012b). The data evaluated as part of the 2011 SI are also included in this BERA, in addition to analytical, toxicological, and biological data collected in 2012 to support this RI and BERA.

A formal ecological risk evaluation had not been conducted previously at Youth Pond. However, in 2001, two surface water and two sediment samples collected during the 2000 Pond Study (Baker, 2001) were compared to ESVs. The results of the Pond Study, plus the hydrological connection between Site 4 water bodies and Youth Pond, resulted in the inclusion of Youth Pond in this RI and BERA.

6.2 Environmental Setting

Site 4 is approximately 4 acres in size and includes a small (0.5-acre) freshwater pond (Upstream Pond) (**Figure 1-2**). AOC 3, historically a distinct area, is now included within the boundary of Site 4 and now known as Burial Investigation 1. Historically, various types of waste material were disposed of at Site 4 (including AOC 3), and some of this material remains on the ground surface, while some of it is buried. Surface debris includes railroad ties, metal debris, and general trash, as well as construction materials scattered across the site. A surface debris pile with approximate dimensions of 20 feet by 20 feet by 10 feet high is located in the north-central portion of the site, adjacent to (west of) Upstream Pond (**Figure 4-1**). The surface debris pile contains metal banding, a few empty drums, and charred wood.

A total of 42 test pits and 6 test holes (**Figure 4-1**) were excavated during various investigations to delineate the horizontal and vertical extent of buried debris within the two burial areas that are located within the Site 4 study area. Buried debris, including asphalt, bricks, concrete, metal, construction and wood debris, automotive parts, tarpaper, shingles, and a 55-gallon drum, was encountered in Burial Area 1 between the ground surface and depths greater than 8 feet bgs. Additional buried debris may exist at depths greater than 8 feet bgs; however, due to the depth of groundwater encountered in test pits located closest to Upstream Pond, the vertical depth of debris could not be confirmed. It is not expected to be encountered at depths much greater than 8 feet bgs due to the difficulty of excavating below the water table in saturated, sandy materials. Buried debris, including medical supplies (such as syringes, sharps, tubing, and bottles), metal, and construction/fill debris, was encountered in Burial Area 2 between the ground surface and 7.5 feet bgs.

There are no known disposal activities associated with Youth Pond. Youth Pond is, however, hydrologically connected with Upstream Pond via a culvert under D Street (**Figure 1-2**).

6.2.1.1. Habitats

Site 4 is currently a wooded area located between CAD Buildings 11 and 12 (**Figure 1-2**). Future land use at Site 4 is not expected to change, and it will likely continue as a wooded area in the foreseeable future. The CAD

Buildings 11 and 12 are currently used for general warehousing and storage. According to the CAX inventory, there are four ASTs located outside of Building 12, one 1,000-gallon kerosene AST, one 1,000-gallon diesel AST, one 600-gallon used-oil AST, and one 1,000-gallon used-oil AST. Other materials, including garbage, gasoline, cleaners, generators, vehicles, paint, and miscellaneous wood and metal, are stored outside of CAD Building 12. The topography slopes down from CAD Building 12 towards Upstream Pond.

Site 4 is heavily vegetated, containing mature mixed forest (an approximate 100-foot canopy height) with nearly full canopy cover in terrestrial areas but more open near Upstream Pond. The overstory is dominated by sweetgum (*Lireodendron tuliperifa*), oaks (*Quercus rubra*), and loblolly pine (*Pinus taeda*). The understory is dominated by sassafras (*Sassafras albidum*), *Viburnum spp.*, common waxmyrtle (*Myrica cerifera*), and dogwood (*Cornus floridanum*); willow (*Salix nigra*) is common along the western shore of Upstream Pond. Ground cover is relatively sparse, with patches of herbaceous growth in scattered areas. Many large downed trees are present; some of these are partly to mostly in Upstream Pond. Surrounding areas are developed (buildings to the north and south; a parking lot to the west; and D Street to the east; **Figure 1-2**). East of D Street is Youth Pond. Youth Pond is mostly surrounded by mature mixed forest (similar to that found on Site 4). The York River lies east of Youth Pond (**Figure 1-2**).

In general, the topography of Site 4 slopes to the east or northeast towards D Street and Upstream Pond. Drainage from Outfall #2 (which drains developed and industrialized upgradient areas) and runoff from the areas surrounding CAD Buildings 11 and 12 (including the parking area located west of Site 4), flows through the Site 4 drainage channels (**Figure 1-2**) and into Upstream Pond. During periods with high water levels, surface water in Upstream Pond flows through a culvert under D Street and into Youth Pond.

Surface water from the surrounding area enters Youth Pond from either Upstream Pond (from the drainage culvert that flows under D Street) or a surface drainage feature that runs parallel to D Street from Outfall #34 (**Figure 1-2**). The surface water runoff from the surface drainage feature parallel to D Street originates from several stormwater drains, one located between CAD Buildings 12 and 13, one at the corner of CAD Building 12 and D Street, and one possibly from a stormwater drain located inside the fenced area of CAD Building 12. Surface water from these drains flows to Outfall #34 (which is regulated under a state stormwater permit), which ultimately discharges to Youth Pond through a culvert and surface drainage feature that connects Outfall #34 and Youth Pond. When surface water within Youth Pond reaches a certain height, it flows into a flood control structure within Youth Pond and ultimately discharges down the slope and into the adjacent tidal York River through Outfall #NR-30 (which is regulated under a state stormwater permit).

Upstream Pond is a small (approximately 0.5-acre) and shallow pond; average water depth during October 2012 sampling was 2 feet. The pond contained a large amount of large woody debris (downed trees), snags, and green algae. Along the pond periphery occur woody shrubs and small trees (such as willow), and emergent species such as water smartweed (*Polygonum punctatum*), rice cutgrass (*Leersia oryzoides*), and sedges (*Carex spp*). Open water areas were generally limited to the center portions of the pond. Waters were generally stagnant, except when water levels are high enough to allow flow through the system, but were slightly to moderately turbid. Sediment within the pond was dark gray/black mud/muck, with mostly silts and some fine sand in the upper 6 inches, and interspersed organic material (detritus), and grade to a fine sandy layer at depths deeper than 6 inches. The TOC averaged approximately 6 percent. The input drainage channels entering the pond from the west were high gradient, particularly at the western end of Site 4, with well defined banks. These banks were much less cut as they approached the pond. Channel width was generally 5 to 10 feet and flow is highly variable. The substrate was firm and generally sandy, with rip-rap occurring at the Outfall #2 discharge pipe.

Youth Pond is approximately 2.5 acres in size with an average water depth during October 2012 sampling of approximately 3 feet; portions of the pond were as deep as 6 feet. The pond contained some large woody debris and a large amount of emergent vegetation and filamentous green algae near the shores. Open water occupied only approximately 20 percent of the pond. Emergent species included false nettle (*Boehmeria cylindrical*), rice cutgrass (*Leersia oryzoides*), and sedges (*Carex spp*). Waters are generally stagnant, except when water levels are high enough to allow flow through the system, but were slightly turbid. Sediment within the pond was brownish-gray mud/muck, with mostly silts and some fine sand, and interspersed organic material (detritus). The TOC

averaged 7.35 percent. Sediment grades to thicker mud/muck silt with lots of organic material near the shorelines. Vegetation mats as thick as 3 feet occurred in some areas.

6.2.1.2. Biota

No known federal or state-listed endangered or threatened species currently occur on the site. The upland areas are utilized by common woodland bird species such as downy woodpecker (*Picoides pubescens*) and mammalian species such as white-tailed deer (*Odocoileus viginianus*). The two ponds are utilized by common mammalian species such as raccoon (*Procyon lotor*) and by common aquatic birds such as great blue heron (*Ardea herodias*) and great egret (*Ardea alba*). Two species of frogs (see as follows) were observed, as were aquatic snakes and turtles. Fish were generally common (see as follows).

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Upstream and Youth Ponds, as well as in a reference pond (Cheatham Pond, located approximately 0.5 mile northwest of Upstream and Youth Ponds) in October 2012 to determine the presence and type of aquatic community existing within these water bodies. The results of this survey were used to characterize the ecological receptors that are present in Upstream and Youth Ponds and to guide the collection of fish and frog tissue samples. In addition, a semi-quantitative survey of aquatic/ benthic macroinvertebrates was conducted in Upstream Pond (10 locations) and Youth Pond (11 locations), as well as in the reference pond (10 locations), to characterize the type of community that was present.

The benthic invertebrate communities were very similar between Youth and Upstream Ponds. A total of 163 organisms from 17 taxa were found in the 11 Youth Pond samples, while a total of 149 organisms from 14 taxa were found in the 10 Upstream Pond samples. The dominant organisms in Youth Pond were chironomids (midges), dragonflies (Anisoptera), oligochaetes (worms), and damselflies (Zygoptera). The dominant organisms in Upstream Pond were chironomids (midges), dragonflies (Anisoptera), beetles (Coleoptera), damselflies (Zygoptera), and oligochaetes (worms).

In Youth Pond, the dense macrophyte beds made electrofishing difficult and gill nets were used to prevent fish from escaping the field of the electroshocker. Two species of frogs, American bullfrog (*Lithobates catesbeinanus*; 16 specimens) and leopard frog (*Lithobates sphenocephalus*; 2 specimens), were collected. Mosquitofish (*Gambusia holbrooki*) were the most numerous fish present; American eel (*Anguilla rostrata*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), and largemouth bass (*Micropterus salmoides*) were also collected. None of the fish and frog specimens had any observed external abnormalities, deformities, or anomalies.

In Upstream Pond, fish were predominately found in the deeper pools in the center of the pond, except for mosquitofish, which occurred throughout the pond system (including at the headwaters of the streams). Two species of frogs, American bullfrog (27 adult specimens and 37 tadpole specimens) and leopard frog (1 specimen), were collected, mostly from the southern end of the pond. Mosquitofish were the most numerous fish present; American eel, bluegill, brown bullhead (*Ameirus nebulosus*), golden shiner (*Notemigonus crysoleucas*), and largemouth bass were also collected. None of the fish and frog specimens had any observed external abnormalities, deformities, or anomalies. The number and diversity of fish species was surprising, particularly the presence of large-sized largemouth bass, given the small size and relative isolation of Upstream Pond, and the presence of a large population of bullfrogs. It is likely that some fish species (such as largemouth bass) move between Upstream and Youth Ponds via the connecting culvert. While it is not known if Youth Pond was ever officially stocked with fish, there is anecdotal evidence that small numbers of fish (sport fish species, but specific species not known) were unofficially moved from Cheatham Pond to Youth Pond for recreational purposes. Currently, fishing at Youth Pond is restricted to catch-and-release. Thus, it is highly likely that current fish populations in Upstream and Youth Ponds represent reproducing populations since there is little, if any, natural colonization potential from other areas. The presence of frog tadpoles also indicates that the frog population is actively reproducing.

6.3 Analytical Data Used in the Baseline Ecological Risk Assessment

Both historical Site 4/AOC 3 soil, surface water, and sediment samples (from 1999 and 2009) and soil, surface water, and sediment samples collected as part of this RI (in 2012) were quantitatively evaluated in this BERA. Since ecological exposures are generally confined to the top 2 feet of the soil column, the soil data used in this BERA were confined to this depth range, but were evaluated separately as surface samples (0 to 6 inches) and subsurface samples (typically 6 to 24 inches); food web exposures only considered the surface samples. Soil data from deeper depths (below 24 inches) were available but were not considered in this BERA per Region III BTAG guidance. Sediment data were also available from two depths (0 to 4 inches and 4 to 8 inches). As for soil, these two depth strata were evaluated separately and only the surface samples were used in food web models.

Earthworm tissue from Site 4, whole-body fish and frog tissue from Upstream and Youth Ponds (as well as reference areas), and sediment toxicity test data from Upstream Pond (as well as reference areas) collected in 2012 were also used in this BERA. Reference surface water and sediment data were also collected from portions of Cheatham Pond and are discussed further in **Appendix M**. In addition, background soil UTLs from the Yorktown-CAX background study were considered in the BERA.

6.4 Conceptual Site Model

The CSM relates potentially exposed receptor populations with potential source areas based on physical site characteristics and complete exposure pathways. Important components of the CSM are the identification of potential source areas, transport pathways, exposure media, exposure pathways and routes, and receptors. **Figure 6-1** illustrates a diagrammatic CSM for Site 4 and Youth Pond. Key components of this CSM are discussed in **Appendix L**. **Table 6-1** shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the BERA and the receptors associated with each of these endpoints.

6.5 Results

6.5.1 Terrestrial Habitats

Ten assessment endpoints were developed for terrestrial habitats on the site (**Table 6-1**), which consisted of Site 4, the developed and industrialized area northwest of Youth Pond, and the Outfall #34 Drainage Channel parallel to D Street at Youth Pond (**Figure 6-2**). Lines of evidence for terrestrial habitats included:

- Comparison of surface soil and shallow subsurface soil concentrations with ESVs
- Comparison of modeled dietary doses (using measured tissue concentrations in earthworms for metals and PCBs) with ingestion Toxicity Reference Values (TRVs)
- Comparison of site soil concentrations with background concentrations

No chemicals were identified as COPCs for further evaluation in the developed and industrialized area northwest of Youth Pond. The Outfall #34 Drainage Channel is evaluated as part of the aquatic risk evaluation (**Section 6.5.2**).

In Site 4 surface soil, six metals (aluminum, arsenic, lead, mercury, selenium, and zinc), eight pesticides (aldrin, dieldrin, endosulfan I, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and lindane), PAHs (including the related chemicals carbazole and dibenzofuran), and acetone were identified as COPCs for further risk evaluation. Aluminum was only identified as a COPC in the area east of Upstream Pond (and was the only COPC from this area) due largely to the low measured soil pH in this area. The ratios to the background UTL for the two samples in this area were 1.28 and 1.60, so they were not highly elevated relative to background. Thus, potential ecological risks related to aluminum are not expected to be ecologically significant. In subsurface soil, aluminum exceeded both the ESV and background UTL in seven samples, and the maximum ratio to the background UTL for these samples (2.45) was higher than in surface soil (1.60). However, there was no discernible pattern to these subsurface exceedances and most were located outside of the buried waste areas, suggesting that they are not site-related and may reflect background conditions.

Arsenic exceeded ESVs in only a single surface soil sample from CAS04-SS13 (**Figure 6-2**), which is within Burial Area 1, but at a high magnitude (hazard quotient [HQ] of 19.2). A subsurface sample was not available from this location. Thus, arsenic is identified as a COC but the spatial extent is limited. Similarly, lead had only one significant exceedance (HQ of 6.61) of its ESV in surface soil, in sample CAA03-SS06 located offsite next to CAD Building 12. As noted in Section 4.2.2.3, this sample was collected from a drainage swale that receives stormwater runoff from the adjacent road and parking areas as well as stormwater drainage from the CAD Building 12 rooftop, which suggests that the constituents detected in this sample likely reflect non-CERCLA-regulated impacts. Lead did not exceed ESVs in three surface soil samples collected on Site 4 downgradient of this location, indicating that it is not significantly migrating onto the site. Also, lead did not exceed ESVs in the subsurface sample from this location. This location also had some of the most significant pesticide and PAH exceedances in surface soil samples.

Mercury equaled or exceeded ESVs in five surface soil samples, particularly in samples CAS004-4HA02, CAS004-4HA04, and CAS004-4HA05, located within Burial Investigation Area 2 on the southern portion of the site. Mercury also equaled or exceeded ESVs in four subsurface soil samples, particularly in CAS004-4HA03, CAS004-4HA04, and CAS004-4HA05, in this same area. Thus, mercury was identified as a COC in both surface and subsurface soil, and although likely site-related, the spatial extent is likely limited to the eastern portion of Burial Area 2.

Selenium exceeded ESVs in four surface soil samples from Site 4, but the maximum HQ was less than 2 and the mean HQs in the area-specific evaluations were less than 1. Selenium also exceeded ESVs in one subsurface soil sample, but the maximum HQ was 1.50 and the mean HQs in the area-specific evaluations were less than 1. There was no discernible pattern to these exceedances, and the magnitude (HQs less than 2) and spatial extent (four of 29 samples) of the exceedances was limited.

Zinc exceeded ESVs in five surface soil samples from Site 4; the maximum HQ was less than 3 and the mean HQs in the area-specific evaluations were less than 1. However, the two highest exceedances (CAS004-4HA04 and CAS004-4HA05) were in Burial Area 2. In subsurface soil, the maximum HQ was approximately 3 and the mean HQs in the area-specific evaluations were less than 1. However, subsurface soil exceedances for zinc also occurred in the same general area as for surface soil. Thus, zinc was identified as a COC in both surface and subsurface soil, and although likely site-related, the spatial extent is likely limited to portions of Burial Area 2.

The PAH exceedances in surface soil were confined to CAA03-SS06 (discussed previously) and CAS004-4HA06, located in Burial Area 1 near CAS04-SS13 (**Figure 6-2**). There were no exceedances in subsurface samples. The exceedances in sample CAA03-SS06 (located offsite next to CAD Building 12) are not site-related, but may be related to impacts from stormwater runoff from the building rooftop or the adjacent paved surfaces. The PAHs did not exceed ESVs in three surface samples collected at Site 4 downgradient of this location, indicating that PAHs are not migrating onto the site from this area. The exceedances related to CAS004-4HA06 may be site-related, so PAHs are identified as COCs in surface soil.

The notable pesticide exceedances in surface soil were generally clustered in two samples, CAA03-SS06 (located offsite next to CAD Building 12) and CAS004-4HA05 (located in the southern portion of Site 4, near the confluence of the two Site 4 streams). Pesticide ESV exceedances in subsurface soil were uncommon and of lower magnitude than in surface samples, occurring in only a few scattered samples for the three subsurface soil COPCs. This spatial pattern suggests that pesticides are not site-related.

Acetone was only identified as a COPC for further risk evaluation in the northwestern portion of Site 4 and did not have an available soil ESV or background UTL. Acetone was detected at a maximum concentration (640 µg/kg) that exceeded some soil ESVs for other VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg. Only 2 of 12 surface soil samples had concentrations that exceeded 173 µg/kg, the lowest ESV for other VOCs. The mean soil concentration (140 µg/kg), however, was less than 173 µg/kg. In addition, the USEPA Region 5 soil ESV for acetone (based on back-calculated food web models) is 2,500 µg/kg, which is greater than the maximum detected concentration is surface soils. For these reasons, acetone was not identified as a COC in site soils.

Arsenic, dieldrin, dioxin-like PCBs, and pyrene were identified as COPCs for further risk evaluation in terrestrial food webs based on Maximum Acceptable Toxicant Concentration (MATC) exceedances of the 95 percent upper confidence level (UCL) exposure dose for the short-tailed shrew. However, as previously discussed, arsenic, dieldrin, and pyrene concentrations were elevated due to high concentrations in single samples (CAS04-SS13 for arsenic, and CAA03-SS06 for dieldrin and pyrene; CAA03-SS06 is located offsite next to CAD Building 12). Only dieldrin exceeded based on the Lowest Observed Adverse Effect Level (LOAEL) for the 95 percent UCL exposure dose. None of these chemicals were identified as COCs for terrestrial food web exposures because the spatial distribution of chemical concentrations is unlikely to result in significant exposures, especially for dieldrin and pyrene given the location (developed and industrialized area) of the high concentrations. The PCBs were found in significant concentrations only at CAS004-HA04 (600 µg/kg in surface soil and 330 µg/kg in subsurface soil for total PCBs) and HA05 (3,700 µg/kg in surface soil and 3,900 µg/kg in subsurface soil for total PCBs). These two samples are located in the southern portion of the site near the confluence of the two Site 4 streams where the only earthworm samples from the site were collected. The 95 percent UCL MATC HQ was 1.27 (shrew) and the LOAEL HQ was less than 1. The HQs based on Aroclors and total PCBs did not exceed 1 based on the No Observed Adverse Effect Level . The likely source of these PCBs is Outfall #2 since PCBs were not detected in subsurface soil samples except in this area (and thus are probably not site-related) and the PCBs likely were deposited in this area near the stream channel during flood events. The PCBs were selected as terrestrial food web COCs for risk management consideration, but the magnitude of the exceedances is marginal and PCBs are limited in spatial extent in soil samples.

In summary, arsenic, mercury, zinc, and PAHs were identified as COCs in surface and/or subsurface soil from Site 4 and may be site-related, although PAHs also had non-site-related sources. Lead and pesticide exceedances are thought not to be site-related. The exceedances for all of these chemicals were spatially limited and likely have a low ecological risk potential on a site-wide and population-level basis. Similarly, the PCBs were identified as terrestrial food web COCs, but were also not likely site-related, and their distribution in soil was spatially limited. The terrestrial areas of Site 4 consist of relatively mature forested habitats and any decision to conduct intrusive remedial actions in this area should consider the potential impacts to these habitats that such actions would entail relative to the potential risks that have been identified.

6.5.2 Aquatic Habitats

Eleven assessment endpoints were developed for aquatic habitats on the site (**Table 6-1**), which included Upstream Pond, the Site 4 drainage channels, Youth Pond, the York River drainage channel, and the Outfall #34 Drainage Channel (**Figure 6-2**). Lines of evidence for aquatic habitats included:

- Sediment toxicity testing
- Comparison of modeled dietary doses (using measured tissue concentrations in frogs and fish for metals and PCBs) with ingestion TRVs
- Biological surveys (fish, frogs, and benthic macroinvertebrates)
- Comparison of site surface water, sediment, and tissue concentrations with background (reference) concentrations
- Bioavailability measures
- Comparison of surface water, sediment, and tissue concentrations with ESVs

6.5.2.1. Upstream Pond/Site 4 Drainage Channels

Upstream Pond serves as a repository for stormwater runoff from developed and industrialized areas within its watershed as well as from the source areas evaluated as part of this RI. The principal source of PCBs, in particular, appears to be stormwater discharged through Outfall #2. Few chemicals exceeded both ESVs and background UTLs in the surface water of Upstream Pond and the Site 4 drainage channels. In Upstream Pond, no metal exceeded both the ESV and the background UTL based on detected 95 percent UCL dissolved concentrations. In the Site 4 drainage channels, only iron and manganese exceeded both the ESV and the background UTL based on

detected 95 percent UCL dissolved concentrations and only in a single sample (CAS04-SW09) located in Drainage Channel #3, a small drainage channel that flows outside of Burial Area 2 and enters the southeastern corner of Upstream Pond (**Figure 6-2**). This drainage channel carries runoff primarily from the area near CAD Building 11. Neither iron nor manganese exceeded ESVs and background UTLs in surface sediment samples from either Upstream Pond or the Site 4 drainage channels. Nine PAHs were detected in surface water samples from Upstream Pond and the Site 4 drainage channels, and two (benzo[a]pyrene and pyrene) exceeded ESVs in one or more samples (a third, chrysene, did not have an ESV). The PAH exceedances were likely the result of turbid samples since these PAHs have very low water solubility, so they would typically be associated with particulates. Thus, they would not be expected to be retained in the water column, but be deposited to sediment. PAHs were COPCs in surface sediment from these water bodies.

In Upstream Pond surface sediment, eight metals (arsenic, barium, beryllium, cadmium, copper, lead, silver, and zinc) were identified as COPCs for further risk evaluation; cadmium was the only metal so identified in the Site 4 drainage channels (the maximum HQ was 1.6 and the mean HQ did not exceed 1 in the drainage channels). Arsenic exceeded ESVs based on the 95% UCL, and beryllium did not have an ESV, but the maximum background UTL ratios were only 1.03 and 1.15, respectively, and there was only a single background UTL exceedance for each metal. Thus, neither of these metals was identified as a COC in Upstream Pond sediment. Barium concentrations were generally consistent with background, exceeding the background UTL in 7 of 31 samples, but only exceeding by a factor of more than 1.5 in two of these samples from the pond. The maximum ratio (2.21) occurred in sample CAS04-SD04, located near D Street, well away from site source areas. The other five metal COPCs were SEM metals. The SEM/AVS ratios only exceeded 1 (indicating that metals are likely bioavailable) at three of the 14 Upstream Pond locations that had at least one exceedance of both ESVs and background UTLs for these five metals. Thus, the bioavailability of these metals is likely to be low in most of the pond, but particularly in areas with the highest metal concentrations. However, relatively high concentrations of each of these metals occurred in some surface sediment samples with SEM/AVS ratios that were greater than 1, such as CAS04-SD03, located in a depositional area in the southern portion of the pond, just downstream of Burial Area 2 and the inflow point of the Site 4 drainage channels. Thus, localized impacts are possible in areas where these metals may be bioavailable and these five metals were identified as COCs in Upstream Pond surface sediment. Three (cadmium, lead, and silver) of these five metals were also identified as COPCs in subsurface sediment, so contamination may extend down to subsurface layers (although potential exposure would be very limited).

The PCBs (predominantly Aroclor-1254 and -1260) in surface sediment were generally highest in the southern end of the pond (the maximum concentration [21,000 µg/kg for total PCBs] was at CAS04-SD03), although several relatively high concentrations (in excess of 1,000 µg/kg) also occurred in the northwestern corner of the pond (samples CAA03-SD02 and CAS04-SD10). Total PCB concentrations in the Site 4 drainage channels were lower (maximum of 650 µg/kg for total PCBs), likely due to scouring in the upper end of this drainage system and lower TOC concentrations (mean of 2.37 percent in the drainage channels versus 6.11 percent in the pond), although no PCB concentration in the drainage channels exceeded the equilibrium partitioning (EqP) ESV (which includes a site-specific measure of bioavailability) (maximum HQs based on the screening level concentration [SLC] ESV were about 8). The TOC concentrations in the pond were higher and only the maximum PCB concentration exceeded the EqP ESV (HQ of 4.24), suggesting that bioavailability is limited (the maximum SLC HQ exceeded 100). Concentrations in subsurface sediment exceeded 1,000 µg/kg only in the sample where the highest surface concentration was observed. Thus, PCBs were identified as COCs in the sediment of Upstream Pond, but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas as discussed previously in the terrestrial risk evaluation.

Eleven pesticides (4,4’-dichlorodiphenyldichloroethane [DDD], 4,4’-DDE, 4,4’-DDT, alpha-chlordane, dieldrin, endosulfan II, endrin, endrin aldehyde, gamma-chlordane, heptachlor epoxide, and methoxychlor) were identified as COPCs for further risk evaluation in Upstream Pond and/or Site 4 drainage channel surface sediment. As with the PCBs, pesticide concentrations were lower in the drainage channels than in the pond, and none of the four drainage channel COPCs exceeded EqP ESVs. The highest surface sediment concentration for most of these pesticides was in CAS04-SD03, the same sample with the maximum PCB concentration, suggesting that the two have a common source (likely Outfall #2). The EqP ESVs were generally only exceeded in the sample with the

maximum concentration. Thus, as with the PCBs, pesticides (particularly dieldrin, endosulfan II, endrin, and methoxychlor, which exceeded 95 percent UCLs based on a comparison with EqP ESVs) were identified as COCs in the sediment of Upstream Pond (exceedances for these pesticides extend into the subsurface sediment), but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas.

Fourteen PAHs (plus high molecular weight [HMW], low molecular weight [LMW], and total PAHs) were identified as COPCs for further risk evaluation in Upstream Pond surface sediment. As with the PCBs and pesticides, the highest concentrations of total PAHs occurred at CAS04-SD03 and concentrations were lower in the drainage channels (where EqP ESVs were rarely exceeded for individual compounds and total PAHs were not COPCs) than in the pond. The majority of pond samples exceeded ESVs for total PAHs, which is not surprising given that this pond is the repository of urban stormwater runoff. Total PAHs did not often exceed ESVs in subsurface sediment samples (and the 95 percent UCL HQ was less than 1). Thus, the PAHs were identified as COCs in the surface sediment of Upstream Pond, but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas.

Although metal, PCB, pesticide, and PAH COCs were identified in surface sediment samples from Upstream Pond, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the Upstream Pond locations. At the conclusion of the test (Day 42), there were no significant differences relative to the control or reference locations for any of the endpoints tested. Although none of these samples contained the maximum sediment concentrations for the COCs, metal (except silver), PCB, and PAH concentrations (pesticides were not measured in these sediment samples) in excess of ESVs were represented in these samples (for example, the maximum Aroclor-1260 concentration was 2,300 µg/kg). There also do not appear to be any widespread impacts to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of this BERA.

Most of the frogs that were collected from Upstream Pond for tissue analysis came from the southern end of the pond near where the Site 4 drainage channels enter. This is the area that generally had the highest surface sediment concentrations, particularly for the organic COPCs. Although most of the detected metal COPCs in frog tissue samples from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, only aluminum and cobalt exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. Few of the detected metals had available frog tissue ESVs, and those that were available were No Observed Effect Concentrations (NOECs) unbounded by the Lowest Observed Effect Concentration (LOEC) (that is, there were no reported effects at the highest concentration tested or observed). The LOECs for the three metals with NOEC values were estimated by multiplying the NOEC by an uncertainty factor of 5. Only the LOEC value for aluminum was exceeded. The NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC, but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs, although the uncertainties are too high to warrant formally selecting frog tissue COCs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (tadpoles were present and were sampled) population of bullfrogs (and likely leopard frogs) in the pond, and none of the sampled frogs had any external abnormalities or deformities.

Although most of the detected metal COPCs in fish tissue samples collected from Upstream Pond exceeded concentrations in reference area (background) samples, based on maximum concentrations, only aluminum exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. Aluminum was also the only COPC to exceed ESVs based on the LOEC and the maximum concentration (but not the 95 percent UCL concentration). Several detected metals (barium, iron, and manganese) without ESVs were selected as COPCs. However, none of these were selected as COCs because none were identified as COCs in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present)

population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

The PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) and endrin were identified as COPCs for further risk evaluation in aquatic food webs, based on MATC exceedances of the 95 percent UCL exposure dose for the tree swallow and mink (PCBs), and osprey (endrin). However, the LOAEL TRV was not exceeded for any of these receptor-chemical combinations, and the endrin exceedance is not likely to be biologically significant, because the use of Upstream Pond by osprey is likely to be occasional at best. Further, there were no exceedances based on the MATC and LOAEL for the mean exposure scenarios. Receptors actually observed in Upstream Pond (raccoon and great blue heron) had 95 percent UCL HQs that were less than 1, based on the MATC. Thus, potential risks based on exposure to PCBs in aquatic food webs are marginal for this water body, but Aroclor-1254, total PCBs, and dioxin-like PCBs are identified as COCs to allow for risk management consideration.

Upstream Pond contains a fairly abundant and diverse aquatic community, given its small size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization, since there are no natural sources of colonizing organisms other than Youth Pond, which is connected to Upstream Pond. Further, the source of most of the organic COCs is likely to be urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

6.5.2.2. Youth Pond

Youth Pond serves as a repository for stormwater runoff from developed and industrialized areas within its watershed. There are no specific source areas associated with this pond. In surface water, only barium exceeded both the ESV and the background UTL based on detected 95 percent UCL dissolved concentrations; however, the maximum ratio to the background UTL was only 1.03. Thus, no surface water COCs were identified for Youth Pond.

In Youth Pond surface sediment, eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) were identified as COPCs for further risk evaluation. The maximum HQ or ratio to the background UTL exceeded 3 only for mercury (3.09; but only one exceedance) and zinc (3.88; seven exceedances). Barium was generally consistent with background, exceeding the background UTL in 6 of 12 samples, but only exceeding by a factor of more than 1.4 in one of these samples from the pond. The maximum ratio (1.44) occurred in sample CAYP-SD10, located on the far eastern bank of the pond, well away from the two culverts. There were no strong spatial patterns to the exceedances for these metals except that the maximum concentration for five of the eight occurred at CAYP-SD05, located at the southern end of the pond, approximately 100 feet from the culvert connecting Youth Pond with Upstream Pond (**Figure 6-2**). There were no exceedances, however, at CAYP-SD06, located right at the Youth Pond end of this culvert. In addition, only zinc exceeded its ESV (HQ of 1.32) at CAYP-SD01, located approximately 100 feet from where the Outfall #34 Drainage Channel enters Youth Pond. The SEM/AVS ratios exceeded 1 at all Youth Pond surface sediment locations. However, mean concentrations in Youth Pond surface sediment were comparable, except for selenium, to mean concentrations in surface sediment samples used in the Upstream Pond toxicity testing, which were not impacted. There also do not appear to be any widespread impacts to the benthic invertebrate community in Youth Pond, based on the semi-quantitative biological survey that was conducted as part of this BERA. Thus, the observed concentrations of these metals are not likely to result in adverse impacts to the benthic community in Youth Pond. However, these seven metals are identified as COCs because there is no single compelling line of evidence with which to eliminate them, although the weight of the available evidence suggests that risks are likely to be acceptable. Arsenic was the only one of these seven metals that was also identified as a COPC in subsurface sediment.

The PCB Aroclor-1260 and three pesticides (4,4’-DDD, 4,4’-DDE, and 4,4’-DDT) were identified as COPCs for further risk evaluation in surface sediment. However, the frequency of exceedance was low for each of these chemicals and, except for 4,4’-DDT, none exceeded its EqP ESV. The pesticide 4,4’-DDT did not exceed its EqP ESV based on the 95 percent UCL. No PCB or pesticide exceeded its EqP ESV in subsurface sediment. Total PAHs did

not exceed both ESVs and background UTLs in surface sediment samples, and no individual PAH compound exceeded its EqP ESV. Total PAHs were also not exceeded in subsurface sediment.

Few of the detected metals in frog tissue samples had available frog tissue ESVs, and those that were available were NOECs unbounded by a LOEC; that is, there were no reported effects at the highest concentration tested or observed. The LOECs for the three metals with NOEC values were estimated by multiplying the NOEC by an uncertainty factor of 5. Only the LOEC value for aluminum was exceeded. The NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs, although the uncertainties are too high to warrant formally selecting frog tissue COCs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (based on the presence of tadpoles) population of bullfrogs (and likely leopard frogs) in the pond, and none of the sampled frogs had any external abnormalities or deformities.

Although most of the detected metal COPCs in fish tissue samples collected from Youth Pond exceeded concentrations in reference samples based on maximum concentrations, none exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. No COPC exceeded ESVs based on the LOEC and the maximum concentration. Two detected metals (barium and manganese) without ESVs were selected as COPCs for risk evaluation. However, neither of these metals was selected as a COC, because neither was identified as a COC in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

No food web COPCs were identified for Youth Pond; risks are acceptable for this pathway.

Youth Pond contains a fairly abundant and diverse aquatic community, given its size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms other than Upstream Pond, which is connected to Youth Pond. Further, the source of the COCs is likely urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

6.5.2.3. York River Drainage Channel

Lead was the only metal that exceeded ESVs and background UTLs in surface sediment. The HQ was 5.06 (and 4.35 compared with the background UTL). Lead was not exceeded in the subsurface sample. Fourteen PAHs (plus HMW, LMW, and total PAHs) had Screening-level Concentration (SLC) HQs that equaled or exceeded 1 and also exceeded background UTLs (where available) in surface sediment. Eight of the 14 individual PAHs also had EqP ESVs, and five of the eight were exceeded. These exceedances extended into the subsurface sample. Thus, lead and PAHs were identified as COCs in surface sediment. However, PAHs did not exceed ESVs and background UTLs in CAYP-SD03, located at the Youth Pond end of the York River Ditch, nor were there exceedances at CAYP-SD04, the next closest sample within Youth Pond to the York River culvert. The source of these PAHs (and lead, which also did not exceed ESVs in either CAYP-SD03 or CAYP-SD04) does not appear to be Youth Pond. While these samples were collected from an apparent depositional area within the drainage channel, this location could be impacted by contaminants transported by York River tidal cycles or by storm surges and the samples have the potential to contain contaminants from offsite sources.

6.5.2.4. Outfall #34 Drainage Channel

Two metals (selenium and zinc) were identified as surface soil COPCs for risk evaluation in the drainage channel. Selenium only exceeded ESVs in one of the four samples from the upper portion of this drainage channel at a maximum HQ of 1.28. It did not exceed sediment ESVs. Lead and zinc were the only metals with an HQ that exceeded 1 based on detected 95 percent UCL concentrations and also exceeded background UTLs (where

available) in surface sediment. Lead only exceeded sediment ESVs in one of six samples at a maximum HQ of 2.01. It did not exceed soil ESVs. Zinc exceeded both soil and sediment ESVs, but only in the three samples from the upper portion of the drainage channel. The three samples from the lower portion of the drainage channel, including the portion with viable aquatic habitat, did not exceed ESVs. Potential exposures in the upper portion of the drainage channel are minimal since the channel is narrow and only holds water intermittently. One pesticide (4,4'-DDT), bis(2-ethylhexyl)phthalate, and nine PAHs (plus LMW and total PAHs) exceeded SLC ESVs. However, these exceedances occurred in the upper portion of the drainage channel; soil ESVs were not exceeded.

6.6 Ecological Risk Assessment Summary and Conclusions

This section provides a summary of the results of the BERA and outlines the conclusions.

6.6.1 Terrestrial Habitats

In summary, arsenic, mercury, zinc, and PAHs were identified as COCs in surface and/or subsurface soil from Site 4 (**Table 6-2**) and may be site-related, although PAHs also had non-site-related sources. Lead and pesticide exceedances are thought not to be site-related. The exceedances for all of these constituents were spatially limited and likely have a low ecological risk potential on a site-wide and population-level basis. Similarly, the PCBs were identified as terrestrial food web COCs, but were also not site-related, and their distribution in soil was spatially limited. The terrestrial areas of Site 4 consist of relatively mature forested habitats and any decision to conduct intrusive remedial actions in this area should consider the potential impacts to these habitats that such actions would entail relative to the potential risks that have been identified. There were no unacceptable risks for the Youth Pond terrestrial habitats (developed and industrialized area and the upper portion of the Outfall #34 Drainage Channel).

6.6.2 Aquatic Habitats

Aquatic habitats evaluated in this BERA included Upstream Pond/Site 4 drainage channels, Youth Pond, the York River Drainage Channel, and the Outfall #34 Drainage Channel.

6.6.2.1. Upstream Pond and Site 4 Drainage Channels

Upstream Pond serves as a repository for stormwater runoff from developed and industrialized areas within its watershed, as well as from the source areas evaluated as part of this RI. The principal source of PCBs, in particular, appears to be stormwater runoff discharged at Outfall #2, which includes stormwater originating within a developed and industrialized area of considerable size to the west. Few constituents exceeded both ESVs and background UTLs in the surface water of Upstream Pond and the Site 4 drainage channels, and none were identified as COCs. Although metal, PCB, pesticide, and PAH COCs were identified in surface sediment samples from Upstream Pond, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the Upstream Pond locations. At the conclusion of the test (Day 42), there were no significant differences relative to the control or reference locations for any of the endpoints tested. Although none of the surface sediment samples used in the toxicity tests contained the maximum sediment concentrations for the COPCs, metal (except silver), PCB, and PAH concentrations (pesticides were not measured in these sediment samples) in excess of ESVs were represented in these samples. There also do not appear to be any widespread impacts to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of this BERA.

Most of the frogs that were collected from Upstream Pond for tissue analysis came from the southern end of the pond near where the Site 4 drainage channels enter. This is the area that generally had the highest surface sediment concentrations, particularly for the organic COPCs. Most of the detected metal COPCs in frog tissue samples from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but only aluminum and cobalt exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. Only the LOEC value for aluminum was exceeded. The NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at

concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (tadpoles were present and were sampled) population of bullfrogs (and likely leopard frogs) in the pond, and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples collected from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but only aluminum exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. Aluminum was also the only COPC to exceed ESVs based on the LOEC and the maximum concentration (but not the 95 percent UCL concentration). Several detected metals (barium, iron, and manganese) without ESVs were selected as COPCs. However, none of these were selected as COCs because none were identified as COCs in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

The PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) were selected as COCs in aquatic food webs based on MATC exceedances of the 95 percent UCL exposure dose for the tree swallow and mink. However, the LOAEL TRV was not exceeded for any of these receptor-chemical combinations. Further, there were no exceedances based on the MATC and LOAEL for the mean exposure scenarios. Receptors actually observed in Upstream Pond (raccoon and great blue heron) had 95 percent UCL HQs that were less than 1 based on the MATC. Thus, potential risks based on exposure to PCBs in aquatic food webs are marginal for this water body, but are identified for risk management consideration.

Upstream Pond contains a fairly abundant and diverse aquatic community given its small size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Youth Pond, connected to Upstream Pond. Further, the source of most of the organic COCs is likely to be urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

6.6.2.2. Youth Pond

Youth Pond serves as a repository for stormwater runoff from the developed and industrialized areas within its watershed. There are no specific source areas associated with this pond. No COCs were identified in surface water. In surface sediment, eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) were identified as COPCs for further risk evaluation. The maximum HQ or ratio to the background UTL exceeded 3 only for mercury (3.09; but only one exceedance) and zinc (3.88; seven exceedances). Barium was generally consistent with background, exceeding the background UTL in 6 of 12 samples, but only exceeding by a factor of more than 1.4 in one of these samples from the pond. The maximum ratio (1.44) occurred in sample CAYP-SD10, located on the far eastern bank of the pond, well away from the two culverts. There were no strong spatial patterns to the exceedances for these metals except that the maximum concentration for five of the eight occurred at SD05, located at the southern end of the pond and approximately 100 feet from the culvert connecting Youth Pond with Upstream Pond. There were no exceedances, however, at SD06, located right at the Youth Pond end of this culvert. In addition, only zinc exceeded its ESV (HQ of 1.32) at SD01, located approximately 100 feet from where the Outfall #34 Drainage Channel enters Youth Pond. The SEM/AVS ratios exceeded 1 at all Youth Pond surface sediment locations. However, mean concentrations in Youth Pond surface sediment were comparable, except for selenium, to mean concentrations in surface sediment samples from the Upstream Pond toxicity testing, which were not impacted. There also do not appear to be any widespread impacts to the benthic invertebrate community in Youth Pond based on the semi-quantitative biological survey that was conducted as part of this BERA. Thus, the observed concentrations of these metals are not likely to result in adverse impacts to the benthic community in Youth Pond. However, these seven metals are identified as COCs because there is no

single compelling line of evidence with which to eliminate them, although the weight of the available evidence suggests that risks are likely to be acceptable. No organic COCs were identified for Youth Pond surface sediment.

Few of the detected metals in frog tissue samples had available frog tissue ESVs. Only the LOEC value for aluminum was exceeded. The NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC, but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing population of bullfrogs (and likely leopard frogs) in Youth Pond, and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples from Youth Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but none exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. No COPC exceeded ESVs based on the LOEC and the maximum concentration. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple ages classes present) population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

No food web COCs were identified for Youth Pond; risks are acceptable for this pathway.

Youth Pond contains a fairly abundant and diverse aquatic community, given its size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Upstream Pond, connected to Youth Pond. Further, the source of the COCs is likely to be urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

6.6.2.3. York River Drainage Channel

Lead was the only metal that exceeded ESVs and background UTLs in surface sediment within the drainage channel from Youth Pond to the York River. Lead was not exceeded in the subsurface sample. Fourteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also exceeded background UTLs (where available) in surface sediment. These exceedances extended into the subsurface sample. However, the PAHs did not exceed ESVs and background UTLs in CAYP-SD03, located at the Youth Pond end of the York River Drainage Channel, nor were there exceedances at CAYP-SD04, the next closest sample within Youth Pond to the York River culvert. The source of these PAHs (and lead, which did not exceed ESVs in either CAYP-SD03 or CAYP-SD04) does not appear to be Youth Pond. While these samples were collected from an apparent depositional area within the drainage channel, this location could be impacted by contaminants transported by York River tidal cycles or by storm surges and the samples have the potential to contain contaminants from offsite sources.

6.6.2.4. Outfall #34 Drainage Channel

There were no unacceptable risks associated with the lower [aquatic] portion of the drainage channel.

TABLE 6-1

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Terrestrial Habitats			
Survival, growth, and reproduction of terrestrial soil invertebrate	Are site-related chemical concentrations in surface soil sufficient to adversely affect soil invertebrate communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely affect terrestrial plant communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants (seeds) from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mourning dove
Survival, growth, and reproduction of avian terrestrial invertivore/omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	American robin
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume plants from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Meadow vole
Survival, growth, and reproduction of mammalian terrestrial invertivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Short-tailed shrew

TABLE 6-1

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of mammalian terrestrial omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	White-footed mouse
Survival, growth, and reproduction of mammalian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red fox
Aquatic Habitats			
Survival, growth, and reproduction of aquatic and wetland plant communities	Are site-related chemical concentrations in surface water and surface sediment sufficient to adversely affect aquatic or wetland plant communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and wetland plants
Survival, growth, and reproduction of aquatic and benthic invertebrate communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect aquatic and benthic invertebrate communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and benthic invertebrates
		Comparison of invertebrate field survey results in site water bodies with a reference water body	
		Comparison of 42-day sediment toxicity test results (growth, survival, and reproduction) with the amphipod, *Hyalella azteca* , using site and reference sediment	
Survival, growth, and reproduction of fish communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect fish communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Fish
		Comparison of fish tissue residue analysis results with literature-based tissue ESVs	
Survival, growth, and reproduction of amphibian populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to amphibian populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Amphibians
		Comparison of tissue residue analysis results with literature-based tissue ESVs	
		Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	

TABLE 6-1

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of wetland/aquatic reptile populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to aquatic/wetland reptile populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Reptiles
		Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	
Survival, growth, and reproduction of avian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mallard
Survival, growth, and reproduction of avian aquatic/wetland piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Belted kingfisher Great blue heron Osprey
Survival, growth, and reproduction of avian aerial insectivore populations	Are site-related constituent concentrations in surface water and/or sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian insectivore populations that may consume emergent aquatic invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Tree swallow
Survival, growth, and reproduction of mammalian aquatic/wetland herbivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland plants from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Muskrat
Survival, growth, and reproduction of mammalian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Raccoon
Survival, growth, and reproduction of mammalian semi-aquatic piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mink

TABLE 6-2

Summary of Ecological Constituents of Concern

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Terrestrial Food Web	Surface Soil				Subsurface Soil			Surface Water			Surface Sediment					Fish Tissue		Aquatic Food Web	
		Site 4 NW	Site 4 South	Site 4 East	Developed Area	Site 4 NW	Site 4 South	Site 4 East	Upstream Pond	Site 4 Streams	Youth Pond	Upstream Pond	Site 4 Streams	Youth Pond	York River Ditch	Northern Ditch	Upstream Pond	Youth Pond	Site 4	Youth Pond
Metals																				
Arsenic		X												x						
Cadmium												X		x						
Copper												X		x						
Lead		x										X		x	x					
Mercury			X				X							x						
Selenium														x						
Silver												X								
Zinc			X				X					X		x						
PCBs																				
Aroclor-1254												x							x	
Total PCBs												x							x	
Dioxin-like PCBs	x																		x	
Pesticides																				
Aldrin			x																	
Dieldrin		x										x								
Endosulfan I		x																		
Endosulfan II												x								
Endosulfan sulfate		x																		
Endrin		x	x									x								
Endrin aldehyde		x	x																	
Endrin ketone			x																	
gamma-BHC (lindane)		x																		
Methoxychlor												x								
Semivolatile Organic Compounds																				
PAHs		X										x			x					

X - Likely site-related

x - Not likely site-related

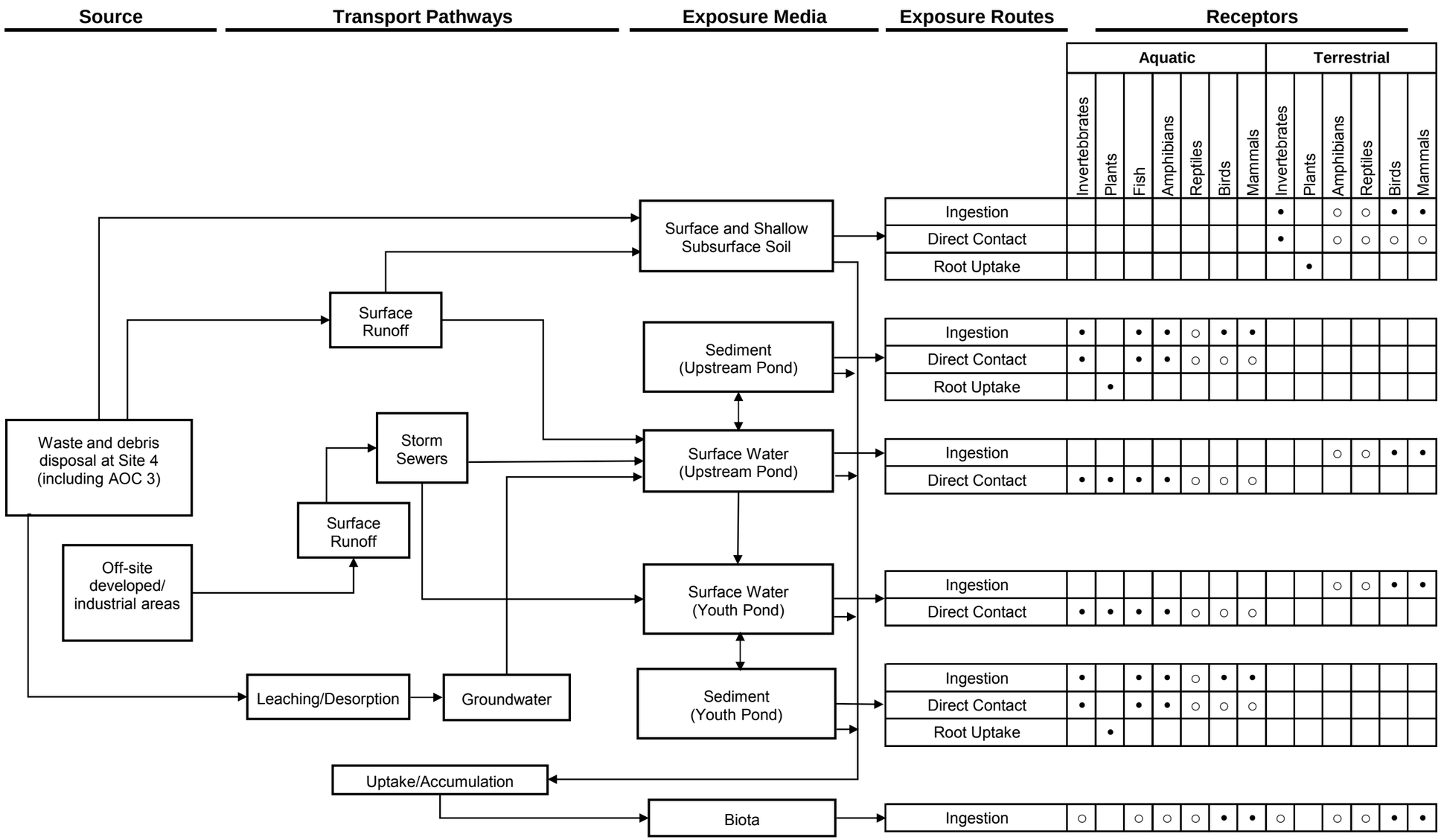
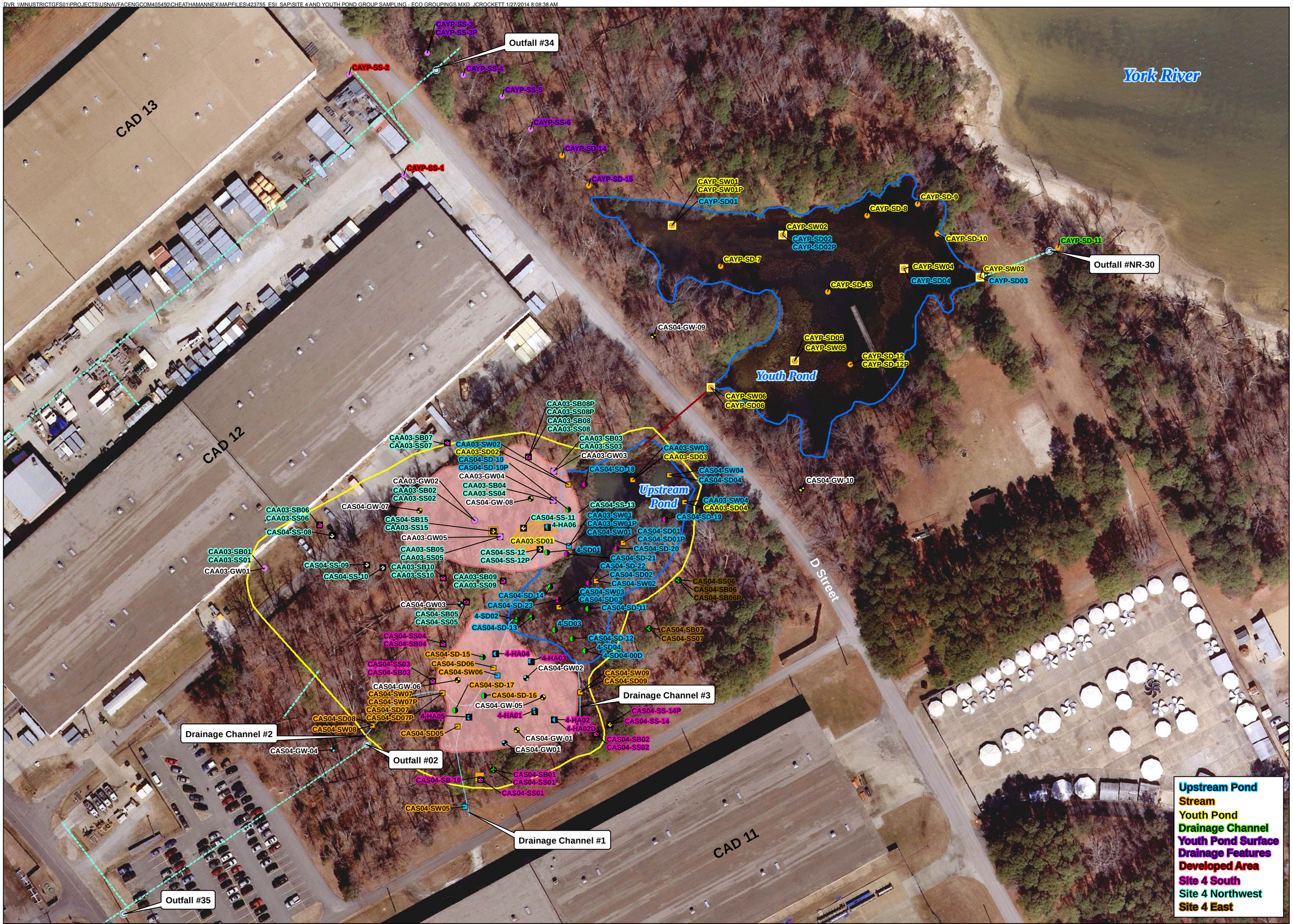


Figure 6-1
Ecological Conceptual Site Model
Site 4/Youth Pond Remedial Investigation
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

DVR: \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\423755_ESI_SAP\SITE 4 AND YOUTH POND GROUP SAMPLING - ECO GROUPINGS.MXD, JCROCKETT 1/27/2014 8:08:38 AM



Legend

- Groundwater Sample Location
- Surface Sediment Samples
- Sediment/Toxicity Samples
- Surface Soil Samples
- Surface/Subsurface Soil Samples
- Surface Soil Samples for Hexavalent/Total Chromium
- Subsurface Soil Samples for Total and Hexavalent Chromium Analysis

- Outfall
- 2009 SI Soil Sample Location
- 2009 SI Surface Water Sample Location
- 2009 SI Surface Water/Sediment Sample Location
- 2009 SI Well Point Groundwater Sample Location
- 2009 SI DPT Soil Sample/Well Point Groundwater Sample Location

Youth Pond Samples:

- Sediment Sample Location
- Sediment/Surface Water Sample Location
- Surface Soil Sample Location

- Storm Water Line
- Culvert
- Drainage Channels
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure 6-2
Site Features and Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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SECTION 7

Chemical Fate and Transport

This section discusses the fate and transport of COCs identified from the HHRA and ERA (Sections 5 and 6, respectively) for Site 4 and Youth Pond. Fate and transport consists of the identification of theoretical chemical phases and migration and degradation pathways. An understanding of the mobility and persistence of a constituent in the subsurface is part of the overall assessment of the potential for that constituent to cause an adverse human health or environmental effect. As shown in **Table 7-1**, the COCs for Site 4 and Youth Pond include VOCs (groundwater), SVOCs (surface soil, subsurface soil, groundwater, and sediment), pesticides (surface soil, subsurface soil, groundwater, and sediment), PCBs (subsurface soil, sediment, fish tissue), and total and/or dissolved metals (surface soil, subsurface soil, groundwater, and sediment). The PCBs were also identified as aquatic and terrestrial food web COCs. There were no COCs identified for the surface water medium. Fate and transport characteristics for each of these groups of chemicals are described as follows. Chemical properties are listed in **Table 7-2**.

This section also presents and summarizes the overall CSM for Site 4 and Youth Pond, which was developed using the compendium of information and data presented in this RI Report, including the fate and transport discussion in this section.

7.1 Chemical Mobility and Persistence

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

7.1.1 Volatilization

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

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

Values of vapor pressure and K_h for the site COCs are provided in **Table 7-2**. The K_h values indicate that the VOCs and 1,1-biphenyl have properties indicative of higher volatility. Dibenzofuran, naphthalene, PCBs, and some pesticides (aldrin, dieldrin, ensosulfan I, and methoxychlor) have moderate volatility. HMW PAHs and the remaining pesticides generally have limited volatility. Due to the complexity of metals and their variable forms in the environment, no K_h values can be provided for metals. However, these constituents are typically not volatile under normal temperature and pressure conditions. Emissions to ambient air are usually in the form of particulates.

7.1.2 Sorption

Sorption occurs when a constituent adheres to and becomes associated with solid particles in the geologic formation. The subsurface materials likely to sorb chemicals are clays and organic matter. Silty clay is present in

the Yorktown confining unit. In addition, some metals, such as arsenic species, can sorb to iron and oxyhydroxide or oxide coatings on soil and sediment grains.

The conventional measure of sorption is the distribution coefficient (K_d). The K_d for organic chemicals is the product of the soil organic carbon partition coefficient (K_{oc}) of the chemical and the fraction of organic carbon (f_{oc}) in the soil. Based on site-specific organic carbon data (**Table 4-2**), the f_{oc} content in Site 4 subsurface soil is estimated at 0.010. In general, chemicals with a K_{oc} greater than 10,000 milliliters per gram (ml/g) have high degrees of adsorption and consequentially low mobility, whereas chemicals with a K_{oc} lower than 1,000 ml/g have lower degrees of adsorption and consequentially higher mobility. The VOCs in groundwater at Site 4 have relatively low K_{oc} values, whereas the HWM PAHs, PCBs, and some pesticides (aldrin, dieldrin, endrin aldehyde, and methoxychlor) at Site 4 have high K_{oc} values. The remaining SVOCs and pesticides listed in **Table 7-2** had moderate K_{oc} values.

The K_d for metals is a complex function of pH, organic content, oxide coatings, and other factors; therefore, K_d is not easily estimated by methods other than site-specific testing. Due to the number of factors that impact the K_d values for metals, these values range from 0.1 ml/g to greater than 600,000 ml/g (**Table 7-2**). Generally, inorganic adsorption increases with pH. Metals most often sorb to clay minerals, organic matter, and iron and manganese oxyhydroxides. Metals may be sorbed on the surface of the soil or fixed to the interior of the soil, where they are unavailable for release to groundwater. After available sorption sites are filled, most metals are incorporated into the structures of major mineral precipitates as co-precipitates.

7.1.3 Solubility

Solubility is a measure of the degree to which a constituent will dissolve in water. Highly soluble chemicals are more likely to be leached from soil by precipitation or runoff that infiltrates into the subsurface. The detected VOCs (benzene and ethylbenzene) have relatively high solubilities, while some SVOCs (1,1-biphenyl, dibenzofuran, naphthalene) and lindane had more moderate water solubilities. The majority or pesticides and PCBs listed in **Table 7-2** have low solubilities (less than 0.6 mg/L), while the HMW PAHs have very low solubilities (less than 0.1 mg/L).

The solubilities of metals are dependent on several factors and are, therefore, not included in **Table 7-2**. In general, solubility is highly dependent on the oxidation state of the inorganic constituent, which is dependent on subsurface conditions. The solubility of cations decreases as pH increases. Some cations may complex with oxygen and hydroxide, forming insoluble oxyhydroxides, or with phosphate, sulfate, and carbonate, forming insoluble mineral precipitates. Metal sulfide complexes, which form in reducing environments, are extremely insoluble and tend to reduce the total metals concentrations (USEPA, 1979).

7.1.4 Bioaccumulation

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

Table 7-2 lists some bioaccumulation values for the COCs. The PCBs had the highest values, followed by PAHs and pesticides, which indicates a higher potential to bioaccumulate. The VOCs had the lowest bioaccumulation values. It is assumed that for a metal to be taken up by a plant or to exert an effect on plant growth, it must be present in solution. Therefore, factors that influence the speciation and solubility of metals in soil also affect bioconcentration. The pH of soil can also affect the amount of plant uptake of certain elements.

7.1.5 Transformation

Transformation occurs when the valence state of metals is increased (oxidation) or decreased (reduction). It can be caused by changes in oxidation potential and/or pH and by microbial or non-microbial (abiotic) processes.

Transformation may have a significant effect on the mobility of an inorganic constituent, either increasing or decreasing it.

7.1.5.1. Aluminum, Iron, and Manganese

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

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

7.1.5.2. Arsenic, Chromium, and Selenium

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

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

7.1.5.3. Cadmium, Lead, and Zinc

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

7.1.5.4. Copper, Mercury, and Silver

These metals are highly insoluble in reduced environments, where they precipitate as metal sulfides (ERG, 2003). They are sorbed by iron and manganese oxides and clays. Mercury and copper are also both strongly adsorbed by organic matter. However, complexing of these constituents to ammonia, chloride (or other halogens), and humic acids can increase their solubility and thus mobility. Copper is insoluble above a pH of 7 to 8 and in the presence of abundant carbonate. Mercury can volatilize from soil and water, creating a cycle through the environment.

7.1.5.5. Thallium

The mobility of thallium in water is limited by the low solubility of thallium oxides. It is only soluble in highly reduced environments in the charged ionic form. Thallium is strongly adsorbed by montmorillonite clays and manganese oxides.

7.1.6 Degradation

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

7.1.6.1. VOCs

The VOCs identified as COCs at Site 4 include benzene and ethylbenzene in groundwater. These aromatic VOCs can be biodegraded in oxidation-reduction (redox) reactions, in which the contaminant is used as the electron donor by the microorganism. Biodegradation will occur when a sufficient amount of electron acceptors, electron donors, and nutrients are available in groundwater. Microorganisms preferentially use electron acceptors, which will provide the most energy. The DO is consumed first as the prime electron acceptor. Nitrate is the next preferred electron acceptor, followed by manganese, ferric iron (III), sulfate, and carbon dioxide. As each electron acceptor is used and depleted, the ORP of the groundwater system is driven downward (that is, more negative). Biodegradation of aromatic VOCs occurs most rapidly under aerobic conditions. Sulfate reduction and methanogenesis, however, have been reported as accounting for more than 70 percent of the assimilative capacity for benzene and ethylbenzene degradation (Parsons Engineering, 1999); therefore, these processes can be significant.

7.1.6.2. SVOCs

The SVOCs identified as COCs at Site 4 include PAHs, 1,1-biphenyl, and dibenzofuran. The PAHs can be biodegraded under aerobic and anaerobic conditions. However, aerobic biodegradation occurs at a much faster rate. The principal mechanism for aerobic metabolism is the initial oxidation of the benzene ring by the action of oxygenases. Nevertheless, the PAHs sorbed to organic matter may be less available for biodegradation. In general, HMW PAHs (such as, benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, and dibenz[a,h]anthracene) are generally more recalcitrant than LMW PAHs and resultantly have longer half lives. The COC 1,1-biphenyl is readily biodegraded under aerobic conditions; however, biodegradation can be slow or nonexistent under anaerobic conditions. Dibenzofuran can also be biodegraded under aerobic conditions. Aneraobic biodegradation and abiotic photolysis have been also been documented (Hazardous Substances Data Bank, 2013).

7.1.6.3. Pesticides

Several pesticides have been identified as COCs at Site 4. Aldrin can be biodegraded under aerobic and anaerobic conditions. Under aerobic conditions, it may be converted to dieldrin via epoxidation. On the contrary, dieldrin can be resistant to biodegradation under both aerobic and anaerobic conditions. Both aldrin and dieldrin will degrade via abiotic photolysis. The two major degradation routes for endosulfan I and II include aerobic biodegradation and abiotic hydrolysis. However, anaerobic biodegradation may also occur. Endosulfan sulfate, which is a metabolic product of endosulfan, can be degraded via aerobic biodegradation or a variety of abiotic processes. Biodegradation of endrin and lindane is more favorable under anaerobic conditions. When exposed to light, endrin may form endrin aldehyde and endrin ketone. On the contrary, biodegradation of methoxychlor favors aerobic conditions. Endrin, lindane, and methoxychlor can degrade via photolysis or hydrolysis. Similar to PAHs, the degradation of these pesticides may be limited by their availability in the soil, due to sorption to the surrounding matrix.

7.1.6.4. PCBs

The PCBs identified as COCs at Site 4 include Aroclor-1242, Aroclor-1254, and Aroclor-1260. In general, tetra-isomers (Aroclor-1016 and -1242) are reported to aerobically biodegrade slowly, while higher PCBs (Aroclor-1248, -1254, and -1260) are resistant to biodegradation (Hazardous Substances Data Bank, 2013). Anaerobic reductive dechlorination of these PCBs can occur, but may require enhancement to achieve effective degradation rates. These PCBs do not significantly degrade abiotically in the environment.

7.1.7 Natural Attenuation Evaluation

Geochemical and general water quality parameters were measured during the RI to help evaluate natural attenuation processes in groundwater at Site 4. Natural attenuation includes a variety of physical, chemical, or biological processes that under favorable conditions act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater. These processes consist of biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants. Geochemical data are provided in **Tables 4-3** and **4-4** and can be used to determine if conditions are favorable for degradation of organic constituents in groundwater and assess the potential speciation of

metals. The COCs identified in Yorktown-Eastover aquifer groundwater at Site 4 include VOCs (benzene, ethylbenzene), SVOCs (1,1-biphenyl, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, dibenzofuran, indeno[1,2,3-cd]pyrene, and naphthalene), dieldrin, and metals (arsenic, aluminum, chromium, iron, manganese, thallium). Physical attenuation processes can also be important. Sorption was discussed in Section 7.1.2 while volatilization was discussed in Section 7.1.3.

In the Yorktown-Eastover aquifer, groundwater is under predominantly anaerobic and reducing conditions. The DO concentrations were measured below 1 mg/L, with the exception of the upgradient well (CAA03-GW01) and two monitoring wells located at Burial Area 2 (CAS04-GW01 and CAS04-GW02). The ORP values ranged from +231.4 mV to -266 mV. The positive, more oxidizing, ORP values are contradictory with data from nearby monitoring wells; therefore, these values may have been impacted by extraneous factors acting on the field meter (for example, organic matter on the ORP probe). Nitrate concentrations were low (0.5 mg/L or less) in all groundwater analyzed for geochemical parameters. Therefore, even though nitrite was detected at CAS04-GW05, denitrification is not considered a significant process at the site. The strongest geochemical indicators for reducing conditions were observed at monitoring well CAS04-GW08 at Burial Area 1; sulfate reduction and methanogenesis appear to be proceeding at this location. Limited sulfate reduction and methanogenesis may also be occurring at monitoring well CAS04-GW07, located at the upgradient/western edge of Burial Area 1. At monitoring well CAS04-GW05, located in Burial Area 2, geochemical data did not provide strong evidence for reducing or oxidizing conditions. However, the ORP readings (+231.4 mV) are indicative of oxidizing conditions. Additionally, the DO concentrations at this well (0.55 mg/L) were lower than in the upgradient well (2.91 mg/L), which may be due to aerobic metabolism. Since additional geochemical data were not collected at the upgradient well, it is uncertain if other redox reactions are proceeding. However, based on the low methane and higher nitrate and sulfate concentrations compared to other monitoring wells with geochemical data, it is assumed that any other redox reactions are not dominant processes in groundwater in this area. Notably, the ORP readings were measured below -198 mV at the three other groundwater sample locations within Burial Area 2, indicating the potential for variable redox conditions within Site 4 groundwater. The pH values were generally neutral across the aquifer.

Under these anaerobic conditions, the organic compound COCs (benzene, ethylbenzene, PAHs 1,1-biphenyl and dibenzofuran], and dieldrin) can undergo biodegradation. However, degradation rates are expected to be slower than under aerobic conditions, particularly for the PAHs. Furthermore, HMW PAHs and dieldrin may be still be resistant to biodegradation if suitable subsurface conditions are not present. For these constituents, physical natural attenuation processes may be the controlling factors in contaminant fate and transport.

The reducing conditions generally observed in the Yorktown-Eastover aquifer at Site 4 also impact inorganic constituent concentrations. Under these conditions, the solid forms of iron (iron hydroxides) and manganese (manganese oxides), which are usually present in the natural soil matrix, can reductively dissolve into soluble forms. Any metals (such as, arsenic, chromium, and thallium) that may be naturally bound to these hydroxides will also be released to groundwater. Aluminum minerals (aluminum hydroxides and imogolite) can also reductively dissolve into a soluble form; however, this transformation process is more associated with a decrease in pH rather than ORP. The soluble form of aluminum can also be released to groundwater through complexation to organic acids. Thallium may also be transformed to its more soluble form under more reducing conditions.

7.2 Contaminant Migration

The following subsections present a generalized description of theoretical contaminant flow pathways at Site 4 that may have resulted in the distribution of contaminants. Potential exposure and receptor pathways were discussed in Sections 5 and 6.

7.2.1 Unsaturated Zone Migration

Contaminants released to surface soil (via direct waste and debris placement or stormwater runoff) may have migrated vertically through the unsaturated subsurface soil through gravitational force or leaching from infiltration. Buried debris was also placed directly in contact with subsurface soil at Burial Area 1 (at depths potentially greater than 8 feet bgs) and Burial Area 2 (to a depth of 7.5 feet bgs).

Site 4 and the land areas surrounding Youth Pond are heavily vegetated with shrubs and trees, providing little to no restriction for infiltration. This includes the two burial areas, which have no engineered soil cover or ground sloping, which might limit infiltration. The presence of vegetation limits the potential for wind erosion and volatilization, which could release contaminants in surface soil to the atmosphere. Once in the unsaturated zone, contaminants may have sorbed to soil or organic matter, become trapped in residual pore spaces, or continued to leach and be transported to the saturated zone. Constituents sorbed or complexed to surface soil may be transported to sediment via surface water runoff.

HMW PAHs were identified as COCs in surface and subsurface soil at Site 4. These constituents have low volatility and, therefore, are unlikely to be lost to the atmosphere. Their high tendency to sorb to the soil matrix and very low water solubilities make them less likely to vertically migrate into the subsurface. Nevertheless, leaching likely occurs where subsurface soil is in direct contact with buried waste. These PAHs are subject to biodegradation; however, they may be recalcitrant in soil, especially if sorbed to organic matter.

Numerous pesticides were identified as COCs in soil at Site 4. In surface soil, this includes aldrin, dieldrin, endosulfan I, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and lindane. Only dieldrin was identified as a COC in subsurface soil. Aldrin, dieldrin, and ensosulfan I have moderate volatility and therefore may volatilize somewhat into the atmosphere and soil gas. Pesticides identified as soil COCs would be expected to preferentially sorb to soil due to their low water solubility and moderate to high sorption coefficients. Again, only dieldrin was identified as having leached or been transported into subsurface soil and groundwater at concentrations that might pose unacceptable risks. Pesticides identified as soil COCs can undergo biotic and abiotic degradation; however, dieldrin can be resistant. The presence of endosulfan sulfate, endrin ketone, and endrin aldehyde may be due to degradation of the parent compounds (endosulfan I and endrin). Dieldrin may also have been formed from the degradation of aldrin. Biodegradation of endrin and lindane are more favorable under anaerobic conditions; therefore, degradation of these constituents may be slow in surface soil, which is exposed to the atmosphere.

Aroclor-1242 and -1260 were identified as COCs in subsurface soil. Similar to PAHs, these PCBs are expected to sorb to soil and not appreciably leach to groundwater. Based on their moderate volatility, they may evaporate into soil gas and then into the atmosphere. Elevated concentrations were only detected in three samples, which were located at the northern and southwestern corner of Burial Area 2.

Numerous metals were identified as COCs in soil at Site 4. These include arsenic, lead, mercury, and zinc in surface soil and aluminum, arsenic, chromium, iron, mercury, thallium, and zinc in subsurface soil. As stated in Section 4, metals like iron and arsenic may be naturally occurring in the environment, and their reported presence may or may not indicate a CERCLA release. The mobility of metals in the unsaturated zone is highly dependent on the subsurface conditions. Assuming that the soil at Site 4 exists under more oxidizing conditions, aluminum and iron will tend to be in their immobile forms of aluminum hydroxides and iron hydroxides. In oxidizing environments, arsenic and chromium are typically present in forms that are more mobile. Mercury is moderately mobile in soil and may become more soluble in areas with high salinity. However, these metals, along with lead, thallium, and zinc, will potentially sorb or complex with clays, organic material, iron hydroxides, or manganese oxides, limiting their mobility. Only a small fraction of lead in soil will be in a water-soluble form.

7.2.2 Surface Water, Sediment, and Stormwater Runoff Migration

Stormwater runoff and the resulting intermittent surface water flow can transport site-related contaminants released to Site 4 surface soil or non-site-related contaminants typically found in runoff from paved surfaces, building rooftops, and other impervious surfaces in developed and industrialized areas that are then deposited in drainage channels and the sediment of Upstream and Youth Ponds. Transport occurs when contaminants are either dissolved in the stormwater/runoff or sorbed to particulate matter small enough to be carried by the stormwater flow. Contaminants are ultimately deposited, sorbed onto sediment, or released to one of the surface water bodies. The TOC content in Upstream Pond and Youth Pond sediment is moderate to very high, ranging from 2,400 mg/kg to 250,000 mg/kg (**Table 4-5**).

As shown on **Figure 3-1**, stormwater runoff flows from the north (CAD Building 12 area), south (CAD Building 11 area), and west (parking lot) towards Upstream Pond. This runoff, along with stormwater drainage discharged at Outfall #2, flows though the Site 4 drainage channels traversing Burial Area 2 and into Upstream Pond. Runoff may be locally limited by vegetation, where present. Stormwater runoff from D Street may flow west towards Site 4 or east towards the Youth Pond area. Youth Pond also receives runoff from a drainage channel that runs parallel to D Street from Outfall #34. As shown on **Figure 3-1**, Outfall #34 receives stormwater drainage from the area between CAD Buildings 12 and 13 and potentially two other small stormwater drains. When water levels are high in Upstream Pond, surface water will flow from Upstream Pond to Youth Pond through a culvert under D Street. Surface water from Youth Pond then discharges through a culvert into a drainage channel leading to the adjacent York River. The York River may also be an offsite source of contaminants to the drainage channel leading from Youth Pond during periods of significant storm surges. This is supported by the fact that PAH concentrations detected in sediment samples collected from the drainage channel were roughly an order of magnitude higher than those observed in Youth Pond sediment.

The PAHs, pesticides, PCBs, and metals were identified as sediment COCs at Site 4 and Youth Pond. These PAHs (HMW and LMW), pesticides (dieldrin, endosulfan II, endrin, and methocychlor), and PCBs (Aroclor-1254 and total PCBs) are expected to adsorb to sediment and not appreciably dissolve into surface water. LMW PAHs, pesticides, and PCBs identified as sediment COCs may moderately volatilize into the atmosphere. On the contrary, HMW PAHs are unlikely to evaporate. Unlike surface soil, sediment is often subject to more reducing conditions due to the presence of organic matter, which may facilitate biological redox reactions. Although anaerobic biodegradation of the organic COCs are documented, only endrin is considered to favorably biodegrade under these conditions.

Metals identified as COCs in sediment include arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc. Under reducing conditions, arsenic may precipitate out in the presence of sulfides; however, it can also become more mobile if iron hydroxides and manganese oxides are reduced. Chromium and selenium will also tend to form insoluble complexes under reducing conditions. The other metals will sorb to organic matter present in sediment.

There were no COCs identified for the surface water medium at Site 4 or Youth Pond. Nevertheless, the PCBs were identified as COCs in fish tissue and aquatic and terrestrial food web COCs. Therefore, migration of these contaminants via the surface water pathway may have an impact on ecological receptors. The PCBs are less likely to dissolve in surface water likely to preferentially sorb to sediment. Therefore, the PCBs transported via surface water would most likely be sorbed to soil or particulate matter and deposited to sediment or surface soil. They have a high tendency to bioaccumulate.

7.2.3 Saturated Zone Migration

Contaminants have entered groundwater at Site 4 primarily due to leaching through unsaturated zone soil. However, buried debris may have also been placed directly in contact with the saturated zone at Burial Area 1. Because of the shallow depth to groundwater encountered at the test pits located closest to Upstream Pond, the vertical depth of debris could not be confirmed during RI field activities.

Contaminants in the Yorktown-Eastover aquifer have been transported from the source release areas through advection and dispersion. Advection is the primary transport mechanism and includes the transport of dissolved contaminants by the bulk motion of flowing groundwater. Dispersion is the spreading of dissolved contaminants from the path they would be expected to follow during advection due to the spatial variation in aquifer permeability, fluid mixing, and molecular diffusion. At Site 4, groundwater in the Yorktown-Eastover aquifer flows northeast towards the York River. No vertical gradient data are available. Assuming that upward vertical gradients exist near the surface water bodies, this would indicate that groundwater discharges through sediment and into surface water of Upstream Pond and Youth Pond. However, when surface water levels are high, during periods of high precipitation, surface water may serve as a recharge point for groundwater. Since there were no COCs identified in surface water, groundwater to surface water discharge is not considered a dominant transport pathway. Additionally, stormwater runoff would be expected to have a much greater impact on the surface water bodies. Contaminants in groundwater may volatilize into unsaturated zone soil gas at the water table interface.

Contaminants typically will not move as rapidly as groundwater because of retardation or the adsorption of the contaminant to the solid media. At Site 4, the TOC content in shallow and deep subsurface soil is generally moderate, ranging from 3,400 mg/kg to 32,000 mg/kg (**Table 4-2**). The highest values were observed in the deep subsurface soil samples. Therefore, retardation can be a significant factor for several of the COCs. Nevertheless, the TOC values are likely lower in portions of the aquifer where sands and shell hash are more dominant and retardation will not be as controlling in these zones. The advective migration rates of different dissolved contaminants vary depending on the K_d and the rate of groundwater flow. For each contaminant detected at the site, it is theoretically possible to calculate a retardation coefficient, which is an estimate of the degree to which the contaminant is slowed by adsorption in relation to the groundwater flow velocity. The retardation coefficient is calculated according to the following equation:

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

Where :

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

In the Yorktown-Eastover aquifer, the VOCs, SVOCs, pesticides, and metals were identified as groundwater COCs. Assuming a bulk density of 1.5 g/cm^3 and an effective porosity of 0.3, the estimated retardation coefficients are listed in **Table 7-2**. Retardation coefficients for benzene and ethylbenzene were below 13. The retardation coefficients for HMW PAHs ranged from 32,000 to 250,000. Retardation coefficients for the pesticide dieldrin and other SVOCs ranged from 65 to 1,700. The retardation coefficients of metals are variable depending on the form of the chemical in the subsurface and may range from 0.1 to greater than 3,000,000. The effect of retardation is estimated by dividing the groundwater flow velocity by R, which provides a value of migration that is either equal to (in the case of no retardation) or less than (in the presence of retardation) the groundwater flow velocity (**Table 7-2**).

Organic constituents identified as COCs in groundwater include VOCs (benzene and ethylbenzene), SVOCs (HMW PAHs, 1,1-biphenyl, dibenzofuran, and naphthalene), and dieldrin. Benzene, ethylbenzene, and more volatile SVOCs (1,1-dibenzofuran, dibenzofuran, naphthalene) in groundwater may volatilize into soil gas overlying the water table. These constituents also have high to moderate aqueous solubilitiies and have the potential to migrate once dissolved in groundwater. On the contrary, HMW PAHs and dieldrin are more likely to sorb to soil or organic matter and not migrate as extensively. All of the organic groundwater COCs are subject to biodegradation under the anaerobic conditions observed in groundwater at Site 4. However, the biodegradation rates may be limited by electron acceptor availability and the biological community. Although dieldrin can undergo biodegradation, it can be recalcitrant.

Metals identified as COCs in groundwater include aluminum, arsenic, chromium, iron, lead, and thallium. Transport and partitioning of metals in water is dependent on the oxidation state of the constituent and on interactions with other materials present. Under the reducing conditions generally observed in the Yorktown-Eastover aquifer at Site 4, iron, manganese, and thallium can be transformed into more soluble forms. Aluminum can also be reductively dissolved, particularly with a decrease in pH. Any metals (such as, arsenic, chromium, lead, and thallium) that may be naturally bound to iron hydroxides and manganese oxides can also become more mobile. If sulfides are present in groundwater, arsenic may co-precipitate.

7.3 Conceptual Site Model Summary

This subsection summarizes the CSM for Site 4, which qualitatively combines and interprets site-specific physical characteristics (such as, hydrogeology), contaminant sources, nature and extent of contamination, potential migration of the contaminants, and the potential exposure and receptor pathways. **Figure 7-1** provide a graphical depiction of the CSM and supports the discussion in this section. This is a living document used to support

potential risk management decisions and aid in defining the effectiveness of potential remedial alternatives, if needed.

7.3.1 Physical Characteristics

Site 4 includes two identified burial areas, drainage channels carrying stormwater from developed and industrialized areas to the west and south of the site, and Upstream Pond. To the northeast, Youth Pond is located between Site 4 and the York River. The general topography in this area of CAX consists of a downward slope to the northeast towards the York River; however, locally the topography slopes inward towards Upstream Pond and Youth Pond in the near vicinity of these features. Site 4 and the Youth Pond area are heavily vegetated, which provides little restriction for infiltration to the subsurface. However, the areas to the north, south, and west of Site 4 are developed and covered with asphalt pavement and buildings. Stormwater runoff from these impervious surfaces is captured in various storm drains and directed to several stormwater outfalls that discharge through drainage channels to Upstream and Youth Ponds. During times of high water levels, surface water flows from Upstream Pond to York Pond and ultimately to the York River under a VPDES stormwater permit. The York River is tidally influenced.

The groundwater aquifer of interest at Site 4 is the Yorktown-Eastover aquifer. It is composed primarily of silt, fine to coarse-grained sand, and shell hash. The bottom of the aquifer has not been reached by soil borings completed at the site. It is underlain by the thick Eastover-Calvert confining unit. Groundwater in the Yorktown-Eastover aquifer flows to the northeast towards the York River at an estimated groundwater velocity of 0.094 ft/day. Groundwater is not expected to be significantly impacted by tidal action at this site. Vertical hydraulic gradient data have not been collected; however, upward gradients are possible near the surface water bodies, which would be indicative of groundwater to surface water discharge.

The TOC content in the aquifer is considered to be moderate, with an average f_{oc} of 0.0025 in subsurface soil, which could facilitate sorption of some constituents. The TOC concentrations were up to an order of a magnitude higher in sediment compared to subsurface soil.

7.3.2 Potential Sources of Contamination

Based on the investigations conducted at Site 4, releases from potential source areas may have impacted soil, groundwater, and sediment at Site 4 and the Youth Pond area. However, the only known potential source of CERCLA-regulated contamination in the study area is the buried waste and surface debris at Site 4. Potential non-CERCLA-regulated sources of contamination, which may have also impacted site media, include: 1) Stormwater discharges from the developed and industrialized areas adjacent to CAD Buildings 12 through 16, which are used for general warehouse storage of vehicles, equipment, and miscellaneous metal; 2) Stormwater runoff from other impervious surfaces such as roadways and parking lots; and 3) Routine pest and weed management via the normal use of pesticides around buildings and/or roads. In addition, the concentrations of some metals (such as iron, manganese and arsenic) may be naturally occurring in the environment.

7.3.3 Summary of Current Migration Pathways

Based on the fate and transport mechanisms that are active at Site 4, the primary migration pathways of COCs in the site media are:

- Stormwater runoff and surface water transport of contaminants from source areas and deposition within drainage channels, Upstream Pond, and Youth Pond
- Leaching of contaminants from buried waste, surface debris, and impacted surface soil into subsurface soil and subsequently into groundwater
- Dissolved contaminant migration in the Yorktown-Eastover aquifer with groundwater flow (via advection and dispersion)
- Less prominent fate and transport mechanisms at Site 4 include volatilization of surface soil and sediment contaminants into the atmosphere, volatilization of groundwater contaminants into soil gas, and discharge of groundwater contaminants through sediment and into surface water.

7.3.4 Distribution and Transport of COCs

Buried debris was identified in two burial areas at Site 4. At Burial Area 1, waste extends to a depth of at least 8 feet bgs and was present at or below the water table based on the recent RI investigation. Although the ultimate depth of waste could not be confirmed, it is assumed that it does not extend much deeper in the subsurface and would be limited by historic water table levels at the site. Buried waste types identified in test pits included asphalt, bricks, concrete, metal, construction and wood debris, automotive parts, tarpaper, shingles, and a 55-gallon drum. At Burial Area 2, the waste was vertically delineated to a depth of 7.5 feet bgs. Buried waste observed in test pits in this area included medical supplies, metal, and construction/fill debris.

Two VOCs (benzene and ethylbenzene) and three SVOCs (1-biphenyl, dibenzofuran, and naphthalene) were identified as COCs only in groundwater. These groundwater COCs are highly soluble with low to moderate sorption; therefore, they have limited retardation in groundwater. They may volatilize into soil gas at the water table interface and are subject to biodegradation under the anaerobic conditions observed in groundwater at Site 4. These COCs have a very limited extent in groundwater and were only detected at wells located inside Burial Area 1. The highest concentrations were reported at temporary well (CAA03-GW05) adjacent to a surface debris pile. These VOCs were not detected in surface soil or shallow subsurface soil in Burial Area 1. Notably, these VOCs were not detected in the two permanent monitoring wells installed within Burial Area 1 as part of the recent RI. This may suggest that attenuation of these constituents has occurred since the 2009 investigation.

The SVOCs that are COCs only in groundwater were detected in several surface and subsurface soil samples in the northwestern area of the site. In surface soil, the most-elevated concentrations were detected in the offsite grass/dirt area that forms a shallow drainage swale next to CAD Building 12, which was observed to collect stormwater runoff from the building rooftop and the nearby automobile parking area.

At Site 4 and the Youth Pond area, PAHs were identified as COCs in soil, sediment, and groundwater. HMW PAHs were the most frequently detected at the site and generally present at the highest concentrations in site media. These constituents are expected to preferentially sorb to soil and sediment and should not appreciably leach to groundwater or surface water or be lost to the atmosphere. The PAHs can be biodegraded under aerobic and anaerobic conditions. However, aerobic biodegradation occurs at a much faster rate.

- In soil, the PAHs were detected extensively across Site 4 and the Youth Pond area. The highest concentrations were detected in the offsite surface soil sample located in a shallow drainage swale adjacent to CAD Building 12 that directs stormwater runoff from the building rooftop and the adjacent road and parking areas into Site 4. Excluding this offsite sample, the soil sample with the highest PAH concentrations was located between the surface debris pile and Upstream Pond. Elevated PAH concentrations were also present in the southern portion of Burial Area 2 and near the possible stormwater drain at the northeastern corner of CAD Building 12, where equipment is observed to be stored; however, concentrations in all of these samples were much lower than those observed in the offsite sample in the northwestern portion of the site. As expected, the PAH concentrations were generally lower in shallow subsurface soil samples compared to surface soil samples due to the limited mobility of these compounds.
- In sediment, elevated PAH concentrations were observed in Upstream Pond, Youth Pond, the drainage channels that traverse Burial Area 2, and the York River drainage channel. Within the drainage channels, the highest PAH concentrations were detected at the southwest corner of Burial Investigaton Area 2. Surface water flow through these drainage channels is likely transporting PAHs sorbed to particulate matter towards Upstream Pond. The PAHs were also detected in all sediment samples collected from Upstream Pond. The highest concentrations at the site were detected at sample CAS04-SD03, located in the center of the southern portion of Upstream Pond, possibly indicating deposition of sediment from the most-contaminated stormwater inputs within this area of the pond. In the Youth Pond area, sediment samples with elevated PAH concentrations were located along the western and eastern sides of the pond. Similar to Upstream Pond, Youth Pond serves as a repository for stormwater runoff from the developed and industrialized areas within its watershed. Youth Pond receives stormwater inputs of PAHs sorbed to particulate matter from the Outfall #34 drainage channel, as well as overflow from Upstream Pond through the culvert beneath D Street. The

PAH sediment concentrations in the York River drainage channel were generally an order of magnitude higher than concentrations observed within Youth Pond and included PAHs not found in Youth Pond, indicating the possibility of non-site-related impacts from the York River transported by storm surges or tidal effects. Similar to surface compared to subsurface soil samples, concentrations in deeper sediment samples were lower than surface sediment samples due to the strong partitioning behavior of these constituents to sorb to particulate matter with high organic matter content and resist transport. Also, due to the limited solubility of these HMW PAHs, they were only minimally detected in surface water at very low concentrations.

- In groundwater, the PAHs were only detected in temporary wells located within Burial Area 1 during the 1999 investigation. However, HMW PAHs were not detected in groundwater samples from the permanent monitoring wells located in Burial Area 1 during the recent RI. Although anaerobic biodegradation of these PAHs generally does not occur at a fast rate, the lack of PAH detections in the most recent monitoring event may be an evidence of attenuation. Another possible explanation of these results is that the permanent monitoring wells may have allowed for lower turbidity groundwater samples compared to the temporary wells. As indicated earlier, the PAHs tend to sorb to particulate matter, and permanent monitoring well construction techniques generally reduce the likelihood for fine-grained sediment to be drawn into the well screen relative to temporary wells. The PAHs were also not detected in wells located downgradient of Site 4, indicating there is no detectable migration of these constituents in groundwater past the burial area. The PAHs that persist in soil have the potential for continued migration to groundwater. However, leaching should be limited based on the low solubility and high sorption characteristics of PAHs.

Pesticides were identified as COCs in soil, sediment, and groundwater. Similar to the HMW PAHs, these constituents are expected to preferentially sorb to soil and sediment and should not appreciably leach to groundwater or surface water. They may moderately volatize from surface soil and sediment to the atmosphere. The pesticides identified at Site 4 and Youth Pond can undergo biotic and abiotic degradation; however, dieldrin can be resistant.

- In surface soil, the COCs (aldrin, dieldrin, endolsulfan I, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and lindane) were sporadically detected across the investigation area. The highest concentrations were found in a surface soil sample collected adjacent to CAD Building 12, which is likely related to weed maintenance near the building. Elevated concentrations were also observed at the northeastern corner of Burial Area 1, across Burial Area 2, and between the burial areas. Pesticides were less-frequently detected in subsurface soil and were generally present at lower concentrations. This is attributed to the strong tendency of pesticides to sorb to soil rather than dissolve and leach to groundwater. Dieldrin was the only pesticide that was identified as a COC in subsurface soil and groundwater. Endrin and lindance in surface soil may biodegrade more slowly under aerobic conditions. Degradation of endrin may be creating the byproducts endrin aldehyde and endrin ketone.
- In sediment, dieldrin, endolsulfan II, endrin, and methoxychlor were identified as COCs. The highest concentrations were detected at CAS04-SD03, located in the center of the southern portion of Upstream Pond. Concentrations were lower in the deeper sediment samples, likely due their sorption tendency. Dieldrin and endrin had higher concentrations in sediment than observed in soil, possibly due to the higher TOC content. Sediment pesticide COCs were not detected in Youth Pond or in the adjacent surface drainage features. Endolsulfan II and methoxychlor biodegradation may proceed more slowing under reducing conditions in sediment.
- Dieldrin was the only pesticide identified as a COC in groundwater. It was only detected in one monitoring well, CAA03-GW04, at a relatively low concentration of 0.017 J μg/L. Based on this low concentration and the fact that dieldrin is not considered to be highly mobile in groundwater, further migration is not anticipated.

The PCBs were identified as COCs in subsurface soil and sediment. Similar to PAHs, these PCBs are expected to preferentially sorb to soil and not appreciably leach to groundwater. Based on their moderate volatility, they may evaporate into soil gas from subsurface soil or from sediment into the atmosphere. The PCBs may undergo biodegradation under aerobic and anaerobic conditions, if other favorable conditions are present.

- In subsurface soil, Aroclor-1242 and -1260 were identified as COCs. Elevated PCB concentrations were only detected in two subsurface soil samples, located in drainage channels at the northern and southwest corner of Burial Area 2. Notably, the PCBs were not detected in soil samples outside of drainage channels, indicating that the likely source of these PCBs is stormwater discharged through Outfall #2.
- In sediment, total PCBs and Aroclor-1254 were identified as COCs. Similar to PAHs and pesticides in sediment, the highest concentrations were detected at CAS04-SD03, located in the center of the southern portion of Upstream Pond. Notably, concentrations were an order of magnitude lower in the deeper sediment sample compared to the surface sediment sample. Elevated concentrations were also observed in sediment samples collected from the northwest and southeast corners of the Upstream Pond. Lower concentrations of PCBs in sediment were also observed within drainage channels both upstream of and within Burial Area 2, and in the eastern and western corners of Youth Pond. The PCBs were not detected in sediment collected from the York River drainage channel.

Metals were identified as COCs in soil, sediment, and groundwater at Site 4. The mobility of metals is highly dependent on the subsurface conditions, which influences the oxidation state of the inorganic constituent and interactions with other materials present.

- Surface soil COCs include arsenic, lead, mercury, and zinc in surface soil, while subsurface COCs include aluminum, arsenic, chromium, iron, mercury, thallium, and zinc. The highest concentrations in surface soil were observed along the Site 4 drainage channels that traverse Burial Area 2 before reaching Upstream Pond, in the offsite areas adjacent to CAD Building 12 and equipment storage (potentially impacted by stormwater runoff from the building rooftop and parking lots), and between the surface debris pile and Upstream Pond (Burial Area 1). Metals concentrations in subsurface soil were often higher than those observed in surface soil. With the exception of CAA03-SB08, the highest concentrations in subsurface soil were observed in samples located outside the extent of the burial areas, in particular the southern and eastern edges of Site 4. Since soil at Site 4 is assumed to exist under more oxidizing conditions, aluminum and iron will tend to be in their less soluble forms of aluminum hydroxides and iron hydroxides. In oxidizing environments, arsenic and chromium are typically present in more mobile forms. However, these metals, along with lead, mercury, thallium, and zinc, will potentially sorb or complex with either clays, organic material, or iron hydroxides and manganese oxides, limiting their mobility. Surface soil to the south of Burial Area 1 and to the east of Upstream Pond and subsurface soil across the site had pH values measured at 5 or below. This may cause some metals, such as aluminum, to be more mobile in soil. The lower pH values in subsurface soil may be a contributing factor as to why higher concentrations were present there compared to surface soil.
- In sediment, the following COCs were identified: arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc. The highest concentrations were observed at within the south-central portion of Upstream Pond. This is the same general area where the highest organic compound COCs were observed. Relatively elevated metals concentrations were also observed adjacent to the surface debris pile where Burial Area 1 intersects Upstream Pond. In Youth Pond, high metals concentrations were observed in one sediment sample just downstream of the culvert that discharges surface water from Upstream Pond into Youth Pond. Metals concentrations in deep sediment samples were lower than in surface sediment. The highest concentrations in the deep sediment samples were observed in the same Upstream Pond location that had the highest surface sediment concentrations.
- In groundwater, the following COCs were identified: aluminum, arsenic, chromium, iron, manganese, and thallium. The highest concentrations were observed at two wells located with Burial Area 1: (1) temporary well CAA03-GW05, which also had some of the highest concentrations of organic compound COCs (biodegradation of these constituents is likely facilitating more reducing conditions at this well) and (2) temporary well CAA03-GW03, which is located at the northeast corner of Burial Area 1, where elevated metals concentrations were also observed in subsurface soil (this may suggest some leaching into groundwater). Under the more reducing conditions observed in groundwater at Site 4, reductive dissolution of iron and manganese is likely occurring. Although pH in groundwater appears to be relatively neutral, the

low pH values in soil may be facilitating dissolution of aluminum as well. As these metals become more mobile, other metals (such as, arsenic, chromium, and thallium) can be released to groundwater as well.

7.3.5 Risk Receptors

Future land use at Site 4 and Upstream Pond is not expected to change and will likely continue as a wooded area in the foreseeable future. Youth Pond is used by the DoD for recreational activities. A catch-and-release fishing restriction is in place. Currently, groundwater at CAX is not a current or anticipated source of potable drinking water. However, groundwater at CAX is considered to be of potential beneficial use under Commonwealth of Virginia regulations.

The only current receptors at the site are visitors, recreational users, industrial workers, maintenance workers, and ecological receptors. There are unacceptable human health risks to all current receptors and future receptors (current receptors, construction workers, and residents) from potential exposure to contaminants in soil, groundwater, and fish tissue. There are unacceptable risks to ecological receptors from exposure to surface soil, subsurface soil, and sediment, in addition to fish tissue with respect to the food web.

TABLE 7-1

Constituents of Concern By Medium

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Chemical	Medium						Food Web	
	Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Fish Tissue	Aquatic Food Web	Terrestrial Food Web
Volatile Organic Compounds			H					
Benzene			H					
Ethylbenzene								
Semivolatile Organic Compounds								
1,1-Biphenyl			H					
Benzo(a)anthracene	H	H	H					
Benzo(a)pyrene	H	H	H					
Benzo(b)fluoranthene	H	H	H					
Benzo(k)fluoranthene	H	H	H					
Chrysene	H	H						
Dibenz(a,h)anthracene	H	H	H					
Dibenzofuran			H					
Indeno(1,2,3-cd)pyrene	H	H	H					
Naphthalene			H					
PAHs		E			E			
Pesticides/Polychlorinated Biphenyls								
Aldrin	E			None				
Dieldrin	HE	H	H		E			
Endosulfan I	E							
Endosulfan II					E			
Endosulfan sulfate	E							
Endrin	E				E			
Endrin aldehyde	E							
Endrin ketone	E							
gamma-BHC (Lindane)	E							
Methoxychlor					E			
Aroclor-1242		H					H	
Aroclor-1254					E	H		
Aroclor-1260		H				H	H	
Total PCBs					E		H	H
Dioxin-like PCBs						H		
Metals								
Aluminum		H	H					
Arsenic	HE	H	H		E			
Cadmium					E			
Chromium, Total		H	H					
Copper					E			
Iron		H	H					
Lead	E				E			
Manganese			H	None				
Mercury	E	E			E			
Selenium					E			
Silver					E			
Thallium		H	H					
Zinc	E	E			E			

Notes:

1. Dioxin-like PCBs include: 3,3',4,4'-Tetrachlorobiphenyl (77); 3,4,4',5-Tetrachlorobiphenyl (81); 2,3,3',4,4'-Pentachlorobiphenyl (105); 2,3,4,4',5-Pentachlorobiphenyl (114); 2,3',4,4',5-Pentachlorobiphenyl (118); 2,3',4,4',5'-Pentachlorobiphenyl (123); 3,3',4,4',5-Pentachlorobiphenyl (126); 2,3',4,4',5,5'-Hexachlorobiphenyl (167); 3,3',4,4',5,5'-Hexachlorobiphenyl (169); 2,3,3',4,4',5,5'-Heptachlorobiphenyl (189); and Congeners (156/157).

E - Ecological Constituent of Concern

H - Human Health Constiuent of Concern

TABLE 7-2

Physical and Chemical Properties for Constituents of Concern

Site 4 and Youth Pond Remedial Investigation Report

Cheatham Annex

Williamsburg, Virginia

Chemical	Molecular Weight (g/mole)	Density (g/cm^3)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	K_h (atm-m3/mole)	Log K_{oc} (---)	K_d (mL/g)	R (---)	V_c (ft/yr)	Log K_{ow} (---)	Log BCF (---)
Volatile Organic Compounds											
Benzene	78.1	0.88	1,820	95.2	5.56E-03	1.69	0.490	3.45	9.9	2.13	1.48
Ethylbenzene	106.2	0.86	187	9.9	6.60E-03	2.38	2.40	12.99	2.6	3.13	1.19
Semivolatile Organic Compounds											
1,1-Biphenyl	154.2	0.87	7.0	1.00E-02	3.08E-03	3.52	33	167	0.2060	3.95	2.73
Benzo(a)anthracene	228.3	1.27	0.0140	1.10E-07	8.00E-06	5.81	6,457	32,284	0.0011	5.61	4.00
Benzo(a)pyrene	252.3	1.35	0.0018	5.49E-09	3.36E-07	5.95	8,913	44,564	0.0008	6.00	3.69
Benzo(b)fluoranthene	252.3	no data	0.0012	5.00E-07	5.03E-07	6.70	50,119	250,595	0.0001	6.06	4.00
Benzo(k)fluoranthene	252.3	no data	0.0011	9.59E-11	4.24E-07	5.99	9,772	48,863	0.0007	6.40	4.00
Chrysene	228.3	1.27	0.0018	6.30E-09	5.23E-06	6.27	18,621	93,105	0.0004	5.81	3.79
Dibenz(a,h)anthracene	278.4	1.28	0.0025	2.78E-12	1.70E-06	6.22	16,596	82,980	0.0004	6.50	4.00
Dibenzofuran	168.2	1.09	4.22	2.63E-03	5.82E-05	4.54	347	1,735	0.0198	4.17	3.13
Indeno(1,2,3-cd)pyrene	276.3	NA	0.0620	1.01E-10	2.86E-07	6.30	19,953	99,764	0.0003	5.97	3.40
Naphthalene	128.2	1.02	31.7	0.104	4.76E-04	3.11	13	65	0.5245	3.31	2.50
Pesticides/Polychlorinated Biphenyls											
Aldrin	364.9	1.70	0.027	1.52E-04	4.96E-04	4.68	479	2,394	0.0143	6.50	4.10
Dieldrin	380.9	1.75	0.186	3.99E-05	5.80E-05	4.37	234	1,173	0.0292	5.16	2.95
Endosulfan I	406.9	1.75	0.530	4.58E-05	6.55E-05	3.31	20	103	0.3328	3.55	3.35
Endosulfan II	406.9	1.75	0.280	2.40E-05	8.70E-06	3.37	23	118	0.2902	3.62	3.35
Endosulfan sulfate	422.9	no data	0.117	9.75E-06	4.64E-05	3.37	23	118	0.2902	3.66	no data
Endrin	380.9	1.65	0.250	2.00E-07	5.00E-07	3.89	78	389	0.0882	5.16	3.17
Endrin aldehyde	380.9	no data	0.260	2.00E-07	3.86E-07	4.43	269	1,347	0.0255	5.60	no data
Endrin ketone	380.9	no data	no data	no data	2.02E-08	no data	977	4,887	0.0070	4.99	no data
gamma-BHC (Lindane)	290.8	1.57	7.52	4.91E-04	4.80E-07	3.03	11	55	0.6287	3.66	2.65
Methoxychlor	345.7	1.41	0.100	no data	1.58E-05	4.90	794	3,973	0.0086	4.30	3.92
Aroclor-1242	261.0	1.39	0.240	4.06E-04	5.60E-04	4.35	224	1,120	0.0306	4.11	4.51
Aroclor-1254	327.0	1.51	0.057	3.22E-05	2.30E-03	4.88	759	3,794	0.0090	6.47	4.70
Aroclor-1260	324.0	1.57	0.0144	1.31E-05	3.36E-04	6.42	26,303	131,514	0.0003	6.91	5.29
Metals											
Aluminum	26.98	2.70	U	U	U	NA	NA	NA	NA	U	U
Arsenic	74.92	5.78	U	U	U	NA	2.0 - 20,000	11 - 100,000	0.0003 - 3.12	U	U
Cadmium	112.4	8.69	U	U	U	NA	1.3 - 100,000	1.3 - 500,000	0.0001 - 4.57	U	U
Chromium, Total	52.00	7.14	U	U	U	NA	0.20 - 63,000	0.2 - 315,000	0.0001 - 17.2	U	U
Copper	63.55	8.94	U	U	U	NA	1.6 - 4,000	1.6 - 20,000	0.0017 - 3.81	U	U

TABLE 7-2

Physical and Chemical Properties for Constituents of Concern

Site 4 and Youth Pond Remedial Investigation Report

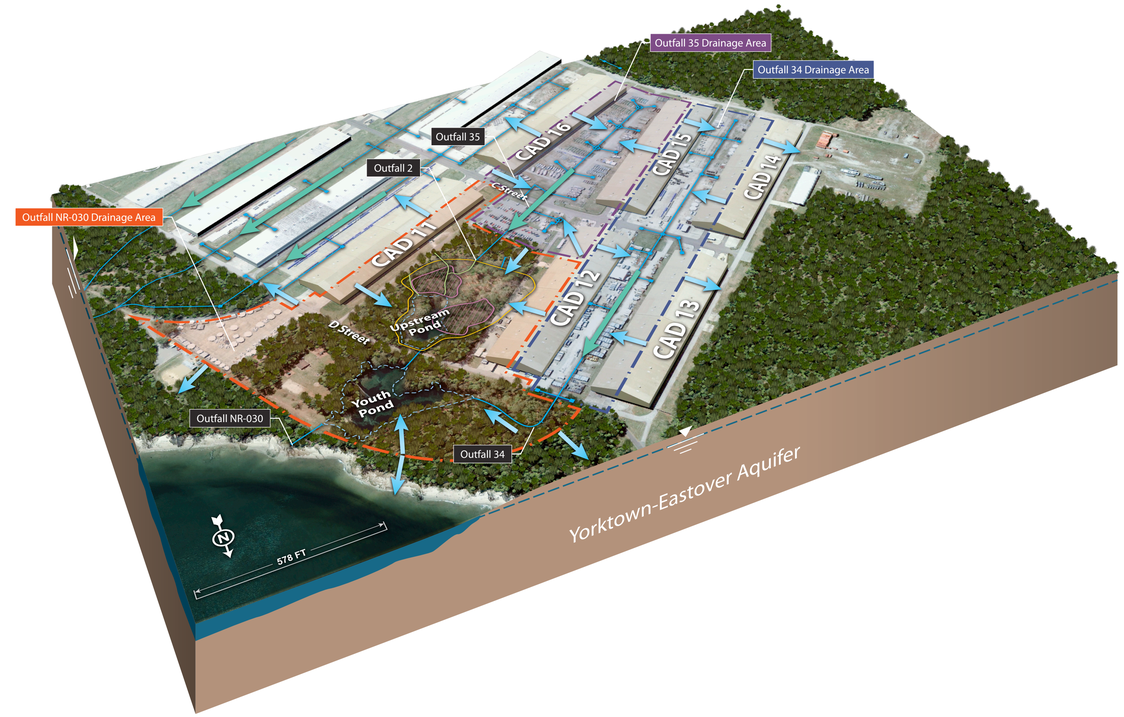
Cheatham Annex

Williamsburg, Virginia

Chemical	Molecular Weight (g/mole)	Density (g/cm^3)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	K_h (atm-m3/mole)	Log K_{oc} (---)	K_d (mL/g)	R (---)	V_c (ft/yr)	Log K_{ow} (---)	Log BCF (---)
Iron	55.85	7.87	U	U	U	NA	NA	NA	NA	U	U
Lead	207.2	11.34	U	U	U	NA	5.0 - 100,000	5 - 500,000	0.0001 - 1.32	U	U
Manganese	54.94	7.30	U	U	U	NA	NA	NA	NA	U	U
Mercury	200.6	13.53	U	U	U	NA	160 - 630,000	160 - 3,150,000	1.1E-05 - 0.0428	U	U
Selenium	78.96	4.39	U	U	U	NA	0.5 - 250	0.5 - 1,251	0.274 - 9.8	U	U
Silver	107.9	10.49	U	U	U	NA	10 - 31,600	10 - 158,000	0.0002 - 0.673	U	U
Thallium	204.4	11.80	U	U	U	NA	1,000 - 3,200	1,000 - 16,000	0.0021 - 0.069	U	U
Zinc	65.39	7.13	U	U	U	NA	0.1 - 100,000	0.1 - 500,000	0.0001 - 22.9	U	U

Notes:
BCF = Bioconcentration Factor
foc = fraction organic carbon = 0.0025 (average of total organic carbon subsurface soil data)
K_d = Soil-Water partition coefficient = K_{oc} x foc for organics; Kow used instead of Koc for endrin ketone
K_h= Henry's Law Constant
K_{oc} = Organic carbon partition coefficient
K_{ow} = Octanol-water partition coefficient
NA = no information available
n_e = Effective porosity = 0.30 (estimate)
R = Retardation coefficient = $1 + K_d \times \rho_b / n_e$
ρ_b = Soil bulk density = 1.5 grams per cubic centimeter (sandy loam)
U = No value is provided because of the uncertainty in the form of these chemicals in the environment.
Vc = Contaminant velocity = seepage velocity (estimated at 0.094 ft/day) / R; velocity calcaulations included in Section 4 of the RI report

Data sources (Source 1 is the primary reference):
(1) Montgomery. 2000. *Groundwater Chemicals Desk Reference. Third Edition.*
(2) United States National Library of Medicine. 2011. Hazardous Substances Data Bank (HSDB). *http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB*
(3) United States Environmental Protection Agency. 1999. *Partition Coefficients for Metals in Surface Water, Soil, and Waste.*
(4) Agency of Toxic Substances and Disease Registry. 1996. *Toxicological Profile for Endrin* . August.



Surface Feature Number Correlations

1. Drainage Channel entering Youth Pond
2. Culvert
3. Outfall 34
4. Stormwater drain between CAD buildings 12 and 11
5. White PVC pipe exposed at surface
6. Stormwater drain by corner of CAD buildings 12

LEGEND

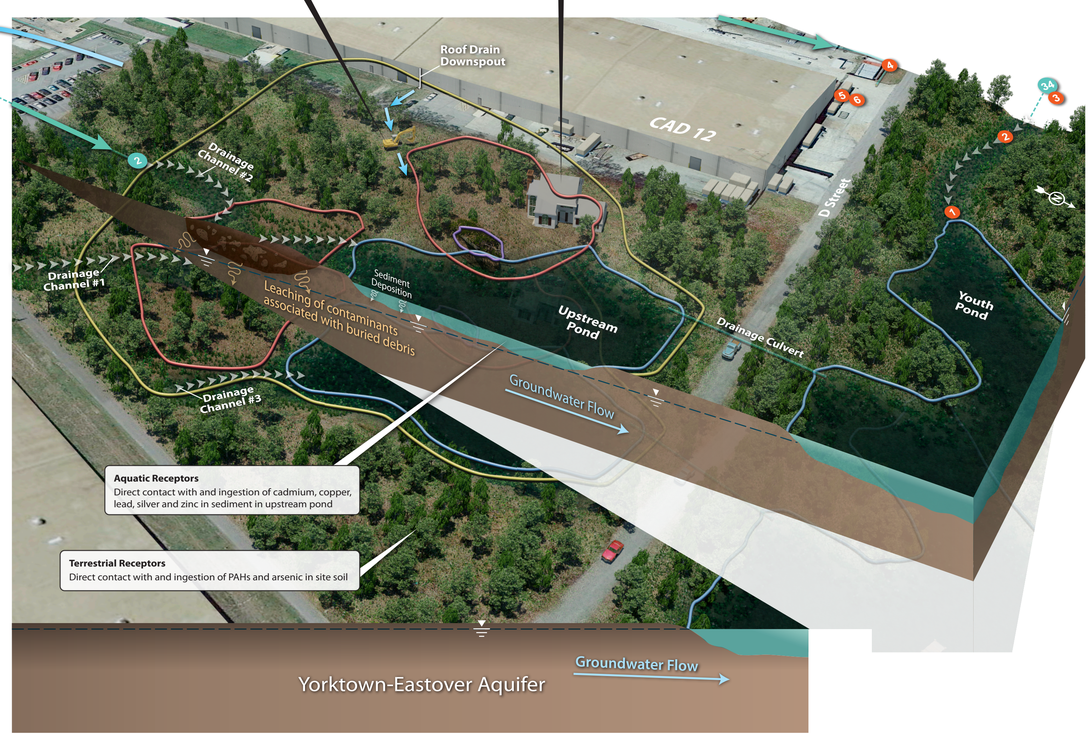
- Drainage Channels
- Drainage Boundaries
- Storm Drains
- Site 4 Boundary
- Burial Areas
- Debris Pile
- Water Body
- Water Table
- Outfall Number
- Surface Water Flow
- Stormwater Flow

Potential Future Adult Resident
Ingestion of dermal contact with, and inhalation of 1.1-biphenyl and dermal contact with, and inhalation of 1.1-biphenyl and naphthalene and ingestion of arsenic in groundwater

Potential Future Child Resident
Ingestion of dibenzofuran, arsenic, iron, and mangarese in groundwater

Potential Future Lifetime Resident
Ingestion of and dermal contact with select PAH's and arsenic in soil and select SVOCs, 1.1-biphenyl, and arsenic in groundwater

Potential Future Construction Worker
Inhalation of 1.1-biphenyl and naphthalene vapors in groundwater



Aquatic Receptors
Direct contact with and ingestion of cadmium, copper, lead, silver and zinc in sediment in upstream pond

Terrestrial Receptors
Direct contact with and ingestion of PAHs and arsenic in site soil

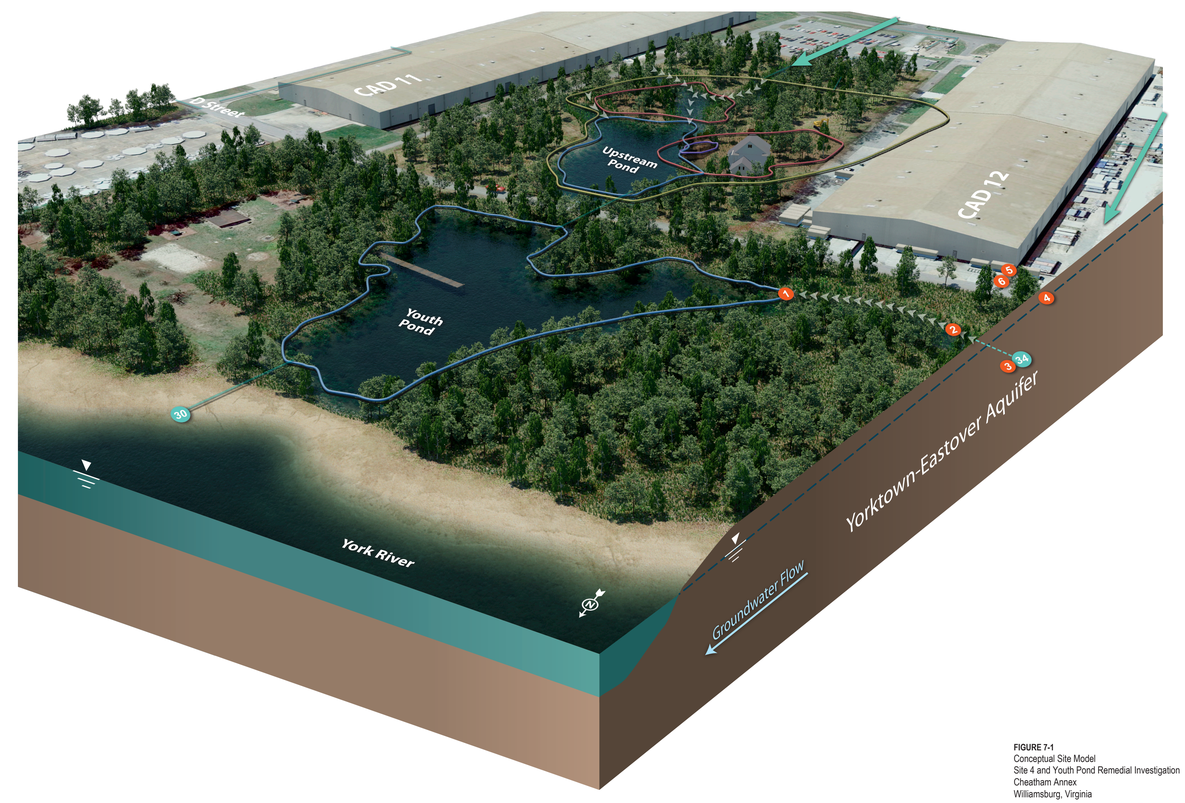


FIGURE 7-1
Conceptual Site Model
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL.

JMS # | CAX_CSM_v09.ai | JM

SECTION 8

Conclusions and Recommendations

This section summarizes the major conclusions of the RI for Site 4 and Youth Pond that have been drawn from the findings and results presented and evaluated in earlier sections of this report. It also presents a recommended path forward to address potentially unacceptable risks to human health or the environment from site-related COCs at Site 4 and Youth Pond.

The RI field activities described in this report were conducted in October and November 2012 to fill data gaps remaining from earlier investigations, to further characterize the nature and extent of contamination, and to support the assessment of potential human health and ecological risks associated with exposure to contaminants in impacted site media at Site 4 and Youth Pond. The data evaluated in the RI included all of the newly collected data, as well as the data from several previous investigations. The chemical analytical data evaluated in the RI included the results from 38 surface soil samples, 24 shallow subsurface soil samples, four deep subsurface soil samples, 14 groundwater samples, 19 surface water samples, 46 surface sediment samples, 31 subsurface soil samples, and 23 animal tissue samples. In addition, a total of 42 test pits and six test holes were installed to delineate the extent of buried debris at Site 4.

8.1 Conclusions

The objectives of the RI have been achieved: data gaps have been filled, the nature and extent of contamination have been sufficiently defined, the CSM has been updated to reflect the compilation of data from all investigation activities to date, and human health and ecological risks have been assessed.

8.1.1 Sources of Contamination and Contaminant Transport Pathways

8.1.1.1. CERCLA-Regulated Sources

Surface debris and buried debris within two burial investigation areas (Burial Investigations Areas 1 and 2) totaling approximately 4 acres in size represent the only identified source of CERCLA-regulated contamination at Site 4. Debris at Burial Investigation Area 1 (formerly identified as AOC 3 and later incorporated into Site 4) consists of metal bandings, several empty drums, tar paper, and charred wood. Debris at Burial Investigation Area 2 (formerly known as Site 4 before Site 4 was expanded to include AOC 3) includes out-of-date medical supplies (including IV injection sets with syringes wrapped in aluminum foil or plastic, empty IV bottles, and numerous sharps [both metal and plastic]), railroad ties, and 1-inch metal banding.

With the exception of the vertical depth of debris next to Upstream Pond, the results of the test-pitting activities indicate that the extent of buried debris at Site 4 has been sufficiently delineated and in some areas is in direct contact with either the groundwater or surface water/sediment within Upstream Pond. However, debris is not expected to be encountered at depths much greater than 8 feet bgs next to Upstream Pond, because it is unlikely that debris was buried significantly below the water table. Due to the generally sandy nature of the soil at the site, excavations below the water table would likely cave in and remain shallow, preventing substantial amounts of debris from being deposited below the water table.

Stormwater runoff originating in the vicinity of the debris areas (Burial Investigation Areas 1 and 2) has the potential to be impacted by contaminants associated with the debris. These contaminants may then be transported via stormwater runoff and deposited in sediment within drainage channels, Upstream Pond, and Youth Pond. Stormwater originating in the vicinity of the debris areas drains to Upstream Pond, which is connected to Youth Pond via a culvert beneath D Street. When surface water in Youth Pond reaches a certain height, excess surface water flows into a flood control structure within the pond and discharges down a slope and into the York River through Outfall #NR-30.

In addition to contaminant transport via stormwater runoff, contamination associated with surface and buried debris may impact subsurface soil and groundwater via contaminant leaching from waste material and associated

soil contamination. Dissolved contaminants in groundwater may be transported downgradient with groundwater flow.

8.1.1.2. Non-CERCLA-Regulated Sources

While a portion of the volume of stormwater runoff discharging to Upstream Pond, and ultimately Youth Pond, is potentially impacted by Site 4 (as previously described in Section 8.1.1.1), a considerable portion of the volume of stormwater runoff draining to these ponds may be impacted by non-CERCLA-regulated contaminant sources unrelated to Site 4. For example, PAHs are ubiquitous in urban environments from sources that include atmospheric emissions from industrial facilities such as power plants, automobile exhaust, tire particles, and asphalt. Stormwater draining from a considerable portion of the developed and industrialized areas north, west, and south of Upstream and Youth Ponds has been in contact with asphalt-paved parking lots and roads, as well as building rooftops. A large component of the stormwater flow that ultimately reaches Youth Pond does not flow through Upstream Pond and is not impacted by Site 4. In addition, widespread detections of pesticides are likely the result of normal pesticide use at DoD facilities to control pests and weeds. Consequently, there is significant potential for contaminants found in soil and sediment within drainages and surface water and sediment in both Upstream and Youth Ponds to have originated from non-CERCLA-regulated sources rather than from sources specific to Site 4.

8.1.2 Nature and Extent of Contamination

8.1.2.1. Site 4 Soil

SVOCs/PAHs were detected above screening criteria in surface and subsurface soil samples in the investigated areas of Site 4, including soil samples collected within the debris areas. However, several of the samples containing the highest concentrations of PAHs and the greatest number of individual PAHs exceeding screening criteria were collected outside of the Burial Areas at locations where no known historic disposal or operational activities took place that would have resulted in a CERCLA-regulated release. For example, in surface soil, the highest concentrations of PAHs exceeding their respective screening criteria (PAH concentrations one to two orders of magnitude higher than in all other samples) were found in a sample collected approximately 100 feet upgradient and entirely outside of Burial Area 1, in a grassy area immediately adjacent to the south side of CAD Building 12. The soil sample at this location was collected from a shallow drainage swale that receives stormwater runoff from the adjacent road and parking areas as well as stormwater drainage from the CAD Building 12 rooftop, which suggests that the PAHs detected in this sample are likely the result of non-CERCLA-regulated impacts.

Pesticides were detected in surface and subsurface soil in the investigated areas of Site 4. Similar to PAHs, the sample with the highest concentrations of pesticides were also located in the immediate vicinity of CAD Building 12, approximately 100 feet upgradient of Burial Area 1. Pesticides were not known to be disposed at Site 4. The distribution and generally low detected concentrations of pesticides in soil are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and not from pesticide disposal activities.

PCBs were only found in soil in the immediate vicinity of Drainage Channel #1, near the confluence of Drainage Channels #1 and #2, upgradient of Upstream Pond. The confluence of the two drainage channels is a floodplain area that, while typically dry, is likely to be under water during heavy rain events and a deposition area for sediment transported by stormwater. Since PCBs were only detected within the drainage channels, the evidence suggests that the PCBs may have been transported to and deposited within site drainage channel floodplain areas via stormwater runoff from the upstream developed and industrialized areas to the west and southwest.

Metals were found at concentrations exceeding screening criteria and base background UTLs in all investigated areas.

8.1.2.2. Groundwater

While VOCs were not detected in soil samples collected throughout Site 4, several VOCs (including benzene, ethylbenzene, and xylenes) were detected in three groundwater samples. Different VOCs were detected at each location, and the overall VOC detections were sporadic, with no discernible VOC plume. The greatest number of VOCs and the highest relative concentrations were found immediately downgradient of the location where a

perforated 55-gallon drum was encountered during test-pitting activities. Therefore, the elevated VOC concentrations at that location could be attributable to a release from the 55-gallon drum or represent an impact from other debris in the vicinity.

SVOCs/PAHs were detected in groundwater at concentrations exceeding screening criteria only beneath Burial Area 1. In general, the SVOCs detected in groundwater were the same SVOCs detected in surface and subsurface soil in this area; therefore, the detected SVOC concentrations may be attributable to SVOCs leaching from soil into the groundwater.

One pesticide, dieldrin, was detected in one groundwater sample at a concentration exceeding a screening criterion. The detection appears to be an isolated occurrence due to the absence of dieldrin in the upgradient and downgradient groundwater samples, and the absence of dieldrin in the Upstream Pond surface water and sediment adjacent to the sample location. Also, the detected concentrations of pesticides found in Site 4 soil are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and not from pesticide disposal activities.

Metals were found at concentrations exceeding screening criteria and base background UTLs in groundwater.

8.1.2.3. Surface Water

Several SVOCs were detected in surface water within Site 4 drainage channels and Upstream Pond at concentrations exceeding screening criteria. No organic chemicals were detected in Youth Pond surface water. As indicated earlier, due to the upstream areas where stormwater found at the sampling locations originates, these detected SVOC concentrations may be the result of impacts from either Site 4 debris, stormwater bringing contaminants from non-CERCLA-regulated sources from upstream paved areas, or a combination of both.

Metals were found in surface water at concentrations exceeding screening criteria and reference pond background UTLs in drainage channels and Upstream Pond, but not Youth Pond.

8.1.2.4. Sediment

A number of SVOCs (primarily PAHs), several pesticides, and two PCBs were detected in sediment samples collected within the drainage channels southwest of Upstream Pond at concentrations exceeding screening criteria. The highest number of detected SVOC and PCB concentrations exceeding screening criteria were found in samples collected within Drainage Channel #1, near the confluence of Drainage Channels #1 and #2, upgradient of Upstream Pond. While the drainage channels flow through Burial Investigation Area 2, they direct stormwater from the paved roadway area north of CAD Building 11 (Drainage Channel #1) and from the large developed and industrialized area draining to Outfalls #35 and #2 (Drainage Channel #2) before entering Site 4. Therefore, the detected SVOC and PCB concentrations in the drainage channel sediment samples could be attributable to non-CERCLA-regulated contaminant sources unrelated to Site 4, to an unknown upstream CERCLA release unrelated to Site 4, or to impacts from buried debris within the Site 4 boundary. The detected pesticide concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds rather than pesticide disposal activities.

A number of SVOCs (primarily PAHs) and pesticides and two PCBs were detected in sediment samples collected within Upstream Pond sediment at concentrations exceeding screening criteria. The highest SVOC and PCB concentrations were found near where the site drainage channels direct stormwater into Upstream Pond, northeast of the surface debris pile within Burial Investigation Area 1, and in the northeastern corner of Upstream Pond. The elevated SVOC concentrations may result from impacts from either Site 4 debris, non-CERCLA-regulated stormwater discharge from outside of Site 4, or a combination of both. Since the PCBs detected in Upstream Pond sediment were only otherwise detected upstream in Site 4 drainage channels, there is a strong possibility that the elevated PCB concentrations in Upstream Pond sediment are the result of non-site-related contaminants transported in stormwater from the developed and industrialized areas to the west and south (such as Outfalls #35 and #2). The detected pesticide concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds rather than pesticide disposal activities.

Youth Pond surface drainage features direct stormwater with no potential to be impacted by Site 4 into Youth Pond. A number of SVOCs (primarily PAHs) and one pesticide were detected within these features at concentrations exceeding screening criteria. The highest SVOC concentrations were detected in samples likely impacted by stormwater runoff from the upstream industrialized area rather than from a CERCLA-regulated source. The detected pesticide concentration is likely attributable to normal pesticide use at DoD facilities to control pests and weeds rather than pesticide disposal activities.

Within Youth Pond sediment, a number of SVOCs (primarily PAHs), several pesticides, and one PCB were detected at concentrations exceeding screening criteria. The highest SVOC concentrations were detected in the middle of Youth Pond, near where the surface drainage features direct stormwater to Youth Pond. In general, the SVOC concentrations were significantly less than the highest concentrations detected within Upstream Pond and in some of the samples within the surface drainage features leading to Upstream and Youth Ponds. Some of the lowest SVOC concentrations detected within Youth Pond were at the outfall of the culvert that connects Site 4 and Upstream Pond to Youth Pond and at the inlet of the flood control structure that directs surface water from Youth Pond into the York River. The detected pesticide concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds rather than pesticide disposal activities.

Metals were found in sediment samples at concentrations exceeding screening criteria and reference pond background UTLs in both surface drainage feature and Youth Pond samples.

In the York River drainage channel, a number of SVOCs were detected at concentrations exceeding screening criteria. Of the SVOCs detected, approximately half were also detected in Youth Pond sediment samples, suggesting that the detected concentrations may be at least partially attributable to offsite contamination in the York River.

8.1.2.5. Animal Tissue

PCBs and metals were found in all Site 4 and Upstream Pond tissue sample types – earthworm, frog, and fish.

PCBs and metals were also found in both Youth Pond tissue sample types – frog and fish.

8.1.3 Human Health Risk Assessment

The HHRA concluded that potentially unacceptable risks were present and identified COCs for exposure to soil in selected soil groupings evaluated as part of the HHRA, for exposure to groundwater, and for exposure to fish tissue. For exposure to surface water or sediment, no potentially unacceptable risks were present and no COCs were identified. Major HHRA conclusions for the media with potentially unacceptable risks are summarized as follows.

8.1.3.1. Soil

The following human health COCs were identified for the evaluated soil groupings:

- Surface soil within the fenced area of Site 4/Youth Pond, including the surface soil samples collected closest to the CAD 12 Building within the fence line surrounding the CAD area buildings: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and arsenic.
  - While dieldrin contributes to the unacceptable cancer risk (based on RME estimates), the detected concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and are not from the disposal of pesticides. The legal application of pesticides is not a CERCLA-regulated release. Therefore, dieldrin is not considered to be a site-related COC. In addition, the cancer risk due to exposure to pesticides alone is within the acceptable risk range.
- Surface soil outside the fenced area of Site 4, including from within the Burial Areas and the surface soil samples collected surrounding the CAD area buildings and the wooded area of Site 4 around Upstream Pond: None.

- Surface and subsurface soil from inside the fenced area of Site 4/Youth Pond, including the surface soil samples collected closest to the CAD 12 Building within the fence line surrounding the CAD area buildings: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- Surface and subsurface soil from inside and outside the fenced area of the site: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor-1260, dieldrin, arsenic, aluminum, chromium, iron, and thallium.
  - Based on the locations where PCBs were detected, the likely source of the elevated PCB concentrations is Outfall #2 since PCBs were not prevalent in subsurface soil and thus are probably not site-related. The PCBs likely were deposited in this area near the drainage channels during flood events. Outfall #2 receives stormwater runoff from the developed and industrialized area of considerable size to the west of Site 4. Therefore, PCBs are not considered to be site-related COCs. In addition, while the Aroclor-1254 and Aroclor-1260 concentrations contribute to the unacceptable cancer risk (based on RME estimates), the exposure to these constituents alone is within the acceptable risk range.
  - While dieldrin contributes to the unacceptable cancer risk (based on RME estimates), the detected concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and are not from the disposal of pesticides. The legal application of pesticides is not a CERCLA-regulated release. Therefore, dieldrin is not considered to be a site-related COC. In addition, the cancer risk due to exposure to pesticides alone is within the acceptable risk range.
  - If groundwater is not used as potable water supply, aluminum, iron, and thallium would not be soil COCs, as the potential hazards associated with these constituents would be acceptable.

The only soil groupings evaluated in the HHRA for which potentially unacceptable risks were identified included the results of samples collected outside of the Burial Areas at locations where no known historic disposal or operational activities took place that would have resulted in a CERCLA-regulated release. As indicated in Section 8.1.2.1, several of the samples evaluated in the RI that contained the highest concentrations of detected PAHs, which were the primary contributors to unacceptable risk for exposure of human receptors to soil, were collected in these areas with no potential for impacts from Site 4 CERCLA-regulated contaminant sources. For example, a surface soil sample collected just south of CAD Building 12 from a shallow drainage swale that receives stormwater runoff from the adjacent road and parking areas as well as from the CAD Building 12 rooftop (CAA03-SS06), contained PAH concentrations one to two orders of magnitude higher than in all other soil samples evaluated in the RI. The lone soil grouping that excluded sample CAA03-SS06 and the majority of surface soil samples collected outside of the Site 4 Burial Investigation Areas, yet contained all of the Burial Investigation Areas 1 and 2 surface soil samples, generated no potentially unacceptable risks from exposure to soil in the HHRA. This suggests that the determination of potentially unacceptable human health risks for these soil groupings was significantly affected by sample results that are likely attributable to non-CERCLA-regulated contaminant sources.

8.1.3.2. Groundwater

The following human health COCs were identified for groundwater:

- VOCs: benzene and ethylbenzene
- SVOCs: naphthalene, 1,1-biphenyl, dibenzofuran, benzo(a)pyrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
- Pesticides: dieldrin
  - While dieldrin contributes to the unacceptable cancer risk (based on RME estimates), the detected concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and are not from the disposal of pesticides. The legal application of pesticides is not a CERCLA-regulated

release. Therefore, dieldrin is not considered to be a site-related COC. In addition, the cancer risk due to exposure to pesticides alone is within the acceptable risk range.

- Metals: aluminum, arsenic, chromium (assuming all detected chromium is hexavalent chromium), iron, manganese, and thallium.
  - While aluminum and thallium were detected at concentrations posing potential unacceptable risk, these detected concentrations likely represent elevated suspended solids within the sample since there metals were not detected at concentrations exceeding the screening criteria within the corresponding dissolved metals sample. Therefore, aluminum and thallium is not considered to be site-related COCs.
  - The hazard associated with chromium is due to the assumption that all the chromium detected in groundwater is in the hexavalent form, which is unlikely since hexavalent chromium was not known to be disposed of at Youth Pond/Site 4. In addition, while the total chromium concentrations contributed to the potential risk, the maximum chromium concentration of 44.5 µg/L (CAA03-GW03) does not exceed the MCL (100 µg/L) and dissolved chromium concentrations do not exceed either the MCL or the base background 95 percent UTL (6.04 µg/L). Therefore, the total chromium concentrations likely represent elevated suspended solids within the groundwater sample.

8.1.3.3. Fish Tissue

The following human health COCs were identified for fish tissue from Upstream and Youth Ponds:

- PCBs: dioxin-like PCBs, Aroclor-1254, and Aroclor-1260
  - As discussed previously, the likely source of PCB concentrations is Outfall #Outfall #2 receives stormwater runoff from the developed and industrialized area of considerable size to the west of Site 4. Therefore, PCBs are not considered to be site-related COCs.
- Metals: Chromium (assuming all detected chromium is hexavalent chromium).
  - As discussed in Appendix J, Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium is not considered a COC for fish tissue.

8.1.4 Ecological Risk Assessment

The BERA concluded that potentially unacceptable risks were present and identified COCs for exposure to various media in the evaluated habitats (**Table 6-2**). Major BERA conclusions are summarized as follows.

8.1.4.1. Terrestrial Habitats

Arsenic, mercury, zinc, and PAHs were identified as COCs in surface and/or subsurface soil from Site 4 and may be site-related, although PAHs also had non-site-related sources. Lead and pesticide exceedances are thought not to be site-related. The exceedances for all of these constituents were spatially limited and likely have a low ecological risk potential on a site-wide and population-level basis. Similarly, the PCBs were identified as terrestrial food web COCs, but are also likely not site-related, and their distribution in soil was spatially limited.

The terrestrial areas of Site 4 consist of relatively mature forested habitats and any decision to conduct intrusive remedial actions in this area should consider the potential impacts to these habitats that such actions would entail relative to the potential risks that have been identified.

There were no unacceptable risks for the Youth Pond terrestrial habitats (developed and industrialized area and the upper portion of the Outfall #34 Drainage Channel).

8.1.4.2. Aquatic Habitats

Aquatic habitats evaluated in the BERA included Upstream Pond/Site 4 Drainage Channels, Youth Pond, the York River Drainage Channel, and the Outfall #34 Drainage Channel.

Upstream Pond and Site 4 Drainage Channels

Upstream Pond serves as a repository for stormwater runoff from developed and industrialized areas within its watershed, as well as from the source areas evaluated as part of this RI. The principal source of PCBs, in particular, appears to be stormwater runoff discharged at Outfall #2, which includes stormwater originating within a developed and industrialized area of considerable size to the west.

Few constituents exceeded both ESVs and background UTLs in the surface water of Upstream Pond and the Site 4 drainage channels, and none were identified as COCs.

Although metal, PCB, pesticide, and PAH COCs were identified in surface sediment samples from Upstream Pond, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the Upstream Pond locations. There also do not appear to be any widespread impacts to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of this BERA.

Most of the frogs that were collected from Upstream Pond for tissue analysis came from the southern end of the pond near where the Site 4 drainage channels enter. This is the area that generally had the highest surface sediment concentrations, particularly for the organic COPCs. Most of the detected metal COPCs in frog tissue samples from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but only aluminum and cobalt exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. The evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (tadpoles were present and were sampled) population of bullfrogs (and likely leopard frogs) in the pond, and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples collected from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but only aluminum exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. Aluminum was also the only COPC to exceed ESVs based on the LOEC and the maximum concentration (but not the 95 percent UCL concentration). The evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

The PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) were selected as COCs in aquatic food webs based on MATC exceedances of the 95 percent UCL exposure dose for the tree swallow and mink. However, the LOAEL TRV was not exceeded for any of these receptor-chemical combinations. Receptors actually observed in Upstream Pond (raccoon and great blue heron) had 95 percent UCL HQs that were less than 1 based on the MATC. Thus, potential risks based on exposure to PCBs in aquatic food webs are marginal for this water body, but are identified for risk management consideration.

Upstream Pond contains a fairly abundant and diverse aquatic community given its small size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Youth Pond. Further, the source of most of the organic COCs and a potential source for the metal COCs is likely to be urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

Youth Pond

Youth Pond serves as a repository for stormwater runoff from the developed and industrialized areas within its watershed. There are no specific CERCLA-regulated source areas directly associated with this pond, only the potential for contaminant transport from Upstream Pond.

No COCs were identified in surface water.

In surface sediment, eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) were identified as COPCs for further risk evaluation. These seven metals were ultimately identified as COCs because there is no single compelling line of evidence with which to eliminate them, although the weight of the available evidence suggests that risks are likely to be acceptable and the observed concentrations of these metals are not likely to result in adverse impacts to the benthic community in Youth Pond. No organic COCs were identified for Youth Pond surface sediment.

The evaluation of frog tissue results suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing population of bullfrogs (and likely leopard frogs) in Youth Pond, and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples from Youth Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, but none exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. No COPC exceeded ESVs based on the LOEC and the maximum concentration. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple ages classes present) population of several fish species in the pond, and none of the sampled fish had any external abnormalities or deformities.

No food web COCs were identified for Youth Pond; risks are acceptable for this pathway.

Youth Pond contains a fairly abundant and diverse aquatic community, given its size and relative isolation. Any intrusive remedial actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms other than Upstream Pond. Further, the source of the COCs is likely to be urban runoff from the stormwater system, so there would also be the potential for recontamination following any intrusive remedial action in the pond itself.

York River Drainage Channel

Lead was the only metal that exceeded ESVs and background UTLs in surface sediment within the drainage channel from Youth Pond to the York River and 14 PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also exceeded background UTLs (where available) in surface sediment. The source of these PAHs and lead does not appear to be Youth Pond. While these samples were collected from an apparent depositional area within the drainage channel, this location could be impacted by contaminants transported by York River tidal cycles or by storm surges and the samples have the potential to contain contaminants from offsite sources.

Outfall #34 Drainage Channel

There were no unacceptable risks associated with the lower [aquatic] portion of the drainage channel.

8.1.5 Summary of COCs

Based on the data evaluations presented in this RI, the following potentially site-related COCs posing risk to either human health or the environment were identified:

- Soil at Site 4: PAHs and arsenic detected within Burial Area 1 and mercury and zinc within Burial Area 2 (potential ecological receptors).
- Groundwater at Site 4: Benzene, ethylbenzene, 1,1-biphenyl, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-cd)pyrene, naphthalene, arsenic, iron, and manganese (potential human health risk).
- Sediment in Upstream Pond: Cadmium, copper, lead, silver, and zinc (potential ecological receptors).

- Surface water in Upstream Pond: None.
- Youth Pond surface drainage features and Youth Pond sediment and surface water: None.
- York River Drainage Channel sediment: None.
- Upstream and Youth Ponds Fish Tissue: None.

The remaining COCs identified in the HHRA and/or ERA as posing potentially unacceptable risks to human health or ecological receptors were determined not to be site-related and are discussed in Sections 8.1.3 and 8.1.4.

8.2 Proposed Actions

A FS should be performed to develop and evaluate remedial alternatives to address buried debris and potentially unacceptable human health or ecological risks associated with potentially site-related COCs in soil and groundwater at Site 4. In addition, while the RI findings indicate that the PCBs in Upstream Pond are not likely to be related to a Site 4 source, the FS should include remedial alternatives to address PCBs in Upstream Pond sediment and PAHs detected in the drainage channel directing surface run off from the roof of CAD Building and the adjacent paved areas to Site 4.

While there are several possibly site-related metals posing potentially unacceptable ecological risk in sediment within Upstream Pond, given its small size and relative isolation, Upstream Pond contains a fairly abundant and diverse aquatic community. The results of the sediment toxicity testing in the BERA did not indicate any consistent impacts from COCs to organism survival, growth, or reproduction at any of the Upstream Pond locations. There also do not appear to be any widespread impacts from COCs to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of this BERA. However, any intrusive remedial actions to address this calculated potential ecological risk would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Youth Pond. Further, since urban runoff from the stormwater system is also a possible source for the COCs, there would also be the potential for recontamination following any intrusive remedial action in the pond itself. For these reasons, it is recommended that this medium not be carried forward to the FS.

SECTION 9

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Appendix A
Physical Characterization and Benthic Invertebrate Data

TABLE A-1

Habitat Characterization and Sediment Descriptions

Upstream Pond

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

Date	**10/1/2012**	
Stream Characterization	Stream Subsystem Stream Type	perennial warm water
Watershed Use	Surrounding Land Use	predominantly forested
Dominant Riparian Vegetation	**Latin Name** Salix nigra Quercus rubra Cornus florida Liriodendron tulipifera Myrica cerifera	**Common Name** black willow northern red oak flowering dogwood tuplic poplar wax myrtle
Stream Features	average depth canopy cover	2 feet partly open
Dominant Aquatic Vegetation	**Latin Name** Polygonum punctatum Leesia oryzoides Cares sp.	**Common Name** spoted martweed rice cutgrass sedge
Inorganic Substrate Components	Gravel (2-64 mm) Sand (0.06-2 mm) Silt (0.004-0.06 mm) Clay (<0.004 mm)	0% 5% 95% 0%
Organic Substrate Components	Detritus (sticks, wood, coarse plant material) Muck-Mud (black, very fine organic material) Marl (grey, shell fragments)	10% 90% 0%
Observed Animals	Racoon Great Blue Heron	Turtles Midland Brown Snake

TABLE A-2

Habitat Characterization and Sedimetn Descriptions

Youth Pond

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

Date	**10/2/2012**	
Stream Characterization	Stream Subsystem	perennial
	Stream Type	warm water
Watershed Use	Surrounding Land Use	predominantly forested
Dominant Riparian Vegetation	**Latin Name**	**Common Name**
	Quercus rubra	northern red oak
	Liriodendron tulipifera	tuplic poplar
	Pinus taeda	loblolly pine
Stream Features	average depth	3 feet
	canopy cover	partly open
Dominant Aquatic Vegetation	**Latin Name**	**Common Name**
	Cares sp.	sedge
	Saururus cernuus	lizzards tail
	Boehmeria cylindrica	smallspike false nettle
Inorganic Substrate Components	Gravel (2-64 mm)	0%
	Sand (0.06-2 mm)	10%
	Silt (0.004-0.06 mm)	90%
	Clay (<0.004 mm)	0%
Organic Substrate Components	Detritus (sticks, wood, coarse plant material)	20%
	Muck-Mud (black, very fine organic material)	80%
	Marl (grey, shell fragments)	0%
Observed Animals	Turtles	Gret Egret
	Midland Brown Snake	Great Blue Heron

TABLE A-3

Habitat Characterization and Sedimetn Descriptions

Cheatham Pond; Site 4 Reference Locations

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

Date	10/3/2012	
Stream Characterization	Stream Subsystem	perennial
	Stream Type	warm water
Watershed Use	Surrounding Land Use	predominantly forested
Dominant Riparian Vegetation	**Latin Name**	**Common Name**
	Quercus rubra	northern red oak
	Liriodendron tulipifera	tuplic poplar
	Myrica cerifera	wax myrtle
Stream Features	average depth	1.5 feet
	canopy cover	partly open
Dominant Aquatic Vegetation	**Latin Name**	**Common Name**
	Cares sp.	sedge
	Polygonum punctatum	dotted smartweed
Inorganic Substrate Components	Gravel (2-64 mm)	0%
	Sand (0.06-2 mm)	5%
	Silt (0.004-0.06 mm)	95%
	Clay (<0.004 mm)	0%
Organic Substrate Components	Detritus (sticks, wood, coarse plant material)	10%
	Muck-Mud (black, very fine organic material)	90%
	Marl (grey, shell fragments)	0%
Observed Animals	Canadian Geese	mallard ducks
	mute swans	Double-crested Cormorant
	wood ducks	Bald Eagle
	Terns	Great Egret
	Turtles	Great Blue Heron

TABLE A-4

Habitat Characterization and Sedimetn Descriptions

Cheatham Pond; Youth Pond Reference Locations

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

Date	**10/3/2012**	
Stream Characterization	Stream Subsystem	perennial
	Stream Type	warm water
Watershed Use	Surrounding Land Use	predominantly forested
Dominant Riparian Vegetation	**Latin Name**	**Common Name**
	Quercus rubra	northern red oak
	Liriodendron tulipifera	tuplic poplar
	Myrica cerifera	wax myrtle
Stream Features	average depth	2 feet
	canopy cover	partly open
Dominant Aquatic Vegetation	**Latin Name**	**Common Name**
	Cares sp.	sedge
	Saururus cernuus	lizzards tail
	Boehmeria cylindrica	smallspike false nettle
Inorganic Substrate Components	Gravel (2-64 mm)	0%
	Sand (0.06-2 mm)	10%
	Silt (0.004-0.06 mm)	90%
	Clay (<0.004 mm)	0%
Organic Substrate Components	Detritus (sticks, wood, coarse plant material)	10%
	Muck-Mud (black, very fine organic material)	90%
	Marl (grey, shell fragments)	0%
Observed Animals	Canadian Geese	mallard ducks
	mute swans	Double-crested Cormorant
	wood ducks	Bald Eagle
	Terns	Great Egret
	Turtles	Great Blue Heron

TABLE A-5

Sampling Results - 2012 Aquatic Biological Surveys

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Benthic Macroinvertebrate Counts																												
		Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
Youth Pond																														
SD-1	10/8/2012	0	0	0	0	0	3	1	0	0	0	0	4	3	1	1	0	0	1	0	0	0	1	0	3	0	0	0	18	9
SD-2	10/8/2012	0	0	0	2	0	5	0	0	0	0	0	4	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	16	6
SD-3	10/8/2012	0	0	0	0	0	3	0	0	0	0	0	7	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0	16	5
SD-4	10/8/2012	0	0	0	1	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	5	0	0	0	16	6
SD-5	10/8/2012	0	0	1	3	0	4	0	1	0	0	0	3	1	1	1	0	0	2	0	0	0	0	0	3	0	0	0	20	10
SD-6	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-7	10/8/2012	0	0	0	1	0	3	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	2	5	0	0	0	17	7
SD-8	10/8/2012	0	0	1	0	1	3	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	11	6
SD-9	10/8/2012	0	0	0	1	0	0	0	0	0	0	0	4	5	3	1	0	0	0	0	0	0	0	0	1	0	2	0	17	7
SD-10	10/8/2012	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2	0	8	0	0	0	19	5
SD-11	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-12	10/8/2012	0	0	1	0	0	2	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	7	5
SD-13	10/8/2012	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-14	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-15	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL		0	0	3	10	1	29	1	7	0	0	0	30	17	7	9	0	0	4	2	0	1	5	4	31	0	2	0	163	17
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3
		0	0	0.3	0.9	0.1	2.6	0.1	0.6	0	0	0	2.7	1.5	0.6	0.8	0	0	0.4	0.2	0	0.1	0.5	0.4	2.8	0	0.2	0	14.8	6.3
		0	0	1	3	1	6	1	4	0	0	0	7	5	3	2	0	0	2	2	0	1	2	2	8	0	2	0	20	10
Upstream Pond																														
SD-10	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-11	10/11/2012	0	0	0	0	0	1	0	0	0	0	0	4	2	0	5	0	0	0	0	0	0	0	0	2	0	1	0	15	6
SD-12	10/11/2012	0	0	1	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	1	2	7	0	0	0	17	7
SD-13	10/11/2012	0	0	0	0	0	3	0	1	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8	5
SD-14	10/11/2012	0	0	0	0	0	0	0	0	1	0	0	4	2	1	3	0	0	0	0	0	0	0	0	5	0	1	0	17	7
SD-15	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-16	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-17	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-18	10/11/2012	0	0	0	0	0	1	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	0	0	2	0	0	0	13	5
SD-19	10/11/2012	0	0	0	0	0	1	0	3	0	0	0	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5
SD-20	10/11/2012	0	0	0	0	0	4	0	0	0	0	0	6	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	14	4
SD-21	10/11/2012	0	0	0	0	0	1	0	1	2	0	0	8	4	0	6	0	0	0	0	0	0	0	0	4	0	0	0	26	7
SD-22	10/11/2012	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-23	10/11/2012	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1	4	14	0	0	0	25	6
TOTAL		0	0	1	3	0	12	0	6	4	0	0	36	14	2	22	0	0	0	0	0	3	2	6	36	0	2	0	149	14
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3
		0	0	0.1	0.3	0	1.2	0	0.6	0.4	0	0	3.6	1.4	0.2	2.2	0	0	0	0	0	0.3	0.2	0.6	3.6	0	0.2	0	14.9	5.5
		0	0	1	2	0	4	0	3	2	0	0	8	4	1	6	0	0	0	0	0	3	1	4	14	0	1	0	26	7

Appendix B
Test Pit Logs

CH2MHILL	PROJECT NUMBER 388429.FI.FS.78	TEST PIT NUMBER CAS04-TP03 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 4 | LOCATION : Cheatham Annex, Site 4 Williamsburg, Virginia | LOGGER : Toby Stewart

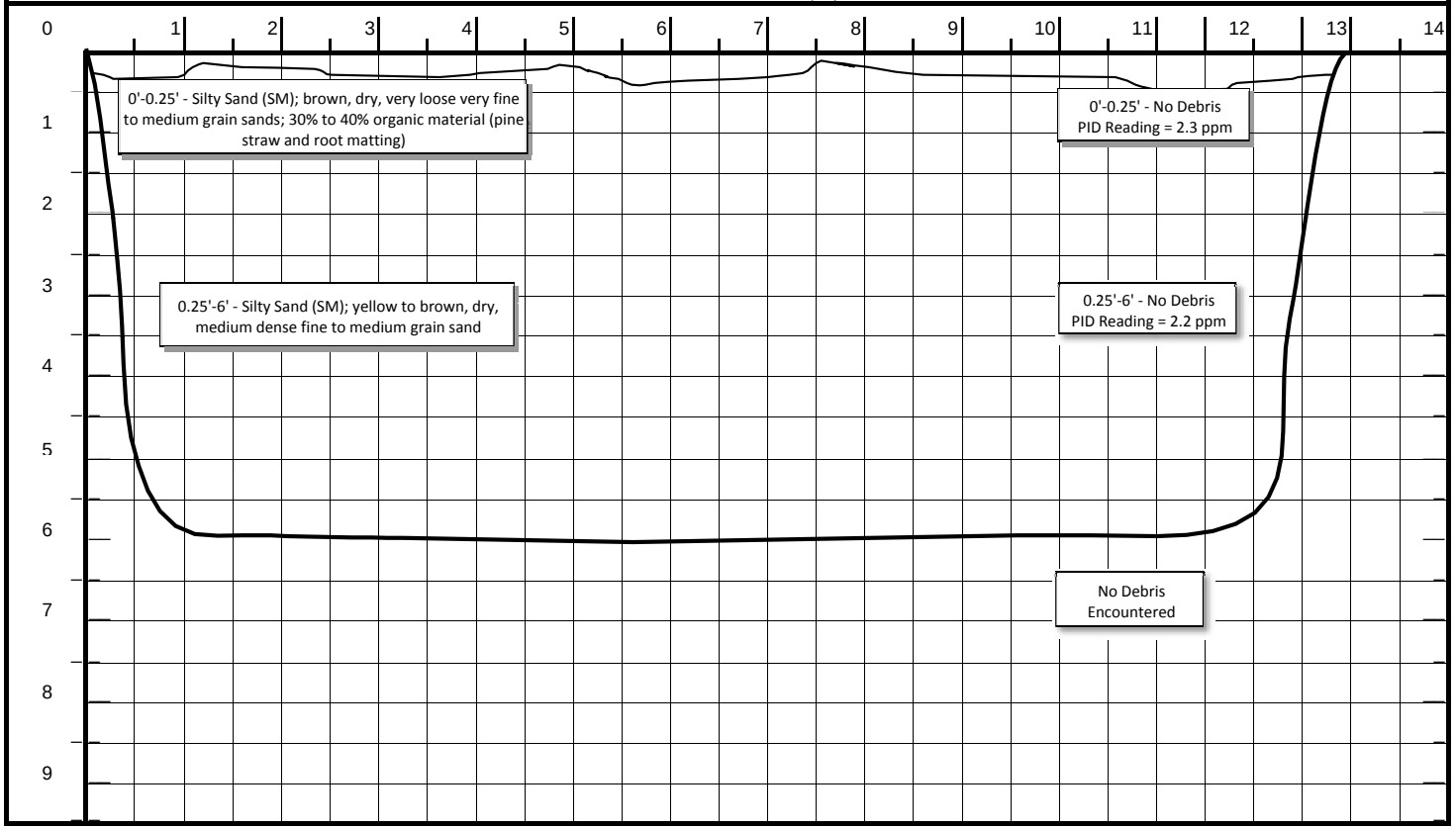
ELEVATION : approx. 5 ft above msl | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe | DATE EXCAVATED: 11/08/12

WATER LEVEL : N/A | APPROX. DIMENS: Length: 13 ft Width: 3 ft Max. Depth: 6 ft

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

TEST PIT DIMENSIONS (FT)



CH2MHILL	PROJECT NUMBER 388429.FI.FS.78	TEST PIT NUMBER CAS04-TP04 SHEET 1 OF 1

TEST PIT LOG

PROJECT : Site 4 | LOCATION : Cheatham Annex, Site 4 Williamsburg, Virginia | LOGGER : Toby Stewart

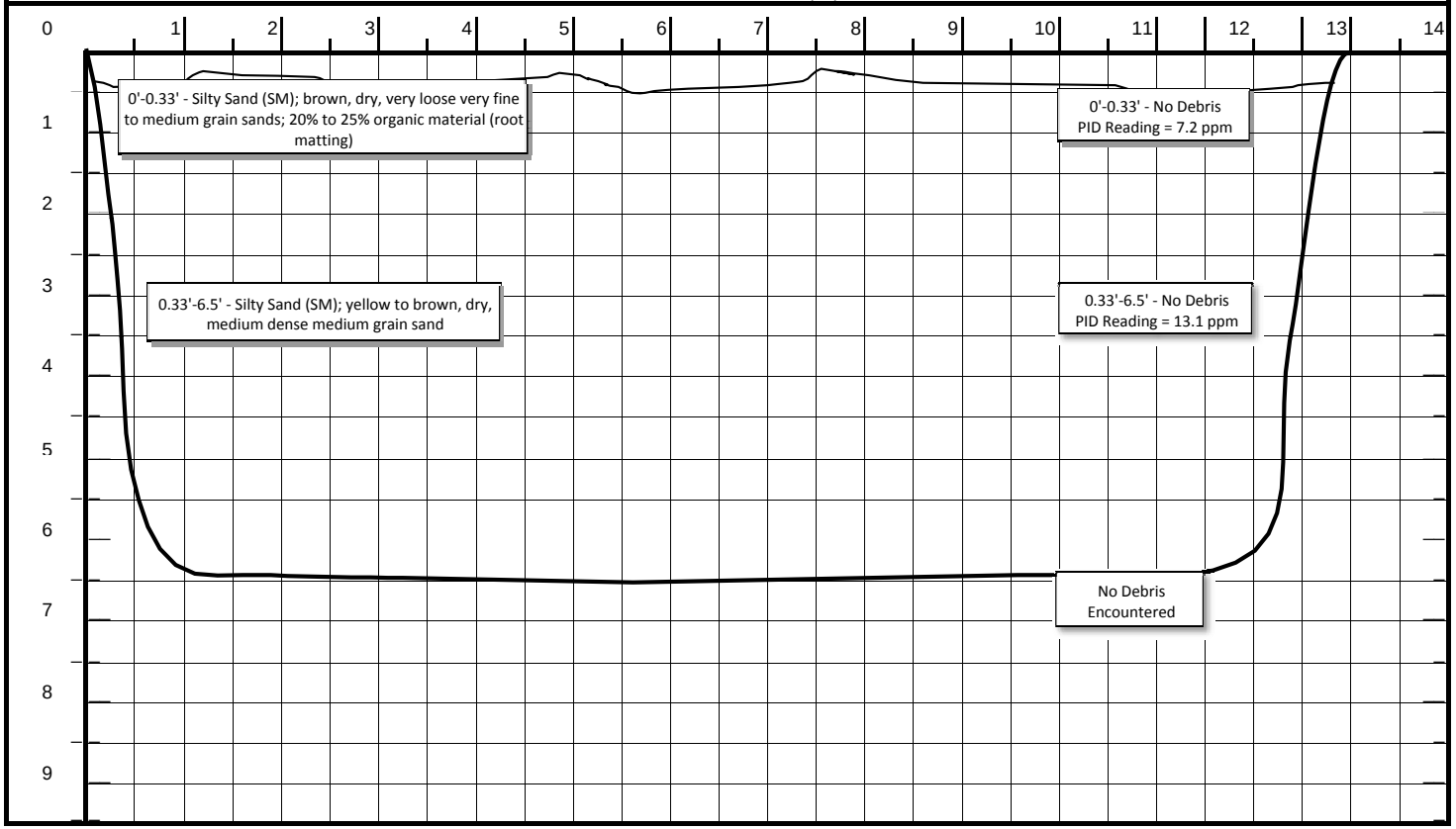
ELEVATION : approx. 5 ft above msl | CONTRACTOR : Parratt-Wolff, Inc.

EXCAVATION EQUIPMENT USED : Backhoe | DATE EXCAVATED: 11/08/12

WATER LEVEL : N/A | APPROX. DIMENS: Length: 13 ft | Width: 3 ft | Max. Depth: 6.5 ft

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

TEST PIT DIMENSIONS (FT)



Appendix C
Soil Boring and Monitoring Well Construction Logs

PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW05	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635207.4 N, 12033286.1 E)

ELEVATION : 18.6 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 6.2 ft bgs
START : 11/13/2012
END : 11/15/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS	WELL DIAGRAM
18.6	0.0			**SILTY SAND (SM)** 0.0-0.2'- dark brown, moist, highly organic			Water level: 11.66 ft. amsl (potentiometric - 12/13/2012)	Grout Seal - Portland Type I/II
		4.0	S-1	**SILTY SAND (SM)** 0.2-3.0'- light yellowish brown, (10YR 6/4), moist, medium dense to loose, fine to medium grained, low plasticity		0.2	Top of Well (PVC) Elevation: 21.46 ft amsl	Bentonite Seal - Medium Chip (0.75-50 lb bag)
	4.0			**SILTY SAND (SM)** 3.0-16.0'- pale yellow to olive yellow, (2.5Y 7/4-6/6), moist to wet, very loose to loose, medium grained, nonplastic, wet at 6.2ft bgs, up to 35% fine to coarse shell fragment gravel (up to core sized)			Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover	2-inch diameter PVC
5 13.6		4.0	S-2			0.3		
	8.0							
10 8.6		4.0	S-3			0.3		Sand Pack (6.5 bags)
	12.0						Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.	10-foot 0.01 slotted screen 2-inch diameter PVC
		4.0	S-4			0.3		
15 3.6	16.0			Bottom of Boring at 16.0 ft bgs on 11/15/2012				8.25" borehole

PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW06	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635244.5 N, 12033181.9 E)

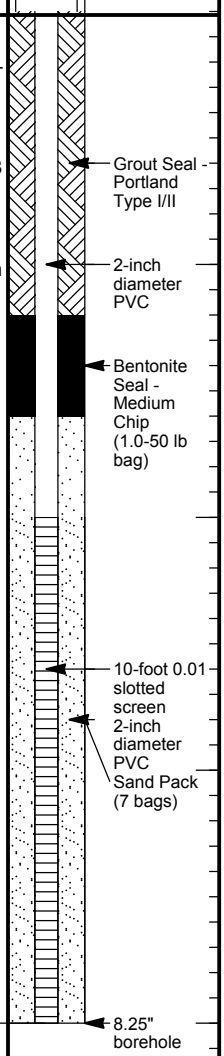
ELEVATION : 21.0 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 8.0 ft bgs
START : 11/13/2012
END : 11/15/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
21.0	0.0			**SILTY SAND (SM)** 0.0-0.2'- dark gray, (5YR 4/1), moist, loose, nonplastic, topsoil			Water level: 11.41 ft. amsl (potentiometric - 12/13/2012)
		4.0	S-1	**SILTY SAND (SM)** 0.2-6.8'- reddish yellow, (7.5YR 6/8), dry, medium dense, fine to medium grained, nonplastic, slightly cohesive		0	Top of Well (PVC) Elevation: 23.98 ft amsl
	4.0			**SILTY SAND (SM)** 6.8-20.0'- pale yellow to olive yellow, (2.5Y 7/4-6/6), wet, loose to very loose, fine to medium grained, wet at 8.0ft bgs, reddish yellow discoloration to 20% over 16-20ft interval, up to 35% fine to coarse shell fragment gravel (up to 1-inch)			Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover
5 16.0		2.6	S-2			0	
	8.0						
10 11.0		3.0	S-3			0.3	
	12.0						
		3.0	S-4			0	
15 6.0	16.0						Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.
		1.6	S-5			0	
20 1.0	20.0			Bottom of Boring at 20.0 ft bgs on 11/15/2012			

WELL DIAGRAM



PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW07	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635407.4 N, 12033149.7 E)

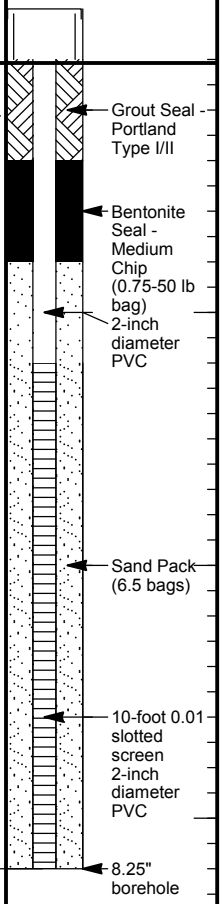
ELEVATION : 19.3 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 5.0 ft bgs
START : 11/13/2012
END : 11/15/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
19.3	0.0	4.0	S-1	**SILTY SAND (SM)** 0.0-3.7'- brown, (10YR 4/3), dry, loose, fine to medium grained, nonplastic, trace coarse black particles		0.3	Water level: 11.85 ft. amsl (potentiometric - 12/13/2012) Top of Well (PVC) Elevation: 22.31 ft amsl
	4.0	2.6	S-2	**SILTY SAND WITH SHELL GRAVEL (SM)** 3.7-8.3'- pale yellow to olive yellow, moist, loose, fine to medium grained, nonplastic, wet at 5ft, up to 30-40% fine to coarse shell fragment gravel		0.2	Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover
5 14.3	8.0	3.0	S-3	**SILTY SAND (SM)** 8.3-16.0'- gray green grading, (Gley 5G 5/2), wet, very loose, very fine to fine grained, nonplastic, grades to greenish gray (Gley 5GY 6/1) at 13.0ft bgs, up to 20% shell fragment gravel		0.3	
10 9.3	12.0	3.0	S-4			0.3	Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.
15 4.3	16.0			Bottom of Boring at 16.0 ft bgs on 11/15/2012			

WELL DIAGRAM



PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW08	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635450.7 N, 12033281.3 E)

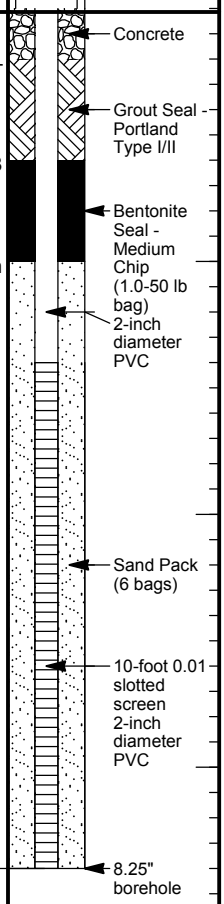
ELEVATION : 13.4 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 4.0 ft bgs
START : 11/14/2012
END : 11/15/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
13.4	0.0	4.0	S-1	**SILTY SAND (SM)** 0.0-0.2'- brown, fine to medium grained, roots **SILTY SAND (SM)** 0.2-3.7'- light yellowish brown, (10YR 6/4), dry to moist, medium dense, low plasticity, trace coarse shell gravel at 3.4-3.7ft, trace coarse black particles up to 1/2-inch		55	Water level: 10.13 ft. amsl (potentiometric - 12/13/2012) Top of Well (PVC) Elevation: 16.68 ft amsl Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover
4.0	4.0	4.0	S-2	**WOOD DEBRIS** 3.7-4.8'- wet, greater than 50ppm reading on wood **CLAY (CL)** 4.8-5.3'- bluish gray, (Gley 5B 5/1), wet, soft, nonplastic, trace black mottling, wet at start of 4-8ft interval run **SILT (ML)** 5.3-6.5'- very dark grayish brown, (10YR 3/2), wet, medium dense to loose, nonplastic, trace coarse black anthropogenic material at 6.4-6.5ft bgs		0	
5 8.4	8.0	2.5	S-3	**NO RECOVERY (NR)** 6.5-8.0' **SILTY SAND (SM)** 8.0-9.7'- light greenish gray, loose, alternating bands of very dark brown (0.4ft thick), 3-5% wood fragments **NO RECOVERY (NR)** 9.7-12.0'		2.3	
10 3.4	12.0	4.0	S-4	**SILTY SAND (SM)** 12.0-14.3'- very dark grayish brown, wet, loose, nonplastic, grades to light gray at 14.1ft bgs, coarse wood fragments throughout **NO RECOVERY (NR)** 14.3-16.0'		0	Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.
15 -1.6	16.0	1.0	S-5			0	
	17.0			Bottom of Boring at 17.0 ft bgs on 11/15/2012			

WELL DIAGRAM



PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW09	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635666.5 N, 12033433.3 E)

ELEVATION : 23.2 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

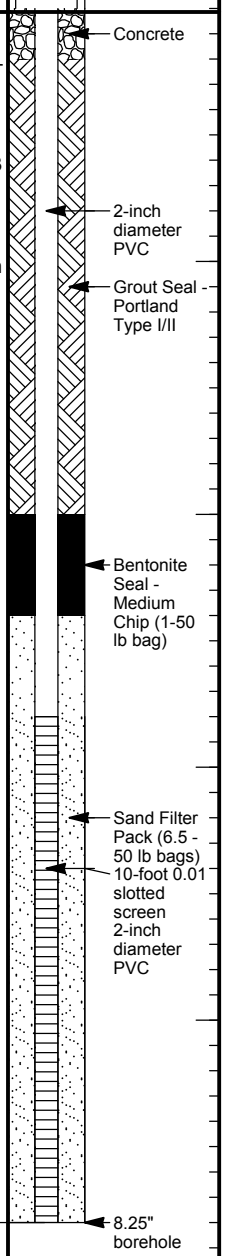
DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 14.5 ft bgs
START : 11/14/2012
END : 11/15/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
23.2	0.0	4.0	S-1	**GRAVEL WITH SAND (GM)** 0.0-0.2'- gray, dry, dense, removed **SILTY SAND (SM)** 0.2-3.8'- yellowish brown, (10YR 5/4-5/6), dry, very loose, fine grained, nonplastic		0	Water level: 8.46 ft. amsl (potentiometric - 12/13/2012) Top of Well (PVC) Elevation: 26.23 ft amsl Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover
5 18.2	4.0	4.0	S-2	3.8-6.8'- brown, (10YR 5/3), moist, loose to medium dense, fine to medium grained, low plasticity, 3-7% fine to medium white shell fragments, trace roots		0	
10 13.2	8.0	2.5	S-3	6.8-10.5'- light yellowish brown, (2.5Y 6/4), moist, loose to medium dense, nonplastic, grades to reddish yellow (7.5YR 6/8) below 7.2ft bgs, perched moisture at 6.8-7.2ft bgs, 1.1ppm at 8.5ft bgs, interval is slightly cohesive		1.1	
	12.0			**NO RECOVERY (NR)** 10.5-12.0'			
15 8.2	16.0	3.0	S-4	**SILTY SAND (SM)** 12.0-14.5'- reddish yellow, wet, medium dense to loose, fine to medium grained, nonplastic, 0.4ppm at ground water-unsaturated soil interface, wet at 14.5ft bgs, 0.4ppm at groundwater-unsaturated soil interface		0.4	
20 3.2	20.0	4.0	S-5	**SILTY SAND (SM)** 14.5-21.2'- pale yellow, (5Y 7/4), moist to wet, very loose to loose, fine to medium grained, nonplastic, trace dusky red concretions up to 3/4-inch diameter at 19.7ft bgs, 3-5% medium to coarse white shell fragments from 20.0-21.2		0.2	Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.
	24.0	3.7	S-6	**SHELL GRAVEL WITH SAND (GM)** 21.2-22.7'- olive, (5Y 5/4) **NO RECOVERY (NR)** No recovery likely due to compacted shell inside macro core liner.		0.3	

Bottom of Boring at 24.0 ft bgs on 11/15/2012

WELL DIAGRAM



PROJECT NUMBER:	BORING NUMBER:	
388429.FI.FS.78	CAS04-MW10	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Site 04 Monitoring Well (MW) Installation
LOCATION : Williamsburg, VA (3635460.9 N, 12033610.7 E)

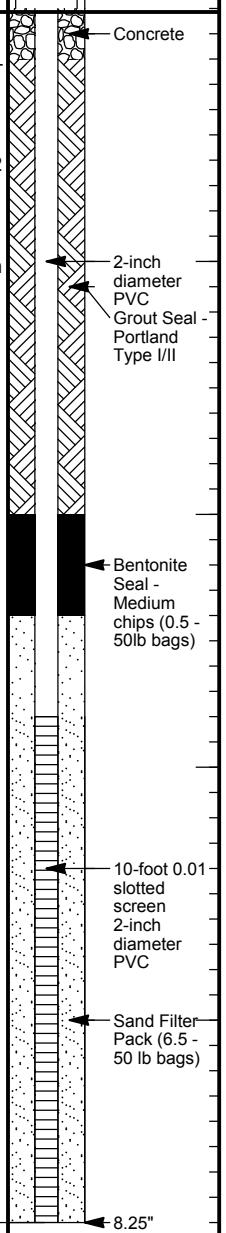
ELEVATION : 23.5 ft NAVD88 (natural ground elevation)
DRILLING CONTRACTOR : Parratt-Wolff Drilling, Inc.

DRILLING METHOD AND EQUIPMENT : Track mounted CME-850X, 4 ¼ ID 8 ¾ O.D. HSA

WATER LEVELS : 13.9 ft bgs
START : 11/14/2012
END : 11/14/2012
LOGGER : T. Stewart\VBO

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
23.5	0.0 – 4.0	4.0	S-1	**SILTY SAND (SM)** 0.0-12.0'- yellowish brown to reddish yellow, (10YR 5/6 to 5YR 5/8), moist to dry, loose, fine to medium grained, nonplastic to low plasticity, slightly cohesive		0	Water level: 8.82 ft. amsl (potentiometric - 12/13/2012) Top of Well (PVC) Elevation: 26.32 ft amsl Stick-up style surface completion, with a water-tight expansion cap and a lockable, protective steel cover
5 18.5	4.0 – 8.0	4.0	S-2			0	
10 13.5	8.0 – 12.0	4.0	S-3			1.1	
	12.0 – 16.0	1.9	S-4	**SILTY SAND (SM)** 12.0-14.1'- reddish yellow, (5YR 6/8), moist to wet, loose, medium grained, nonplastic **NO RECOVERY (NR)** 14.1-16.0'- No Recovery		0.4	
15 8.5	16.0 – 20.0	1.5	S-5	**SILTY SAND (SM)** 16.0-17.5'- grayish green, (Gley 5G 5/2), moist to wet, very loose, nonplastic, olive (5Y 5/4) at 16.9ft bgs, up to 20% fine shell gravel **NO RECOVERY (NR)** 17.5-20.0'		0.3	Elevations and coordinates (NAD83, NAVD88) as surveyed by Michael Surveying & Mapping, P.C. on February 7th, 2013.
20 3.5	20.0 – 24.0	4.0	S-6	**SILTY SAND WITH SHELL GRAVEL (SM)** 20.0-24.0'- olive, (5Y 5/4), wet, loose, medium grained, nonplastic, up to 30-35% coarse shell gravel fragments		0.3	
	24.0			Bottom of Boring at 24.0 ft bgs on 11/14/2012			

WELL DIAGRAM



Appendix D
Survey Report

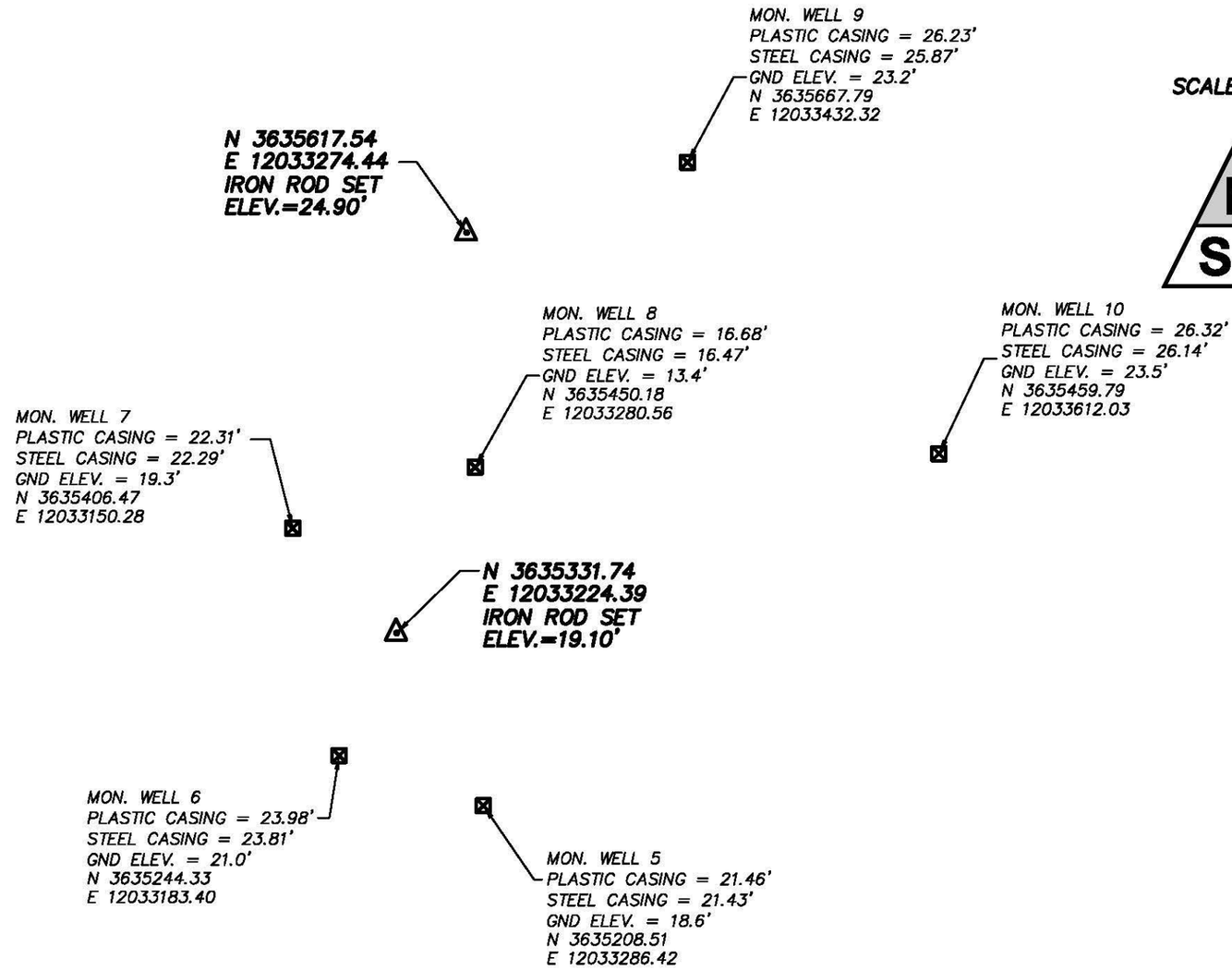
LOCATION OF NEW

MONITORING WELLS

AT SITE 4
CHEATHAM ANNEX
FOR: CH2MHILL
PROJ. #13-017
SCALE: 1"=100' – DATE: FEBRUARY 7, 2013

MICHAEL SURVEYING
& MAPPING, P.C.
41 OLD OYSTER POINT ROAD
SUITE B
NEWPORT NEWS, VA. 23602
TEL 757.873.1762
FAX 757.873.1772

COMMONWEALTH OF VIRGINIA
2/7/13
PAUL W. MICHAEL, JR.
Lic NO. 002438
LAND SURVEYOR



△ DENOTES TRAVERSE CONTROL POINT

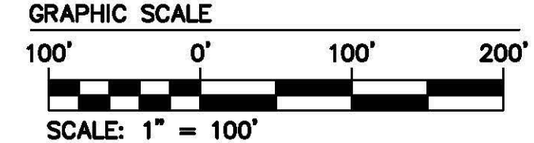
⊠ DENOTES MON. WELL

NOTES:

1. HORIZONTAL COORDINATES ARE REFERRED TO VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD 83. ELEVATIONS REFER TO NAVD 88 DATUM. UNITS ARE IN U.S. SURVEY FEET.

2. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, PAUL W. MICHAEL, JR. FROM AND ACTUAL ☒ GROUND OR AIRBORNE SURVEY MADE UNDER MY SUPERVISION; THAT THE IMAGERY AND/OR ORIGINAL DATA WAS OBTAINED IN FEBRUARY 7, 2013 ; AND THAT THIS PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

GRAPHIC SCALE



SCALE: 1" = 100'

Appendix E
IDW Analytical Data

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-2
Client ID: IDW-11292012-SO
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: D3159.D

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: REC
Extraction Method: 5030/1311
Lab Prep Batch: WG117458

Analysis Date: 05-DEC-12
Analyst: REC
Analysis Method: SW846 8260C
Matrix: AQ
% Solids: 81.
Report Date: 06-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Benzene	U	10	ug/L	20	5	100	5.2	10.
Carbon Tetrachloride	U	10	ug/L	20	5	100	4.4	10.
Chlorobenzene	U	10	ug/L	20	5	100	4.4	10.
Chloroform	U	10	ug/L	20	5	100	6.4	10.
1,2-Dichloroethane	U	10	ug/L	20	5	100	4.0	10.
1,1-Dichloroethene	U	10	ug/L	20	5	100	7.0	10.
2-Butanone	U	50	ug/L	20	15	300	26.	50.
Tetrachloroethene	U	10	ug/L	20	5	100	8.0	10.
Trichloroethene	U	10	ug/L	20	5	100	5.6	10.
Vinyl Chloride	U	20	ug/L	20	5	100	5.0	20.
1,2-Dichloroethane-D4		96.9	%					
Toluene-D8		97.6	%					
p-Bromofluorobenzene		94.4	%					
Dibromofluoromethane		100.	%					

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-2
Client ID: IDW-11292012-SO
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: G7321.D

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117473

Analysis Date: 06-DEC-12
Analyst: JCG
Analysis Method: SW846 8270C
Matrix: AQ
% Solids: 81.
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Pyridine	U	190	ug/L	1	50	250	7.5	190
1,4-Dichlorobenzene	U	38	ug/L	1	10	50.	11.	38.
2-Methylphenol	U	38	ug/L	1	10	50.	19.	38.
3&4-Methylphenol	U	38	ug/L	1	10	50.	28.	38.
Hexachloroethane	U	38	ug/L	1	10	50.	12.	38.
Nitrobenzene	U	38	ug/L	1	10	50.	16.	38.
Hexachlorobutadiene	U	38	ug/L	1	10	50.	9.0	38.
2,4,6-Trichlorophenol	UL	38	ug/L	1	10	50.	14.	38.
2,4,5-Trichlorophenol	UL	94	ug/L	1	25	120	18.	94.
2,4-Dinitrotoluene	U	38	ug/L	1	10	50.	11.	38.
Hexachlorobenzene	U	38	ug/L	1	10	50.	10.	38.
Pentachlorophenol	UL	94	ug/L	1	25	120	12.	94.
2-Fluorophenol		45.7	%					
Phenol-D6		31.8	%					
Nitrobenzene-D5		63.6	%					
2-Fluorobiphenyl		65.1	%					
2,4,6-Tribromophenol		82.9	%					
Terphenyl-D14		91.2	%					

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http://www.katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-2
Client ID: IDW-11292012-SO
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: 1FL00067.I

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117493

Analysis Date: 07-DEC-12
Analyst: JLP
Analysis Method: SW846 8081A
Matrix: AQ
% Solids: 81.
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
gamma-BHC	U	0.12	ug/L	1	.05	0.25	0.036	0.12
Heptachlor	U	0.12	ug/L	1	.05	0.25	0.040	0.12
Heptachlor Epoxide	U	0.12	ug/L	1	.05	0.25	0.037	0.12
Endrin	U	0.25	ug/L	1	.1	0.50	0.042	0.25
Methoxychlor	U	1.2	ug/L	1	.5	2.5	0.042	1.2
Technical Chlordane	U	1.2	ug/L	1	.5	2.5	0.42	1.2
Toxaphene	U	2.5	ug/L	1	1	5.0	0.85	2.5
Tetrachloro-M-Xylene		73.0	%					
Decachlorobiphenyl		100.	%					

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http://www.katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-2
Client ID: IDW-11292012-SO
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: 8FL00044.I

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117390

Analysis Date: 06-DEC-12
Analyst: JLP
Analysis Method: SW846 8151A
Matrix: AQ
% Solids: 81.
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
2,4-D	U	7.5	ug/L	1	3	15.	1.5	7.5
Silvex	U	7.5	ug/L	1	3	15.	1.0	7.5
2,4-Dichlorophenylacetic Acid		78.0	%					

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P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services
Client Field ID: IDW-11292012-SO
Matrix: WATER
SDG Name: SF8474
Percent Solids: 0.00
Lab Sample ID: SF8474-002T

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7440-38-2	ARSENIC, TCLP	25	U		P	1	40	7.15	25
7440-39-3	BARIUM, TCLP	283			P	1	25	1.15	15
7440-43-9	CADMIUM, TCLP	2.8	J		P	1	25	0.25	15
7440-47-3	CHROMIUM, TCLP	3.8	J		P	1	50	1.80	20
7439-92-1	LEAD, TCLP	20	U		P	1	25	5.35	20
7439-97-6	MERCURY, TCLP	0.04	J		CV	1	0.20	0.01	0.10
7782-49-2	SELENIUM, TCLP	35	U		P	1	50	11.80	35
7440-22-4	SILVER, TCLP	20	U		P	1	50	1.35	20

Comments:

Katahdin
ANALYTICAL SERVICES

Accredited in accordance with nelac
Cert No E87604

Report of Analytical Results

Client: Clairette Campbell
CH2MHill
5701 Cleveland St.
Virginia Beach,VA 23462

Lab Sample ID: SF8474-2
Report Date: 20-DEC-12
Client PO: 947215 N62470-11-D-8
Project: Clean 8012 CTO-WE04
SDG: SF8474

Sample Description	Matrix	Date Sampled	Date Received
IDW-11292012-SO	SL	29-NOV-12	30-NOV-12

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
Cyanide, Reactive	U0.80 mg/Kg	1.0	0.16	0.80	SW846 7.3.3	WG117446	04-DEC-12 15:21:36	SW846 7.3.4	04-DEC-12	
Ignitability	>71. Deg. C	71.	71.	N/A	SW846 1010	WG117500	03-DEC-12 13:00:00	N/A	N/A	
Sulfide,Reactive	U20 mg/Kg	27	16.39	20	SW846 7.3.4	WG117507	04-DEC-12 15:13:00	SW846 7.3.4	N/A	
Total Solids	81. %	1		N/A	SM2540G	WG117326	04-DEC-12 08:48:03	ASTM D2216	03-DEC-12	
pH(Soil)	7.5 pH	0.10	0.10	N/A	SW846 9045C	WG117256	30-NOV-12 14:52:00	SW846 9045C	30-NOV-12	

Katahdin Analytical Services A000094

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-1
Client ID: IDW-11292012-AQ
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: D3158.D

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: REC
Extraction Method: 5030/1311
Lab Prep Batch: WG117458

Analysis Date: 05-DEC-12
Analyst: REC
Analysis Method: SW846 8260C
Matrix: AQ
% Solids: NA
Report Date: 06-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Benzene	U	10	ug/L	20	5	100	5.2	10.
Carbon Tetrachloride	U	10	ug/L	20	5	100	4.4	10.
Chlorobenzene	U	10	ug/L	20	5	100	4.4	10.
Chloroform	U	10	ug/L	20	5	100	6.4	10.
1,2-Dichloroethane	U	10	ug/L	20	5	100	4.0	10.
1,1-Dichloroethene	U	10	ug/L	20	5	100	7.0	10.
2-Butanone	U	50	ug/L	20	15	300	26.	50.
Tetrachloroethene	U	10	ug/L	20	5	100	8.0	10.
Trichloroethene	U	10	ug/L	20	5	100	5.6	10.
Vinyl Chloride	U	20	ug/L	20	5	100	5.0	20.
1,2-Dichloroethane-D4		97.5	%					
Toluene-D8		96.8	%					
p-Bromofluorobenzene		96.2	%					
Dibromofluoromethane		98.8	%					

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-1
Client ID: IDW-11292012-AQ
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: G7320.D

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117473

Analysis Date: 06-DEC-12
Analyst: JCG
Analysis Method: SW846 8270C
Matrix: AQ
% Solids: NA
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Pyridine	U	190	ug/L	1	50	250	7.5	190
1,4-Dichlorobenzene	U	38	ug/L	1	10	50.	11.	38.
2-Methylphenol	U	38	ug/L	1	10	50.	19.	38.
3&4-Methylphenol	U	38	ug/L	1	10	50.	28.	38.
Hexachloroethane	U	38	ug/L	1	10	50.	12.	38.
Nitrobenzene	U	38	ug/L	1	10	50.	16.	38.
Hexachlorobutadiene	U	38	ug/L	1	10	50.	9.0	38.
2,4,6-Trichlorophenol	UL	38	ug/L	1	10	50.	14.	38.
2,4,5-Trichlorophenol	UL	94	ug/L	1	25	120	18.	94.
2,4-Dinitrotoluene	U	38	ug/L	1	10	50.	11.	38.
Hexachlorobenzene	U	38	ug/L	1	10	50.	10.	38.
Pentachlorophenol	UL	94	ug/L	1	25	120	12.	94.
2-Fluorophenol		46.5	%					
Phenol-D6		32.0	%					
Nitrobenzene-D5		69.5	%					
2-Fluorobiphenyl		71.9	%					
2,4,6-Tribromophenol		87.4	%					
Terphenyl-D14		91.2	%					

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Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-1
Client ID: IDW-11292012-AQ
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: 1FL00066.I

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117493

Analysis Date: 07-DEC-12
Analyst: JLP
Analysis Method: SW846 8081A
Matrix: AQ
% Solids: NA
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
gamma-BHC	U	0.12	ug/L	1	.05	0.25	0.036	0.12
Heptachlor	U	0.12	ug/L	1	.05	0.25	0.040	0.12
Heptachlor Epoxide	U	0.12	ug/L	1	.05	0.25	0.037	0.12
Endrin	U	0.25	ug/L	1	.1	0.50	0.042	0.25
Methoxychlor	U	1.2	ug/L	1	.5	2.5	0.042	1.2
Technical Chlordane	U	1.2	ug/L	1	.5	2.5	0.42	1.2
Toxaphene	U	2.5	ug/L	1	1	5.0	0.85	2.5
Tetrachloro-M-Xylene		58.6	%					
Decachlorobiphenyl		57.2	%					

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: CH2MHill
Lab ID: SF8474-1
Client ID: IDW-11292012-AQ
Project: Clean 8012 CTO-WE04 Chea
SDG: SF8474
Lab File ID: 8FL00043.I

Sample Date: 29-NOV-12
Received Date: 30-NOV-12
Extract Date: 05-DEC-12
Extracted By: JH
Extraction Method: 3510/1311
Lab Prep Batch: WG117390

Analysis Date: 06-DEC-12
Analyst: JLP
Analysis Method: SW846 8151A
Matrix: AQ
% Solids: NA
Report Date: 07-DEC-12

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
2,4-D	U	7.5	ug/L	1	3	15.	1.5	7.5
Silvex	U	7.5	ug/L	1	3	15.	1.0	7.5
2,4-Dichlorophenylacetic Acid		84.0	%					

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http://www.katahdinlab.com

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services
Client Field ID: IDW-11292012-AQ
Matrix: WATER
SDG Name: SF8474
Percent Solids: 0.00
Lab Sample ID: SF8474-001T

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	LOQ	ADJUSTED MDL	LOD
7440-38-2	ARSENIC, TCLP	25	U		P	1	40	7.15	25
7440-39-3	BARIUM, TCLP	386			P	1	25	1.15	15
7440-43-9	CADMIUM, TCLP	0.38	J		P	1	25	0.25	15
7440-47-3	CHROMIUM, TCLP	20	U		P	1	50	1.80	20
7439-92-1	LEAD, TCLP	20	U		P	1	25	5.35	20
7439-97-6	MERCURY, TCLP	0.02	J		CV	1	0.20	0.01	0.10
7782-49-2	SELENIUM, TCLP	14.3	J		P	1	50	11.80	35
7440-22-4	SILVER, TCLP	20	U		P	1	50	1.35	20

Comments:

Katahdin
ANALYTICAL SERVICES

Accredited in accordance with nelac
Cert No E87604

Report of Analytical Results

Client: Clairette Campbell
CH2MHill
5701 Cleveland St.
Virginia Beach,VA 23462

Lab Sample ID: SF8474-1
Report Date: 20-DEC-12
Client PO: 947215 N62470-11-D-8
Project: Clean 8012 CTO-WE04
SDG: SF8474

Sample Description	Matrix	Date Sampled	Date Received
IDW-11292012-AQ	AQ	29-NOV-12	30-NOV-12

Parameter	Result	Adj LOQ	Adj MDL	Adj LOD	Anal. Method	QC.Batch	Anal. Date	Prep. Method	Prep. Date	Footnotes
Cyanide, Reactive	U0.80 mg/Kg	1.0	0.16	0.80	SW846 7.3.3	WG117446	04-DEC-12 15:21:36	SW846 7.3.4	04-DEC-12	
Ignitability	>71. Deg. C	71.	71.	N/A	SW846 1010	WG117500	03-DEC-12 13:00:00	N/A	N/A	
Sulfide,Reactive	U20 mg/Kg	27.	16.39	20	SW846 7.3.4	WG117507	04-DEC-12 15:13:00	SW846 7.3.4	N/A	
pH(Laboratory)	7.4 pH	0.10	0.10	N/A	SW846 9040B	WG117362	03-DEC-12 10:13:00	N/A	N/A	

Katahdin Analytical Services A0000093

Appendix F
IDW Profiles and Disposal Manifests

Clearfield MMG
Post Office Box 1444
Chesapeake, VA 23327
(757) 549-8448
FAX: (757) 549-6668

NON-HAZARDOUS SHIPPING MANIFEST

MANIFEST NO._____

GENERATOR

NAME **NAVFAC Mid-Atlantic** TELEPHONE **757-341-0480**

ADDRESS **9742 Maryland Ave., Bldg. N-26** CITY **Norfolk** STATE **VA**

SHIPMENT ORIGIN **Naval Weapons Station Yorktown Cheathem Annex, Site 4** CITY **Williamsburg** STATE **VA**

AUTHORIZED AGENT **c/o CH2M HILL, Inc.** FIRM

ADDRESS OTHER **CTO-WE63**

MATERIAL CHARACTERIZATION

ACTIVITY GENERATING THIS MATERIAL: UST/AST REMOVAL _____ OTHER **Soil & Groundwater IDW**

PETROLEUM TYPE (S): **None** VIRGIN PRODUCT _____ NON-VIRGIN PRODUCT _____

PHYSICAL STATE: STOCKPILED _____ EXCAVATING _____ DRUMS **21** *(12 Water & 9 Soil)* OTHER _____

HANDLING INSTRUCTIONS: **Transport To Facility Designated Below**

FIRE OR SPILL INSTRCUTIONS: **Non-Flammable / Non-Hazardous**

DESTINATION: **Chesapeake Facility, 416 Dominion Blvd. North**

I hereby certify, to the best of my knowledge, the material characterized above is non-hazardous as defined by the Virginia Hazardous Waste Management Regulations, Federal Regulations under Subtitle C - RCRA, U.S. Department of Transportation, or local / state of origin regulations.

Rhonda Mickelborough
Signature of Generator / Agent

RHONDA MICKELBOROUGH 28 Jan 2013
Printed Name / Date

TRANSPORTER

TRANSPORTER NAME **Clearfield MMG, Inc.** TELEPHONE **757-549-8448** TRUCK NO. **14**

I certify that the materials described above were received by me for shipment and delivered to the designated facility.

1-28-13
Transporter Signature / Date

FACILTIY

I certify that the materials described above were delivered to the facility and received by me.

ACCEPTED BY _____ DATE 1/28/13

REASONS FOR REJECTION _____

Gross Weight	
Tare Weight	
Net Weight	
Tons	

FACILITY

Appendix G
Data Quality Evaluation

Appendix G

Data Quality Report for Cheatham Annex Site 4, Youth Pond, and Reference Data

October 2013

CH2MHILL®

5701 Cleveland Street, Suite 200

Virginia Beach, Virginia 23462

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SECTION 1

Data Quality Evaluation Process

This data quality evaluation assesses the effect of the overall analytical process on the availability of the analytical data. “Availability” in this context refers to whether results can be used by the project team, and is based on the analytical soundness of the results, as determined in the evaluation process. If a result is analytically sound, it is available for use in evaluating the potential release, nature, and extent of contamination, and estimating potentially associated human health and ecological risks. Though results are available, the datauser may consider a particular result or group of results to be not usable for one or more purposes if other conditions apply. In order to avoid confusion of terms, this data quality evaluation differentiates the “availability” of results from “usability” of results.

Three major categories of data evaluation are considered: laboratory performance, field collection performance, and matrix interference. Evaluation of laboratory performance is a check of the laboratory’s compliance with the method and client-specified requirements. Evaluation of field collection performance is a review of field quality control (QC) samples such as equipment blanks and field duplicates. Evaluation of potential matrix interference involves the review of supporting data such as surrogate recoveries and matrix spike (MS) recoveries.

Data evaluation is a multi-tiered approach, as outlined in Table 2-8 of the Cheatham Annex *Tier II Sampling and Analysis Plan for Site 4 – Remedial Investigation* (CH2M HILL, 2012), and Worksheet #34-36 of the *Remedial Investigation Sampling and Analysis Plan for Youth Pond* (CH2M HILL, 2012). The process begins with an internal review by the laboratory, continues with validation, and ends with an overall review by the CH2M HILL project chemistry team and the production of this report. While only the data validator applies final qualifiers to the data, the tiered-approach allows for data quality to be evaluated thoroughly and provides a medium for essential communication among the laboratory, validator, and project team.

1.1 Laboratory Internal Quality Control Review

During analysis and prior to releasing the analytical data, the laboratory reviewed both the client sample and laboratory QC sample data to verify sample identity, instrument calibration, quantitation limits, dilution factors, numerical computations, transcription accuracy, and chemical identification. The QC data were tabulated and the results reviewed to determine whether they were within the limits for accuracy and precision. Corrective action was taken and any non-conforming data was discussed in the data package cover letter and case narrative.

To identify the need for corrective action, the laboratory referred to their in-house Standard Operating Procedures (SOPs) and the specifications of the Sampling and Analysis Plan(s) (SAPs) specific to this project. Laboratory SOPs were based on the analytical method, Department of Defense requirements, and accumulated laboratory experience; the SAPs were Cheatham Annex *Tier II Sampling and Analysis Plan for Site 4 – Remedial Investigation* (CH2M HILL, 2012), or *Remedial Investigation Sampling and Analysis Plan for Youth Pond* (CH2M HILL, 2012), as appropriate.

1.2 Data Validation

Validation was performed by CH2M HILL. The validator reviewed all definitive data packages, qualified data, and reduced the dataset to present only one result per analyte, per sample. For each sample, and each analyte, the validator retained the result with the highest data quality and excluded any other results (from re-extraction, re-analysis, or multiple dilutions) to avoid redundancy.

During this review and determination of the need for qualification, the validator evaluated analytical results against the quality assurance (QA)/QC criteria of the SAP, analytical methods, and laboratory SOPs, respectively. The data qualifiers applied are those presented in *Region III Modifications to the National Functional Guidelines for Organic Data Review (September 1994)* and *Region III Modifications to National Functional Guidelines for*

Inorganic Data Review (April 1993). National Functional Guidelines may have also been used during validation if criteria did not contradict criteria in the SAPs.

The data validation was focused on the laboratory's performance and the sample matrix and their effects on the analytical results. Areas of review consisted of holding time compliance, surrogate recovery accuracy, blank contamination (trip, equipment, and method blanks), initial and continuing calibration accuracy and precision, laboratory control sample (LCS) accuracy, internal standard response and retention time accuracy, instrument tune criteria accuracy, matrix spike and matrix spike duplicate (MS/MSD) recovery and duplicate sample precision (laboratory and field duplicates). Additionally, the analytical spectrum and raw data output were reviewed and 10% of the laboratory results were recalculated from the raw data to verify final laboratory identification and quantitation.

1.3 Precision, Accuracy, Representativeness, Completeness, Comparability (PARCC)

Throughout the data evaluation process, data quality is evaluated by the precision, accuracy, representativeness, completeness, and comparability (PARCC) of the data. For reference, PARCC is defined as:

1.3.1 Precision

Precision is defined as the agreement between duplicate results, and was characterized by comparing the relative percent differences (RPDs) of MS/MSD, laboratory control sample (LCS) and its duplicate, serial dilutions, laboratory replicates, and/or field duplicate sample results. For this data set, precision was also assessed by examining dual-column reproducibility (percent difference between instrument columns) for pesticides, PCBs and explosives. Although results may have been qualified due to QC exceedances that may suggest an impact on precision, there is no actual significant negative impact on precision unless a data point is deemed unavailable (rejected) due to precision exceedances.

1.3.2 Accuracy/Bias

Accuracy/bias is a measure of the agreement between an analytical determination and the true value of the parameter being measured. For organic analyses, each sample was spiked with surrogate compounds; and for both organic and inorganic analyses, an MS/MSD and LCS were spiked with a known analyte concentration before preparation. Internal standards, surrogates and MS/MSDs provide a measure of the matrix effects on the analytical accuracy. The LCS demonstrates accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy/bias is also assessed by calibration recoveries. Although results may have been qualified due to QC exceedances which may suggest an impact on accuracy/bias, there is no actual significant negative impact on accuracy unless a data point is deemed unusable (rejected) due to accuracy exceedances.

1.3.3 Representativeness

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (in this case, the nature and extent of contamination). Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness is assured by the sampling team by following approved standard operating procedures (SOPs) for sample collection and handling, and the laboratory following approved SOPs for sample handling, preparation, and analysis.

1.3.4 Completeness

Completeness is calculated as the number of analytically-sound results that are available for use compared to the total number of measurements made. All results except those R-qualified as "rejected" are available for use as analytically-sound results. The R-qualifier is the only qualifier that negatively affects a data point's availability. The completeness of the dataset will be compared to a completeness goal identified in the UFP-SAP, or a goal of 95% if no goal was identified in the SAP.

1.3.5 Comparability

Comparability is a qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. If SOPs are followed, then with the exception of data that has been rejected due to quality exceedances, precision and accuracy are said to be acceptable and the data user may be confident that this data set is comparable to others of high data quality.

SECTION 2

Qualifiers and Reasons

2.1 Availability of Qualified Data

The qualifiers applied during validation affect the availability of the results and may affect their usability for certain purposes. The qualifiers in **Table 2-1** were applied to the Site 4, Youth Pond, or Reference datasets during the data quality evaluation process. For definitive data (organics and inorganics), final qualifiers are issued by the validator; for screening data, the laboratory qualifiers are considered final qualifiers. Qualifiers are discussed in greater detail in **Sections 2.1.1 through 2.1.7**, and reasons for applying these qualifiers are discussed in **Section 2.2**.

TABLE 2-1
Final Qualifiers Applied to Cheatham Annex Site 4, Youth Pond, or Reference Data

Qualifier	Meaning	Percent of Data Qualified	Count
U	Nondetect at the reported concentration	50.24%	9,917
[NONE]	Detected	22.40%	4,422
UL	Nondetect, quantitation limit biased low	15.17%	2,994
J	Detected, concentration estimated	7.20%	1,421
B	Attributed to blank contamination	1.84%	363
UJ	Nondetect, estimated quantitation limit	1.41%	278
L	Detected, concentration biased low	0.63%	124
X	Tentatively detected, estimated concentration; specific to PCB Congener data	0.62%	123
K	Detected, concentration biased high	0.29%	58
R	Rejected, data not available due to gross QA/QC issues	0.19%	37
H	Detected, concentration estimated; specific to screening data	0.01%	2
Q	Detected, concentration estimated; specific to screening data	0.01%	1
Totals:		100.00%	19,740

2.1.1 R-Qualified Results

In certain cases, a result is rejected and deemed to be unavailable. “Unavailable” in this instance is defined as a result that is not analytically sound and is not considered available for use by the project team. The R-qualifier is the only qualifier that may have an adverse effect on the availability of data. There are rejected data points in this data set.

2.1.2 Results with No Qualification

The absence of a qualifier indicates that the analyte was detected at the reported concentration and no qualification was warranted.

2.1.3 J-, UJ-, and U-Qualified Results

The J-qualification, UJ-qualification, and U-qualification of results are common occurrences and have no adverse effect on the availability of that result to the project team for making decisions. J-qualified results are available for use as detects at the reported result as long as they are considered “estimated” by the project team. Human health risk assessment guidance suggests that these qualifiers “indicate uncertainty in the reported concentration

of the chemical, but not in its assigned identity. Therefore, these data can be used just as positive data with no qualifiers or codes." In addition, one is to use "J-qualified concentrations the same way as positive data that do not have this qualifier" (*Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual.* (Part A) EPA/540/1-89/002. Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. 1989). U-qualified and UJ-qualified results are available for use as nondetects at the reported quantitation limit as long as they are considered "nondetect," or "nondetect, estimated quantitation limit," as appropriate.

2.1.4 B-Qualified Results

The B-qualification indicates that the results may be attributable to field or laboratory blank contamination, and that the analyte was detected in an associated blank as well as in the sample. If the B-qualifier is applied to definitive data, the results are usable as nondetects as long as they are considered "not detected at significantly greater concentration than that in an associated blank." If the B-qualifier is applied to screening data, the results are usable as detects as qualified.

2.1.5 K-, L-, and UL-Qualified Results

The K-qualification, L-qualification, and UL-qualification indicate the data is affected by an undeterminable degree of positive or negative bias. This may indicate the presence of a QC problem, but not a problem severe enough to warrant rejection of data. K-qualified results are usable as detects as long as they are considered "estimated and biased high." L-qualified results are available for use as detects and UL-qualified results are usable as nondetects as long as L- and UL-qualified results are considered "estimated and biased low."

2.1.6 X-Qualified Results

The X-qualification indicates uncertainty in the reported concentration of the analyte, as well as its assigned identity. This qualification is applied when there is a response similar to that of the target analyte is detected, but not all of the identification criteria are met. It is a qualification unique to high resolution methods such as those used for dioxins/furans and PCB congeners. X-qualified results are tentative detections and can be treated as detects or nondetects at the reported concentration, as long as they are treated as "estimated maximum possible concentrations." For this RI report, X-qualified data have been treated as detections.

2.1.7 H- and Q-Qualified Results

The H- and Q-qualifications were made at the laboratory and are associated with screening data, not definitive data. H-qualified results are reported from an analysis that was performed outside of the holdtime but within twice the holdtime. Q-qualified results had one or more quality control criteria that were not met; in this case, the associated MS/MSD did not meet criteria. H- and Q-qualified results are available for use as detects at the reported result as long as they are considered "estimated" by the project team.

2.2 Reasons for Data Qualification

When qualifying data the validator associates a reason code to explain why the qualification was made. Examining reasons for qualifying data provides insight into whether QC issues were encountered due to laboratory performance, field collection performance, or matrix interference. **Table 2-2** provides a list of the combinations of qualifiers and reason codes applied to the Site 4, Youth Pond, or Reference datasets, explains them, and identifies the impact of these qualifications on data quality. Whenever data is available for use as reported or as qualified, there is no impact on the availability of data for use by the project team.

TABLE 2-2
Reasons for Data Qualification

Qualifier	Reason Code	Count	Percent	Explanation	Impact on PARCC
Data Available as Reported					
[NONE]	[NONE]	4422	22.40%	Constituent was detected and further qualification was not necessary as there were no QA/QC exceedances. The result is available as a detect as reported.	none
U	[NONE]	9917	50.24%	Constituent was analyzed for but not detected. Further qualification was not necessary as there were no QA/QC exceedances. The result is available as a nondetect at the reported quantitation limit.	none
J	[NONE]	1034	5.24%	Constituent was detected at a concentration less than the quantitation limit and was thus qualified as estimated by the laboratory. Further qualification was not necessary as there were no QA/QC exceedances. The result is available as a detect as reported.	none
Data Available as Qualified					
J	EMPC	238	1.21%	Specific to homologue data. Constituent was detected, however this is an estimated maximum possible concentration because for at least one congener in the homologue group, one of the criteria required for positive identification (ion abundance ratio). The result is available as a detect as qualified.	none
J	FD	40	0.20%	Constituent was detected. Result is J-qualified due to poor reproducibility between the parent and field duplicate. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a detect as qualified, the greater of the parent and duplicate results should be used.	none
J	CCH	20	0.10%	Constituent was detected. Result is J-qualified due to high recovery in the associated continuing calibration verification. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is available as a detect at the reported quantitation limit.	none
J	OT	16	0.08%	Constituent was detected. Result is J-qualified for a reason specified in the DV report. In most instances the data was qualified due to dissolved metals results being greater than total metals results. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. In other instances, the data was qualified due to poor recoveries of the LOQ verification standard. The result is available as a detect as qualified.	none
J	LR	15	0.08%	Constituent was detected at a concentration that exceeded the instrument's linear calibration range. In most instances, the laboratory dilutes and reanalyzes samples so that all compounds are reported from the correct concentration range so that results J-qualified due to linear range are a rare occurrence. However, in some cases schedule prevents the laboratory from performing multiple dilutions, the constituents are present at multiple concentration ranges and the laboratory is not required to perform multiple dilutions, or the more diluted results are not of higher quality. In any case, the QA/QC exceedance (potential accuracy issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	CCL	12	0.06%	Constituent was detected. Result is J-qualified due to low recovery in the associated continuing calibration verification. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	2S	11	0.06%	Constituent was detected. Result is J-qualified due to poor reproducibility between two different calibration standard sources. The QA/QC exceedance (potential accuracy issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none

TABLE 2-2
Reasons for Data Qualification

Qualifier	Reason Code	Count	Percent	Explanation	Impact on PARCC
J	2C	10	0.05%	Specific to Pesticides, PCBs, or Explosives. Constituent was detected. Result is J-qualified due to poor dual-column reproducibility. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	MDP	10	0.05%	Constituent was detected. Result is J-qualified due to poor reproducibility between the MS and MSD. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	ICB	10	0.05%	Constituent was detected. Result is J-qualified due to poor fit of the calibration curve. The QA/QC exceedance (potential accuracy issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	ISH	3	0.02%	Constituent was detected. Result is J-qualified due to high recovery of internal standards. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	SD	1	0.01%	Constituent was detected. Result is J-qualified due to poor reproducibility in the serial dilution. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
J	ISL	1	0.01%	Constituent was detected. Result is J-qualified due to low recovery of internal standards. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
UJ	CCL	107	0.54%	Constituent was analyzed for but not detected. Result is UJ-qualified due to low recovery in a continuing calibration verification. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UJ	ISL	63	0.32%	Constituent was analyzed for but not detected. Result is UJ-qualified due to low recovery of internal standards. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UJ	2S	61	0.31%	Constituent was analyzed for but not detected. Result is UJ-qualified due to poor reproducibility between two calibration standard sources. The QA/QC exceedance (potential accuracy issue) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UJ	ICB	40	0.20%	Constituent was analyzed for but not detected. Result is UJ-qualified due to poor fit of the calibration curve. The QA/QC exceedance (potential accuracy issue) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UJ	MDP	5	0.03%	Constituent was analyzed for but not detected. Result is UJ-qualified due to poor reproducibility between the MS and MSD. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UJ	OT	2	0.01%	Constituent was not detected. Result is J-qualified due to the dissolved metals results being greater than total metals results. The QA/QC exceedance (potential precision issue) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none

TABLE 2-2
Reasons for Data Qualification

Qualifier	Reason Code	Count	Percent	Explanation	Impact on PARCC
B	MBL	132	0.67%	Constituent was detected. The result is B-qualified due to method blank contamination. The result is available as a nondetect as qualified.	none
B	EBL	125	0.63%	Constituent was detected. The result was B-qualified due to equipment blank contamination. The result is available as a nondetect as qualified.	none
B	CCBL	94	0.48%	Constituent was detected. The result was B-qualified due to continuing calibration blank contamination. The result is available as a nondetect as qualified.	none
B	[NONE]	12	0.06%	Specific to screening data. Constituent was detected. The result was B-qualified by the laboratory due to laboratory blank contamination. This is a qualifier applied by the laboratory rather than a data validator, therefore this data is available as a detect as qualified.	none
Data Available as Qualified					
K	MSH	45	0.23%	Constituent was detected. The result was K-qualified due to high recovery in the matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
K	BSH	10	0.05%	Constituent was detected. The result is K-qualified due to high recovery in the LCS. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
K	SSH	3	0.02%	Constituent was detected. The result was K-qualified due to high recovery for a surrogate. The QA/QC exceedance (potential high bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
L	SSL	79	0.40%	Constituent was detected. The result was L-qualified due to low recovery for a surrogate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
L	MSL	39	0.20%	Constituent was detected. The result was L-qualified due to low recovery in a matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
L	BSL	6	0.03%	Constituent was detected. The result was L-qualified due to low recovery in the LCS. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a detect as qualified.	none
UL	SSL	2633	13.34%	Constituent was analyzed for but not detected. The result was UL-qualified due to low recovery for a surrogate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
UL	MSL	259	1.31%	Constituent was analyzed for but not detected. The result was UL-qualified due to low recovery in the matrix spike and/or matrix spike duplicate. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none

TABLE 2-2
Reasons for Data Qualification

Qualifier	Reason Code	Count	Percent	Explanation	Impact on PARCC
UL	BSL	102	0.52%	Constituent was analyzed for but not detected. The result was UL-qualified due to low recovery in the LCS. The QA/QC exceedance (potential low bias) was not severe enough to warrant rejection. The result is available as a nondetect as qualified.	none
X	EMPC	123	0.62%	Specific to PCB Congener data. Constituent was tentatively detected. This is an estimated maximum possible concentration because one of the criteria required for positive identification (ion abundance ratio) was not met; therefore the identity of the detection is not certain. The result is available as a detect as qualified; for some datauses, X-qualified data may not be considered a detection. For this RI report, X-qualified data have been treated as detections.	none
H	[NONE]	2	0.01%	Specific to screening data. Constituent was detected. The result is H-qualified due to exceeding the analysis holdtime. The result is available as a detect as qualified.	none
Q	[NONE]	1	0.01%	Specific to screening data. Constituent was detected. The result is Q-qualified due to MS or MSD not meeting acceptance criteria. The result is available as a detect as qualified.	none
Data Not Available					
R	SSL	28	0.14%	Constituent may or may not have been detected. The result is R-qualified due to severely low recovery of surrogate(s), such that there is little confidence the constituent would be detected at an accurate concentration. This is indicative of matrix effects or matrix interference and laboratory performance is often assured by a second extraction with demonstration of similar matrix effects. The QA/QC exceedance (extreme low bias) was severe enough that the result should not be used as a detect or as a nondetect for any purpose. This has a negative impact on completeness and a negative impact on accuracy. Because the direction of bias is known, the data user may choose to use these data points (as conservative exceedances understanding that the result may be higher than reported) if the result was detected and exceeded a project action limit.	Completeness, Accuracy
R	MSL	9	0.05%	Constituent may or may not have been detected. The result was R-qualified due to severely low recovery in the MS or MSD, such that there is little confidence the constituent would be detected at an accurate concentration. This is indicative of matrix effects or matrix interference and laboratory performance is often assured by acceptable laboratory control sample recoveries. The QA/QC exceedance (extreme low bias) was severe enough that the result should not be used as a detect or as a nondetect for any purpose. This has a negative impact on completeness and a negative impact on accuracy. Because the direction of bias is known, the data user may choose to use these data points (as conservative exceedances understanding that the result may be higher than reported) if the result was detected and exceeded a project action limit. Rejected data is also discussed in Section 3 (specifically 3.2.2 Organics and 3.3.1 Organics).	Completeness, Accuracy
Totals:		19740	100.00%		

99.81% not R-flagged and available for use

SECTION 3

Evaluation of Data against Project Action Limits

When nondetect results are reported at a value greater than project action limits (PALs), the results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn. This is a relatively common occurrence, and there are a variety of potentially unavoidable reasons why the value at which nondetects are reported nondetect may exceed PALs, but the following two are the most common:

- Current technology may not be able to achieve an LOD or DL less than the PAL, in such cases the PAL is considered unreasonably low
- Soil and sediment samples may be too wet to achieve the PAL; samples are reported on a dry-weight basis, so if a soil sample is characterized by high percent moisture, then the reporting limits will be elevated

When drafting the UFP-SAPs for Site 4 and Youth Pond, it was anticipated that some PALs would not be met. This is detailed in the Reference Limits and Evaluation Tables with shading of the PALs that would not be met.

As part of the data quality evaluation, nondetected results, their associated nondetect value (the LOD), and the detection limit (DL) are compared to the minimum PAL (or to the background value if one exists). Such a comparison identifies instances where there is uncertainty regarding whether the analyte is present above the PAL (or background) due to the detection limits of the method and instrument. Since any concentration greater than the DL would be reported as a detection, uncertainty only exists when the DL is greater than the PAL. The different permutations for the PAL, LOD, and DL are summarized in **Table 3-1**, along with their impact on certainty of absence.

TABLE 3-1
Possible Arrangements for PAL, LOD, and DL, and Impact on Certainty of Absence

PAL relative to limits	Impact on Certainty of Absence
PAL > LOD > DL	baring other qualifications, there is certainty that the analyte is not present above the PAL, this is apparent on data tables
LOD > PAL > DL	baring other qualifications, there is certainty that the analyte is not present above the PAL, however this may not be apparent from data tables
LOD > DL > PAL	though the data is qualified as nondetect, there is uncertainty regarding whether the analyte is present at a concentration exceeding the PAL; this may not be apparent from data tables

PAL (project action limit) – the comparison criteria
LOD (limit of detection) – the value at which nondetects are reported in data tables
DL (detection limit) – the lowest concentration the instrument can detect; any response greater than this is reported as a detection

Lists of all data for which the PAL is lower than the LOD or the DL is are included in tables **Tables 3-2 through 3-8**. Data for which PAL is lower than the DL is discussed in Section 4 for each site, media, and analytical group as appropriate.

Comparison Criteria

The comparison criteria considered in **Tables 3-2 through 3-8** were as follows; note that in cases where a background value exists, the results and their DLs are compared to the background value instead of the minimum PAL.

- Groundwater: Federal Maximum Contaminant Levels (MCLs), Adjusted USEPA Regional Screening Levels (RSLs) for Tapwater from May 2013, and Cheatham Annex-Eastover Aquifer background
- Surface Water: Adjusted USEPA RSLs for Tapwater from May 2013 times 10 for comparison to surface water, Ecological Screening Values, and BTAG values

- Surface and Subsurface Soil: Adjusted USEPA RSLs for Residential Soil from May 2013, Ecological Screening Values and Cheatham Annex background values for surface soil or subsurface soil (as appropriate)
- Surface and Subsurface Sediment: Adjusted USEPA RSLs for Residential Soil from May 2013 times 10 for comparison to sediment, Ecological Screening Values, and BTAG values
- Tissue: no specific comparison criteria for laboratory data, data is evaluated only in risk-assessments

Tissue Non-Detect Data

Unlike the traditional media of groundwater etc, tissue does not have explicit comparison criteria. Data is available as discussed in **Section 4**.

TABLE 3-2
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Site 4 Groundwater

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAS04-GW05-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	UJ	CCL	0.37	0.50	1.0	0.39
No	CAS04-GW05P-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	UJ	CCL	0.37	0.50	1.0	0.39
No	CAS04-GW06-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	UL	MSL	0.37	0.50	1.0	0.39
No	CAS04-GW07-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	U		0.37	0.50	1.0	0.39
No	CAS04-GW08-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	U		0.37	0.50	1.0	0.39
No	CAS04-GW09-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	U		0.37	0.50	1.0	0.39
No	CAS04-GW10-1212	VOC	1,2,4-Trichlorobenzene	120-82-1	0.50	UG_L	U		0.37	0.50	1.0	0.39
No	CAS04-GW05-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW05P-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW06-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW07-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW08-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW09-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW10-1212	VOC	1,2-Dichloropropane	78-87-5	0.50	UG_L	U		0.25	0.50	1.0	0.38
No	CAS04-GW05-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW05P-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW06-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW07-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW08-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW09-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW10-1212	VOC	1,4-Dichlorobenzene	106-46-7	0.50	UG_L	U		0.24	0.50	1.0	0.42
No	CAS04-GW05-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW05P-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW06-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW07-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW08-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW09-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW10-1212	VOC	Benzene	71-43-2	0.50	UG_L	U		0.26	0.50	1.0	0.39
No	CAS04-GW05-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW05P-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW06-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW07-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW08-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW09-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW10-1212	VOC	Bromomethane	74-83-9	1.0	UG_L	U		0.49	1.0	2.0	0.7
No	CAS04-GW05-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW05P-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW06-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW07-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW08-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW09-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW10-1212	VOC	Carbon tetrachloride	56-23-5	0.50	UG_L	U		0.22	0.50	1.0	0.39
No	CAS04-GW05-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW05P-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW06-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW07-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW08-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW09-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW10-1212	VOC	cis-1,3-Dichloropropene	10061-01-5	0.50	UG_L	U		0.19	0.50	1.0	0.41
No	CAS04-GW05-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW05P-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW06-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW07-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW08-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW09-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
No	CAS04-GW10-1212	VOC	trans-1,3-Dichloropropene	10061-02-6	0.50	UG_L	U		0.20	0.50	1.0	0.41
Yes	CAS04-GW05-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW05P-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW06-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW07-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW08-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW09-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW10-1212	SVOC	Benzo(a)anthracene	56-55-3	0.094	UG_L	UJ	2S	0.043	0.094	0.19	0.029
Yes	CAS04-GW05-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW05P-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW06-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW07-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW08-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW09-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW10-1212	SVOC	Benzo(a)pyrene	50-32-8	0.094	UG_L	UL	BSL	0.062	0.094	0.19	0.0029
Yes	CAS04-GW05-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW05P-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW06-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW07-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW08-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW09-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW10-1212	SVOC	Benzo(b)fluoranthene	205-99-2	0.094	UG_L	UL	BSL	0.084	0.094	0.19	0.029
Yes	CAS04-GW05-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW05P-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW06-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW07-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW08-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW09-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW10-1212	SVOC	Dibenz(a,h)anthracene	53-70-3	0.094	UG_L	U		0.066	0.094	0.19	0.0029
Yes	CAS04-GW07-1212	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.094	UG_L	UJ	2S	0.049	0.094	0.19	0.029

TABLE 3-2
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Site 4 Groundwater

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAS04-GW10-1212	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.094	UG_L	UJ	2S	0.049	0.094	0.19	0.029
Yes	CAS04-GW05-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW05P-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW06-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW07-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW08-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW09-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW10-1212	VOC	1,1,2,2-Tetrachloroethane	79-34-5	0.50	UG_L	U		0.38	0.50	1.0	0.066
Yes	CAS04-GW05-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW05P-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW06-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW07-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW08-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW09-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW10-1212	VOC	1,1,2-Trichloroethane	79-00-5	0.50	UG_L	U		0.33	0.50	1.0	0.041
Yes	CAS04-GW05-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW05P-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW06-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW07-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW08-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW09-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW10-1212	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.0	UG_L	U		0.50	1.0	2.0	0.00032
Yes	CAS04-GW05-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW05P-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW06-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW07-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW08-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW09-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW10-1212	VOC	1,2-Dibromoethane	106-93-4	0.50	UG_L	U		0.22	0.50	1.0	0.0065
Yes	CAS04-GW05-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW05P-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW06-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW07-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW08-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW09-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW10-1212	VOC	1,2-Dichloroethane	107-06-2	0.50	UG_L	U		0.20	0.50	1.0	0.15
Yes	CAS04-GW05-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW05P-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW06-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW07-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW08-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW09-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW10-1212	VOC	Bromodichloromethane	75-27-4	0.50	UG_L	U		0.33	0.50	1.0	0.12
Yes	CAS04-GW05-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW05P-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW06-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW07-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW08-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW09-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW10-1212	VOC	Chloroform	67-66-3	0.50	UG_L	U		0.32	0.50	1.0	0.19
Yes	CAS04-GW05-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW05P-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW06-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW07-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW08-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW09-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW10-1212	VOC	Dibromochloromethane	124-48-1	0.50	UG_L	U		0.30	0.50	1.0	0.15
Yes	CAS04-GW05-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW05P-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW06-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW07-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW08-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW09-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW10-1212	VOC	Trichloroethene	79-01-6	0.50	UG_L	U		0.28	0.50	1.0	0.26
Yes	CAS04-GW05-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW05P-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW06-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW07-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW08-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW09-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015
Yes	CAS04-GW10-1212	VOC	Vinyl chloride	75-01-4	1.0	UG_L	U		0.25	1.0	2.0	0.015

TABLE 3-3
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Site 4 Groundwater

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAS04-GW05P-1212	FMETAL	Arsenic	7440-38-2	5.0	UG_L	UJ	CCL	1.43	5.0	8.0	1.37
No	CAS04-GW05-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW05P-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW06-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW07-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW08-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW09-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW10-1212	FMETAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW05-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW05P-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW06-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW07-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW09-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
No	CAS04-GW10-1212	METAL	Thallium	7440-28-0	5.0	UG_L	U		1.07	5.0	15	0.016
Yes	CAS04-GW05-1212	FMETAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.177
Yes	CAS04-GW06-1212	FMETAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.177
Yes	CAS04-GW07-1212	FMETAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.177
Yes	CAS04-GW08-1212	FMETAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.177
Yes	CAS04-GW06-1212	FMETAL	Cobalt	7440-48-4	4.0	UG_L	U		0.24	4.0	10	0.47
Yes	CAS04-GW07-1212	FMETAL	Cobalt	7440-48-4	4.0	UG_L	U		0.24	4.0	10	0.47
Yes	CAS04-GW08-1212	FMETAL	Cobalt	7440-48-4	4.0	UG_L	U		0.24	4.0	10	0.47
Yes	CAS04-GW09-1212	FMETAL	Cobalt	7440-48-4	4.0	UG_L	U		0.24	4.0	10	0.47
Yes	CAS04-GW10-1212	FMETAL	Cobalt	7440-48-4	4.0	UG_L	U		0.24	4.0	10	0.47
Yes	CAS04-GW05-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW05P-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW06-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW07-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW08-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW09-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW10-1212	FMETAL	Lead	7439-92-1	4.0	UG_L	U		1.07	4.0	5.0	1.7
Yes	CAS04-GW05-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW05P-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW06-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW07-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW08-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW09-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW10-1212	FMETAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.1
Yes	CAS04-GW10-1212	METAL	Arsenic	7440-38-2	5.0	UG_L	U		1.43	5.0	8.0	2.28
Yes	CAS04-GW05P-1212	METAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.605
Yes	CAS04-GW08-1212	METAL	Cadmium	7440-43-9	3.0	UG_L	U		0.05	3.0	5.0	0.605
Yes	CAS04-GW05-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW05P-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW06-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW07-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW08-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW09-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW10-1212	METAL	Mercury	7439-97-6	0.10	UG_L	U		0.01	0.10	0.20	0.081
Yes	CAS04-GW06-1212	METAL	Zinc	7440-66-6	10	UG_L	UJ	CCL	0.72	10	20	4.52

TABLE 3-4
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Site 4 Surface and Subsurface Soil

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAS04-SS11-1012	METAL	Selenium	7782-49-2	2.8	MG_KG	U		0.68	2.8	4.0	0.51
No	CAS04-SS10-1012	METAL	Thallium	7440-28-0	1.1	MG_KG	U		0.18	1.1	3.2	0.078
No	CAS04-SS11-1012	METAL	Thallium	7440-28-0	2.0	MG_KG	U		0.34	2.0	6.0	0.078
No	CAS04-SB06-1012	METAL	Thallium	7440-28-0	0.85	MG_KG	U		0.15	0.85	2.6	0.078
No	CAS04-SB07-1012	METAL	Thallium	7440-28-0	0.94	MG_KG	U		0.16	0.94	2.8	0.078
Yes	CAS04-SS09-1012	METAL	Selenium	7782-49-2	0.59	MG_KG	U		0.14	0.59	0.84	0.51
Yes	CAS04-SS10-1012	METAL	Selenium	7782-49-2	1.5	MG_KG	U		0.36	1.5	2.1	0.51
Yes	CAS04-SS08-1012	METAL	Thallium	7440-28-0	0.35	MG_KG	U		0.06	0.35	1.1	0.078
Yes	CAS04-SS09-1012	METAL	Thallium	7440-28-0	0.42	MG_KG	U		0.07	0.42	1.3	0.078
Yes	CAS04-SS12-1012	METAL	Thallium	7440-28-0	0.32	MG_KG	U		0.06	0.32	0.96	0.078
Yes	CAS04-SS12P-1012	METAL	Thallium	7440-28-0	0.32	MG_KG	U		0.06	0.32	0.97	0.078

TABLE 3-5
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Site 4 Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAS04-SD10P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.031	MG_KG	U		6.8	31.	62.	0.0202
No	CAS04-SD19-1012	SVOC	2-Methylnaphthalene	91-57-6	0.023	MG_KG	U		5.0	23.	46.	0.0202
No	CAS04-SD20-1012	SVOC	2-Methylnaphthalene	91-57-6	0.032	MG_KG	U		7.0	32.	64.	0.0202
No	CAS04-SD21-1012	SVOC	2-Methylnaphthalene	91-57-6	0.021	MG_KG	U		4.6	21.	42.	0.0202
No	CAS04-SD19-1012	SVOC	Acenaphthene	83-32-9	0.023	MG_KG	U		3.4	23.	46.	0.0067
No	CAS04-SD19-1012	SVOC	Acenaphthylene	208-96-8	0.023	MG_KG	U		2.8	23.	46.	0.0059

TABLE 3-6
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Site 4 Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAS04-SD10-1012	METAL	Thallium	7440-28-0	1.6	MG_KG	U		0.27	1.6	4.7	0.78
Yes	CAS04-SD10P-1012	METAL	Thallium	7440-28-0	1.6	MG_KG	U		0.29	1.6	5.0	0.78
Yes	CAS04-SD12-1012	METAL	Thallium	7440-28-0	0.88	MG_KG	U		0.15	0.88	2.6	0.78
Yes	CAS04-SD19-1012	METAL	Thallium	7440-28-0	0.80	MG_KG	U		0.14	0.80	2.4	0.78
Yes	CAS04-SD20-1012	METAL	Thallium	7440-28-0	0.89	MG_KG	U		0.15	0.89	2.7	0.78
Yes	CAS04-SD22-1012	METAL	Thallium	7440-28-0	0.78	MG_KG	U		0.13	0.78	2.4	0.78
Yes	CAS04-SD23-1012	METAL	Thallium	7440-28-0	0.85	MG_KG	U		0.15	0.85	2.6	0.78

TABLE 3-7
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Features

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD14-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD15-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD14-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD15-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD14-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD15-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD14-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD15-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD14-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD15-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD14-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD15-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD14-1012	PEST/PCB	4,4'-DDD	72-54-8	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.00488
No	CAYP-SD15-1012	PEST/PCB	4,4'-DDD	72-54-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00488
No	CAYP-SD14-1012	PEST/PCB	4,4'-DDE	72-55-9	0.024	MG_KG	UL	SSL	0.013	0.024	0.041	0.00316
No	CAYP-SD15-1012	PEST/PCB	4,4'-DDE	72-55-9	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.00316
No	CAYP-SD14-1012	PEST/PCB	4,4'-DDT	50-29-3	0.024	MG_KG	UL	SSL	0.016	0.024	0.041	0.00416
No	CAYP-SD15-1012	PEST/PCB	4,4'-DDT	50-29-3	0.026	MG_KG	UL	SSL	0.017	0.026	0.043	0.00416
No	CAYP-SD14-1012	PEST/PCB	Aldrin	309-00-2	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.002
No	CAYP-SD15-1012	PEST/PCB	Aldrin	309-00-2	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.002
No	CAYP-SS01-1012	Pest/PCB	Aldrin	309-00-2	0.013	MG_KG	UL	SSL	0.0064	0.013	0.022	0.00363
No	CAYP-SS02-1012	Pest/PCB	Aldrin	309-00-2	0.013	MG_KG	UL	SSL	0.0062	0.013	0.021	0.00363
No	CAYP-SS03-1012	Pest/PCB	Aldrin	309-00-2	0.013	MG_KG	UL	SSL	0.0061	0.013	0.021	0.00363
No	CAYP-SS03P-1012	Pest/PCB	Aldrin	309-00-2	0.013	MG_KG	UL	SSL	0.0061	0.013	0.021	0.00363
No	CAYP-SS04-1012	Pest/PCB	Aldrin	309-00-2	0.012	MG_KG	UL	SSL	0.0061	0.012	0.021	0.00363
No	CAYP-SS05-1012	Pest/PCB	Aldrin	309-00-2	0.012	MG_KG	UL	SSL	0.0059	0.012	0.020	0.00363
No	CAYP-SS06-1012	Pest/PCB	Aldrin	309-00-2	0.012	MG_KG	UL	MSL	0.0059	0.012	0.021	0.00363
No	CAYP-SD14-1012	PEST/PCB	alpha-BHC	319-84-6	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.006
No	CAYP-SD15-1012	PEST/PCB	alpha-BHC	319-84-6	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.006
No	CAYP-SD14-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.024	MG_KG	UL	SSL	0.011	0.024	0.041	0.00324
No	CAYP-SD15-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00324
No	CAYP-SD14-1012	PEST/PCB	beta-BHC	319-85-7	0.024	MG_KG	UL	SSL	0.024	0.024	0.041	0.005
No	CAYP-SD15-1012	PEST/PCB	beta-BHC	319-85-7	0.026	MG_KG	UL	SSL	0.026	0.026	0.043	0.005
No	CAYP-SD14-1012	PEST/PCB	delta-BHC	319-86-8	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.003
No	CAYP-SD15-1012	PEST/PCB	delta-BHC	319-86-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.003
No	CAYP-SD14-1012	PEST/PCB	Dieldrin	60-57-1	0.024	MG_KG	UL	SSL	0.011	0.024	0.041	0.0019
No	CAYP-SD15-1012	PEST/PCB	Dieldrin	60-57-1	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.0019
No	CAYP-SS01-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.013	MG_KG	UL	SSL	0.0064	0.013	0.022	0.00632
No	CAYP-SD14-1012	PEST/PCB	Endrin	72-20-8	0.024	MG_KG	UL	SSL	0.018	0.024	0.041	0.00222
No	CAYP-SD15-1012	PEST/PCB	Endrin	72-20-8	0.026	MG_KG	UL	SSL	0.019	0.026	0.043	0.00222
No	CAYP-SS01-1012	Pest/PCB	Endrin	72-20-8	0.013	MG_KG	UL	SSL	0.0097	0.013	0.022	0.00195
No	CAYP-SS02-1012	Pest/PCB	Endrin	72-20-8	0.013	MG_KG	UL	SSL	0.0093	0.013	0.021	0.00195
No	CAYP-SS03-1012	Pest/PCB	Endrin	72-20-8	0.013	MG_KG	UL	SSL	0.0093	0.013	0.021	0.00195
No	CAYP-SS03P-1012	Pest/PCB	Endrin	72-20-8	0.013	MG_KG	UL	SSL	0.0093	0.013	0.021	0.00195
No	CAYP-SS04-1012	Pest/PCB	Endrin	72-20-8	0.012	MG_KG	UL	SSL	0.0092	0.012	0.021	0.00195
No	CAYP-SS05-1012	Pest/PCB	Endrin	72-20-8	0.012	MG_KG	UL	SSL	0.0089	0.012	0.020	0.00195
No	CAYP-SS06-1012	Pest/PCB	Endrin	72-20-8	0.012	MG_KG	UL	MSL	0.0089	0.012	0.021	0.00195
No	CAYP-SD14-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.00222
No	CAYP-SD15-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.00222
No	CAYP-SS01-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.013	MG_KG	UL	SSL	0.0066	0.013	0.022	0.00195
No	CAYP-SS02-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.013	MG_KG	UL	SSL	0.0063	0.013	0.021	0.00195
No	CAYP-SS03-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.013	MG_KG	UL	SSL	0.0063	0.013	0.021	0.00195
No	CAYP-SS03P-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.013	MG_KG	UL	SSL	0.0063	0.013	0.021	0.00195
No	CAYP-SS04-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.012	MG_KG	UL	SSL	0.0062	0.012	0.021	0.00195
No	CAYP-SS05-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.012	MG_KG	UL	SSL	0.0060	0.012	0.020	0.00195
No	CAYP-SS06-1012	Pest/PCB	Endrin aldehyde	7421-93-4	0.012	MG_KG	UL	SSL	0.0060	0.012	0.021	0.00195
No	CAYP-SD14-1012	PEST/PCB	Endrin ketone	53494-70-5	0.024	MG_KG	UL	SSL	0.011	0.024	0.041	0.00222
No	CAYP-SD15-1012	PEST/PCB	Endrin ketone	53494-70-5	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00222
No	CAYP-SS01-1012	Pest/PCB	Endrin ketone	53494-70-5	0.013	MG_KG	UL	SSL	0.0059	0.013	0.022	0.00195
No	CAYP-SS02-1012	Pest/PCB	Endrin ketone	53494-70-5	0.013	MG_KG	UL	SSL	0.0057	0.013	0.021	0.00195
No	CAYP-SS03-1012	Pest/PCB	Endrin ketone	53494-70-5	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.00195
No	CAYP-SS03P-1012	Pest/PCB	Endrin ketone	53494-70-5	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.00195
No	CAYP-SS04-1012	Pest/PCB	Endrin ketone	53494-70-5	0.012	MG_KG	UL	SSL	0.0056	0.012	0.021	0.00195
No	CAYP-SS05-1012	Pest/PCB	Endrin ketone	53494-70-5	0.012	MG_KG	UL	SSL	0.0054	0.012	0.020	0.00195
No	CAYP-SS06-1012	Pest/PCB	Endrin ketone	53494-70-5	0.012	MG_KG	UL	SSL	0.0054	0.012	0.021	0.00195
No	CAYP-SD14-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.024	MG_KG	UL	SSL	0.011	0.024	0.041	0.00237
No	CAYP-SD15-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00237
No	CAYP-SD14-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.024	MG_KG	UL	SSL	0.011	0.024	0.041	0.00324
No	CAYP-SD15-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00324
No	CAYP-SD14-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.024	MG_KG	UL	SSL	0.012	0.024	0.041	0.00247
No	CAYP-SD15-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00247
No	CAYP-SD14-1012	PEST/PCB	Toxaphene	8001-35-2	0.48	MG_KG	UL	SSL	0.19	0.48	0.80	0.00054
No	CAYP-SD15-1012	PEST/PCB	Toxaphene	8001-35-2	0.51	MG_KG	UL	SSL	0.20	0.51	0.84	0.00054
No	CAYP-SD14-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.24	MG_KG	UL	SSL	0.18	0.24	0.78	0.029
No	CAYP-SD15-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.26	MG_KG	U		0.19	0.26	0.84	0.029
No	CAYP-SD14-1012	SVOC	2-Chlorophenol	95-57-8	0.24	MG_KG	UL	SSL	0.19	0.24	0.78	0.167
No	CAYP-SD15-1012	SVOC	2-Chlorophenol	95-57-8	0.26	MG_KG	U		0.21	0.26	0.84	0.167
No	CAYP-SD14-1012	SVOC	2-Methylnaphthalene	91-57-6	0.031	MG_KG	U		0.026	0.031	0.040	0.0202
No	CAYP-SD15-1012	SVOC	2-Methylnaphthalene	91-57-6	0.033	MG_KG	U		0.027	0.033	0.043	0.0202
No	CAYP-SD14-1012	SVOC	Acenaphthene	83-32-9	0.031	MG_KG	U		0.027	0.031	0.040	0.0067
No	CAYP-SD15-1012	SVOC	Acenaphthene	83-32-9	0.033	MG_KG	U		0.029	0.033	0.043	0.0067
No	CAYP-SD14-1012	SVOC	Acenaphthylene	208-96-8	0.031	MG_KG	U		0.023	0.031	0.040	0.0059
No	CAYP-SD15-1012	SVOC	Acenaphthylene	208-96-8	0.033	MG_KG	U		0.025	0.033	0.043	0.0059
No	CAYP-SD14-1012	SVOC	Atrazine	1912-24-9	0.24	MG_KG	UL	SSL	0.18	0.24	0.78	0.035
No	CAYP-SD15-1012	SVOC	Atrazine	1912-24-9	0.26	MG_KG	U		0.19	0.26	0.84	0.035
No	CAYP-SS01-1012	SVOC	Atrazine	1912-24-9	0.26	MG_KG	U		0.19	0.26	0.87	0.0119
No	CAYP-SS02-1012	SVOC	Atrazine	1912-24-9	0.13	MG_KG	U		0.093	0.13	0.42	0.0119

TABLE 3-7
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Features

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SS03-1012	SVOC	Atrazine	1912-24-9	0.13	MG_KG	UL	SSL	0.093	0.13	0.41	0.0119
No	CAYP-SS03P-1012	SVOC	Atrazine	1912-24-9	0.13	MG_KG	UL	SSL	0.093	0.13	0.41	0.0119
No	CAYP-SS04-1012	SVOC	Atrazine	1912-24-9	0.25	MG_KG	UL	SSL	0.18	0.25	0.82	0.0119
No	CAYP-SS05-1012	SVOC	Atrazine	1912-24-9	0.24	MG_KG	UL	SSL	0.18	0.24	0.79	0.0119
No	CAYP-SS06-1012	SVOC	Atrazine	1912-24-9	0.24	MG_KG	UL	SSL	0.18	0.24	0.80	0.0119
No	CAYP-SS01-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	0.26	MG_KG	U		0.24	0.26	0.87	0.21
No	CAYP-SS04-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	0.25	MG_KG	UL	SSL	0.23	0.25	0.82	0.21
No	CAYP-SS05-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	0.24	MG_KG	UL	SSL	0.22	0.24	0.79	0.21
No	CAYP-SS06-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	0.24	MG_KG	UL	SSL	0.22	0.24	0.80	0.21
No	CAYP-SD14-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.24	MG_KG	UJ	CCL	0.20	0.24	0.78	0.18
No	CAYP-SD14-1012	SVOC	Carbazole	86-74-8	0.24	MG_KG	UL	SSL	0.16	0.24	0.78	0.14
No	CAYP-SD15-1012	SVOC	Carbazole	86-74-8	0.26	MG_KG	U		0.17	0.26	0.84	0.14
No	CAYP-SS01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.33	MG_KG	U		0.17	0.33	0.43	0.015
No	CAYP-SS03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.031	MG_KG	U		0.016	0.031	0.041	0.015
No	CAYP-SS03P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.031	MG_KG	U		0.016	0.031	0.041	0.015
No	CAYP-SS04-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.031	MG_KG	U		0.016	0.031	0.041	0.015
No	CAYP-SS06-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.030	MG_KG	U		0.016	0.030	0.040	0.015
No	CAYP-SD14-1012	SVOC	Di-n-butylphthalate	84-74-2	0.24	MG_KG	UL	SSL	0.19	0.24	0.78	0.11
No	CAYP-SD15-1012	SVOC	Di-n-butylphthalate	84-74-2	0.26	MG_KG	U		0.20	0.26	0.84	0.11
No	CAYP-SD14-1012	SVOC	Hexachlorobenzene	118-74-1	0.24	MG_KG	UL	SSL	0.19	0.24	0.78	0.02
No	CAYP-SD15-1012	SVOC	Hexachlorobenzene	118-74-1	0.26	MG_KG	U		0.21	0.26	0.84	0.02
No	CAYP-SS01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.26	MG_KG	U		0.24	0.26	0.87	0.069
No	CAYP-SS02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.13	MG_KG	U		0.11	0.13	0.42	0.069
No	CAYP-SS03-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.13	MG_KG	UL	SSL	0.11	0.13	0.41	0.069
No	CAYP-SS03P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.13	MG_KG	UL	SSL	0.11	0.13	0.41	0.069
No	CAYP-SS04-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.25	MG_KG	UL	SSL	0.22	0.25	0.82	0.069
No	CAYP-SS05-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.24	MG_KG	UL	SSL	0.22	0.24	0.79	0.069
No	CAYP-SS06-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.24	MG_KG	UL	SSL	0.22	0.24	0.80	0.069
No	CAYP-SD14-1012	SVOC	Phenol	108-95-2	0.24	MG_KG	UL	SSL	0.18	0.24	0.78	0.048
No	CAYP-SD15-1012	SVOC	Phenol	108-95-2	0.26	MG_KG	U		0.19	0.26	0.84	0.048
No	CAYP-SD14-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0009	MG_KG	U		0.0003	0.0009	0.0019	0.00027
No	CAYP-SD15-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0012	MG_KG	U		0.0003	0.0012	0.0023	0.00027
No	CAYP-SD14-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0009	MG_KG	U		0.0003	0.0009	0.0019	0.00027
No	CAYP-SD15-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0012	MG_KG	U		0.0004	0.0012	0.0023	0.00027
Yes	CAYP-SS01-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.013	MG_KG	UL	SSL	0.0059	0.013	0.022	0.011
Yes	CAYP-SS02-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.013	MG_KG	UL	SSL	0.0057	0.013	0.021	0.011
Yes	CAYP-SS03-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.011
Yes	CAYP-SS03P-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.011
Yes	CAYP-SS04-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.012	MG_KG	UL	SSL	0.0056	0.012	0.021	0.011
Yes	CAYP-SS05-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.012	MG_KG	UL	SSL	0.0054	0.012	0.020	0.011
Yes	CAYP-SS06-1012	Pest/PCB	alpha-Chlordane	5103-71-9	0.012	MG_KG	UL	MSL	0.0054	0.012	0.021	0.011
Yes	CAYP-SS01-1012	Pest/PCB	Dieldrin	60-57-1	0.013	MG_KG	UL	SSL	0.0059	0.013	0.022	0.0105
Yes	CAYP-SS02-1012	Pest/PCB	Dieldrin	60-57-1	0.013	MG_KG	UL	SSL	0.0057	0.013	0.021	0.0105
Yes	CAYP-SS03-1012	Pest/PCB	Dieldrin	60-57-1	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.0105
Yes	CAYP-SS03P-1012	Pest/PCB	Dieldrin	60-57-1	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.0105
Yes	CAYP-SS04-1012	Pest/PCB	Dieldrin	60-57-1	0.012	MG_KG	UL	SSL	0.0056	0.012	0.021	0.0105
Yes	CAYP-SS05-1012	Pest/PCB	Dieldrin	60-57-1	0.012	MG_KG	UL	SSL	0.0054	0.012	0.020	0.0105
Yes	CAYP-SS06-1012	Pest/PCB	Dieldrin	60-57-1	0.012	MG_KG	UL	MSL	0.0054	0.012	0.021	0.0105
Yes	CAYP-SD14-1012	PEST/PCB	Endosulfan I	959-98-8	0.024	MG_KG	UL	SSL	0.0094	0.024	0.041	0.0155
Yes	CAYP-SD15-1012	PEST/PCB	Endosulfan I	959-98-8	0.026	MG_KG	UL	SSL	0.010	0.026	0.043	0.0155
Yes	CAYP-SS01-1012	Pest/PCB	Endosulfan I	959-98-8	0.013	MG_KG	UL	SSL	0.0051	0.013	0.022	0.00632
Yes	CAYP-SS02-1012	Pest/PCB	Endosulfan I	959-98-8	0.013	MG_KG	UL	SSL	0.0049	0.013	0.021	0.00632
Yes	CAYP-SS03-1012	Pest/PCB	Endosulfan I	959-98-8	0.013	MG_KG	UL	SSL	0.0049	0.013	0.021	0.00632
Yes	CAYP-SS03P-1012	Pest/PCB	Endosulfan I	959-98-8	0.013	MG_KG	UL	SSL	0.0049	0.013	0.021	0.00632
Yes	CAYP-SS04-1012	Pest/PCB	Endosulfan I	959-98-8	0.012	MG_KG	UL	SSL	0.0048	0.012	0.021	0.00632
Yes	CAYP-SS05-1012	Pest/PCB	Endosulfan I	959-98-8	0.012	MG_KG	UL	SSL	0.0047	0.012	0.020	0.00632
Yes	CAYP-SS06-1012	Pest/PCB	Endosulfan I	959-98-8	0.012	MG_KG	UL	SSL	0.0047	0.012	0.021	0.00632
Yes	CAYP-SS01-1012	Pest/PCB	Endosulfan II	33213-65-9	0.013	MG_KG	UL	SSL	0.0063	0.013	0.022	0.00632
Yes	CAYP-SS02-1012	Pest/PCB	Endosulfan II	33213-65-9	0.013	MG_KG	UL	SSL	0.0061	0.013	0.021	0.00632
Yes	CAYP-SS03-1012	Pest/PCB	Endosulfan II	33213-65-9	0.013	MG_KG	UL	SSL	0.0060	0.013	0.021	0.00632
Yes	CAYP-SS03P-1012	Pest/PCB	Endosulfan II	33213-65-9	0.013	MG_KG	UL	SSL	0.0060	0.013	0.021	0.00632
Yes	CAYP-SS04-1012	Pest/PCB	Endosulfan II	33213-65-9	0.012	MG_KG	UL	SSL	0.0059	0.012	0.021	0.00632
Yes	CAYP-SS05-1012	Pest/PCB	Endosulfan II	33213-65-9	0.012	MG_KG	UL	SSL	0.0057	0.012	0.020	0.00632
Yes	CAYP-SS06-1012	Pest/PCB	Endosulfan II	33213-65-9	0.012	MG_KG	UL	SSL	0.0058	0.012	0.021	0.00632
Yes	CAYP-SS02-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.013	MG_KG	UL	SSL	0.0062	0.013	0.021	0.00632
Yes	CAYP-SS03-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.013	MG_KG	UL	SSL	0.0061	0.013	0.021	0.00632
Yes	CAYP-SS03P-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.013	MG_KG	UL	SSL	0.0061	0.013	0.021	0.00632
Yes	CAYP-SS04-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.012	MG_KG	UL	SSL	0.0061	0.012	0.021	0.00632
Yes	CAYP-SS05-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.012	MG_KG	UL	SSL	0.0059	0.012	0.020	0.00632
Yes	CAYP-SS06-1012	Pest/PCB	Endosulfan sulfate	1031-07-8	0.012	MG_KG	UL	SSL	0.0059	0.012	0.021	0.00632
Yes	CAYP-SS01-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.013	MG_KG	UL	SSL	0.0059	0.013	0.022	0.00775
Yes	CAYP-SS02-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.013	MG_KG	UL	SSL	0.0057	0.013	0.021	0.00775
Yes	CAYP-SS03-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.00775
Yes	CAYP-SS03P-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.00775
Yes	CAYP-SS04-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.012	MG_KG	UL	SSL	0.0056	0.012	0.021	0.00775
Yes	CAYP-SS05-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.012	MG_KG	UL	SSL	0.0054	0.012	0.020	0.00775
Yes	CAYP-SS06-1012	Pest/PCB	gamma-BHC (Lindane)	58-89-9	0.012	MG_KG	UL	MSL	0.0054	0.012	0.021	0.00775
Yes	CAYP-SS01-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.013	MG_KG	UL	SSL	0.0059	0.013	0.022	0.011
Yes	CAYP-SS02-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.013	MG_KG	UL	SSL	0.0057	0.013	0.021	0.011
Yes	CAYP-SS03-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.011
Yes	CAYP-SS03P-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.013	MG_KG	UL	SSL	0.0056	0.013	0.021	0.011
Yes	CAYP-SS04-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.012	MG_KG	UL	SSL	0.0056	0.012	0.021	0.011
Yes	CAYP-SS05-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.012	MG_KG	UL	SSL	0.0054	0.012	0.020	0.011
Yes	CAYP-SS06-1012	Pest/PCB	gamma-Chlordane	5103-74-2	0.012	MG_KG	UL	MSL	0.0054	0.012	0.021	0.011
Yes	CAYP-SS01-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	0.52	MG_KG	UJ	CCL	0.19	0.52	0.87	0.5
Yes	CAYP-SS04-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	0.50	MG_KG	UJ	CCL	0.18	0.50	0.82	0.5
Yes	CAYP-SD14-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.24	MG_KG	UL	SSL	0.17	0.24	0.78	0.223

TABLE 3-7
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Features

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAYP-SD15-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.26	MG_KG	U		0.18	0.26	0.84	0.223
Yes	CAYP-SS01-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	0.79	MG_KG	U		0.34	0.79	0.87	0.49
Yes	CAYP-SS04-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	0.74	MG_KG	UL	SSL	0.32	0.74	0.82	0.49
Yes	CAYP-SS05-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	0.72	MG_KG	UL	SSL	0.31	0.72	0.79	0.49
Yes	CAYP-SS06-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	0.72	MG_KG	UL	SSL	0.31	0.72	0.80	0.49
Yes	CAYP-SD15-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.033	MG_KG	U		0.017	0.033	0.043	0.033
Yes	CAYP-SD14-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.031	MG_KG	U		0.015	0.031	0.040	0.017
Yes	CAYP-SD14-1012	VOC	Carbon disulfide	75-15-0	0.0047	MG_KG	U		0.0020	0.0047	0.0095	0.0045
Yes	CAYP-SD15-1012	VOC	Carbon disulfide	75-15-0	0.0058	MG_KG	U		0.0024	0.0058	0.012	0.0045

TABLE 3-8
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Youth Pond Surface Features

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SS01-1012	METAL	Selenium	7782-49-2	1.70	MG_KG	U		0.562	1.70	3.41	0.51
No	CAYP-SS02-1012	METAL	Selenium	7782-49-2	2.10	MG_KG	U		0.694	2.10	4.21	0.51
No	CAYP-SS03-1012	METAL	Selenium	7782-49-2	2.37	MG_KG	U		0.781	2.37	4.74	0.51
No	CAYP-SS03P-1012	METAL	Selenium	7782-49-2	1.96	MG_KG	U		0.647	1.96	3.92	0.51
No	CAYP-SS04-1012	METAL	Selenium	7782-49-2	1.55	MG_KG	U		0.511	1.55	3.10	0.51
No	CAYP-SS06-1012	METAL	Selenium	7782-49-2	1.98	MG_KG	U		0.652	1.98	3.95	0.51
No	CAYP-SS01-1012	METAL	Thallium	7440-28-0	1.70	MG_KG	U		0.511	1.70	3.41	0.078
No	CAYP-SS02-1012	METAL	Thallium	7440-28-0	2.10	MG_KG	U		0.631	2.10	4.21	0.078
No	CAYP-SS03-1012	METAL	Thallium	7440-28-0	2.37	MG_KG	U		0.710	2.37	4.74	0.078
No	CAYP-SS03P-1012	METAL	Thallium	7440-28-0	1.96	MG_KG	U		0.588	1.96	3.92	0.078
No	CAYP-SS04-1012	METAL	Thallium	7440-28-0	1.55	MG_KG	U		0.464	1.55	3.10	0.078
No	CAYP-SS05-1012	METAL	Thallium	7440-28-0	1.20	MG_KG	U		0.359	1.20	2.39	0.078
No	CAYP-SS06-1012	METAL	Thallium	7440-28-0	1.98	MG_KG	U		0.593	1.98	3.95	0.078
Yes	CAYP-SD14-1012	METAL	Cyanide	57-12-5	0.22	MG_KG	U		0.076	0.22	0.59	0.1
Yes	CAYP-SD15-1012	METAL	Cyanide	57-12-5	0.23	MG_KG	U		0.081	0.23	0.63	0.1
Yes	CAYP-SD14-1012	METAL	Thallium	7440-28-0	1.57	MG_KG	U		0.472	1.57	3.15	0.78
Yes	CAYP-SD15-1012	METAL	Thallium	7440-28-0	1.73	MG_KG	U		0.520	1.73	3.47	0.78

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD02P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD04-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD05-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD06-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD07-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD08-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD09-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD10-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD11-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD12-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD12P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SD13-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAYP-SSD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD02P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD04-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD05-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD06-1112	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD07-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD08-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD09-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD10-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD11-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD12-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SSD13-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAYP-SD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD02P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD04-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD05-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD06-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD07-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD08-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD09-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD10-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD11-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD12-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD12P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD13-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD02P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD04-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD05-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD06-1112	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD07-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD08-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD09-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD10-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD11-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD12-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SSD13-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAYP-SD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD02P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD04-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD05-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD06-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD07-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD08-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD09-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD10-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD11-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD12-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD12P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD13-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD02P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD04-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD05-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD06-1112	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD07-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD08-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD09-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD10-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD11-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD12-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SSD13-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAYP-SD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD02-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD02P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD03-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD04-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD05-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD06-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD07-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD08-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD09-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD10-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD11-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD12-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD12P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD13-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD02-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD02P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD03-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD04-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD05-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD06-1112	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD07-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD08-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD09-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD10-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD11-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD12-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SSD13-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAYP-SD01-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD02-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD02P-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD03-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD04-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD05-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD06-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD07-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD08-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD09-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD10-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD11-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD12-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD12P-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD13-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD01-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD02-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD02P-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD03-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD04-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD05-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD06-1112	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD07-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD08-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD09-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD10-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD11-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD12-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SSD13-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAYP-SD01-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD02-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD02P-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD03-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD04-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD05-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD06-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD07-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD08-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD09-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD10-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD11-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD12-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD12P-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD13-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD01-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD02-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD02P-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD03-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD04-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD05-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD06-1112	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD07-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD08-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD09-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD10-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD11-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD12-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SSD13-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAYP-SD01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.00488
No	CAYP-SD02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.00488
No	CAYP-SD02P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.00488
No	CAYP-SD03-1012	PEST/PCB	4,4'-DDD	72-54-8	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.00488
No	CAYP-SD06-1112	PEST/PCB	4,4'-DDD	72-54-8	0.014	MG_KG	UL	SSL	0.0068	0.014	0.024	0.00488
No	CAYP-SD07-1012	PEST/PCB	4,4'-DDD	72-54-8	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.00488
No	CAYP-SD10-1012	PEST/PCB	4,4'-DDD	72-54-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.00488
No	CAYP-SD11-1012	PEST/PCB	4,4'-DDD	72-54-8	0.027	MG_KG	UL	SSL	0.013	0.027	0.047	0.00488
No	CAYP-SD12-1012	PEST/PCB	4,4'-DDD	72-54-8	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.00488
No	CAYP-SD12P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.00488
No	CAYP-SD13-1012	PEST/PCB	4,4'-DDD	72-54-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.00488
No	CAYP-SSD01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00488
No	CAYP-SSD02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.00488
No	CAYP-SSD02P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.00488
No	CAYP-SSD03-1012	PEST/PCB	4,4'-DDD	72-54-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.00488
No	CAYP-SSD04-1112	PEST/PCB	4,4'-DDD	72-54-8	0.017	MG_KG	UL	SSL	0.0082	0.017	0.029	0.00488
No	CAYP-SSD06-1112	PEST/PCB	4,4'-DDD	72-54-8	0.013	MG_KG	UL	SSL	0.0064	0.013	0.023	0.00488
No	CAYP-SSD07-1012	PEST/PCB	4,4'-DDD	72-54-8	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.00488
No	CAYP-SSD09-1012	PEST/PCB	4,4'-DDD	72-54-8	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.00488
No	CAYP-SSD10-1012	PEST/PCB	4,4'-DDD	72-54-8	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.00488
No	CAYP-SSD11-1012	PEST/PCB	4,4'-DDD	72-54-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00488
No	CAYP-SSD12-1012	PEST/PCB	4,4'-DDD	72-54-8	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.00488
No	CAYP-SSD13-1012	PEST/PCB	4,4'-DDD	72-54-8	0.051	MG_KG	UL	SSL	0.024	0.051	0.087	0.00488
No	CAYP-SD01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.033	MG_KG	UL	MSL	0.017	0.033	0.056	0.00316
No	CAYP-SD02-1012	PEST/PCB	4,4'-DDE	72-55-9	0.038	MG_KG	UL	SSL	0.020	0.038	0.065	0.00316
No	CAYP-SD02P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.038	MG_KG	UL	SSL	0.020	0.038	0.065	0.00316
No	CAYP-SD03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.066	MG_KG	UL	SSL	0.034	0.066	0.11	0.00316
No	CAYP-SD04-1112	PEST/PCB	4,4'-DDE	72-55-9	0.022	MG_KG	UL	SSL	0.012	0.022	0.038	0.00316
No	CAYP-SD05-1112	PEST/PCB	4,4'-DDE	72-55-9	0.038	MG_KG	UL	SSL	0.020	0.038	0.064	0.00316
No	CAYP-SD06-1112	PEST/PCB	4,4'-DDE	72-55-9	0.014	MG_KG	UL	SSL	0.0073	0.014	0.024	0.00316
No	CAYP-SD07-1012	PEST/PCB	4,4'-DDE	72-55-9	0.035	MG_KG	UL	SSL	0.018	0.035	0.060	0.00316
No	CAYP-SD10-1012	PEST/PCB	4,4'-DDE	72-55-9	0.046	MG_KG	UL	SSL	0.024	0.046	0.077	0.00316
No	CAYP-SD11-1012	PEST/PCB	4,4'-DDE	72-55-9	0.027	MG_KG	UL	SSL	0.014	0.027	0.047	0.00316
No	CAYP-SD12-1012	PEST/PCB	4,4'-DDE	72-55-9	0.060	MG_KG	UL	SSL	0.031	0.060	0.10	0.00316
No	CAYP-SD12P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.045	MG_KG	UL	SSL	0.023	0.045	0.077	0.00316
No	CAYP-SD13-1012	PEST/PCB	4,4'-DDE	72-55-9	0.046	MG_KG	UL	SSL	0.024	0.046	0.079	0.00316
No	CAYP-SSD01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.026	MG_KG	UL	MSL	0.013	0.026	0.044	0.00316
No	CAYP-SSD02-1012	PEST/PCB	4,4'-DDE	72-55-9	0.030	MG_KG	UL	SSL	0.016	0.030	0.052	0.00316
No	CAYP-SSD02P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.033	MG_KG	UL	SSL	0.017	0.033	0.056	0.00316
No	CAYP-SSD03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.033	MG_KG	UL	SSL	0.017	0.033	0.057	0.00316
No	CAYP-SSD04-1112	PEST/PCB	4,4'-DDE	72-55-9	0.017	MG_KG	UL	SSL	0.0089	0.017	0.029	0.00316
No	CAYP-SSD05-1112	PEST/PCB	4,4'-DDE	72-55-9	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.00316
No	CAYP-SSD06-1112	PEST/PCB	4,4'-DDE	72-55-9	0.013	MG_KG	UL	SSL	0.0069	0.013	0.023	0.00316
No	CAYP-SSD07-1012	PEST/PCB	4,4'-DDE	72-55-9	0.029	MG_KG	UL	SSL	0.015	0.029	0.050	0.00316
No	CAYP-SSD09-1012	PEST/PCB	4,4'-DDE	72-55-9	0.023	MG_KG	UL	SSL	0.012	0.023	0.039	0.00316
No	CAYP-SSD10-1012	PEST/PCB	4,4'-DDE	72-55-9	0.031	MG_KG	UL	SSL	0.016	0.031	0.053	0.00316
No	CAYP-SSD11-1012	PEST/PCB	4,4'-DDE	72-55-9	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.00316
No	CAYP-SSD12-1012	PEST/PCB	4,4'-DDE	72-55-9	0.051	MG_KG	UL	SSL	0.027	0.051	0.087	0.00316
No	CAYP-SSD13-1012	PEST/PCB	4,4'-DDE	72-55-9	0.051	MG_KG	UL	SSL	0.026	0.051	0.087	0.00316
No	CAYP-SD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.033	MG_KG	UL	SSL	0.022	0.033	0.056	0.00416
No	CAYP-SD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.038	MG_KG	UL	SSL	0.025	0.038	0.065	0.00416
No	CAYP-SD02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.038	MG_KG	UL	SSL	0.025	0.038	0.065	0.00416
No	CAYP-SD03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.066	MG_KG	UL	SSL	0.043	0.066	0.11	0.00416
No	CAYP-SD04-1112	PEST/PCB	4,4'-DDT	50-29-3	0.022	MG_KG	UL	SSL	0.015	0.022	0.038	0.00416
No	CAYP-SD06-1112	PEST/PCB	4,4'-DDT	50-29-3	0.014	MG_KG	UL	SSL	0.0093	0.014	0.024	0.00416
No	CAYP-SD07-1012	PEST/PCB	4,4'-DDT	50-29-3	0.035	MG_KG	UL	SSL	0.023	0.035	0.060	0.00416
No	CAYP-SD08-1012	PEST/PCB	4,4'-DDT	50-29-3	0.050	MG_KG	UL	SSL	0.033	0.050	0.085	0.00416
No	CAYP-SD10-1012	PEST/PCB	4,4'-DDT	50-29-3	0.046	MG_KG	UL	SSL	0.030	0.046	0.077	0.00416
No	CAYP-SD11-1012	PEST/PCB	4,4'-DDT	50-29-3	0.027	MG_KG	UL	SSL	0.018	0.027	0.047	0.00416
No	CAYP-SD12-1012	PEST/PCB	4,4'-DDT	50-29-3	0.060	MG_KG	UL	SSL	0.040	0.060	0.10	0.00416
No	CAYP-SD12P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.045	MG_KG	UL	SSL	0.030	0.045	0.077	0.00416
No	CAYP-SD13-1012	PEST/PCB	4,4'-DDT	50-29-3	0.046	MG_KG	UL	SSL	0.031	0.046	0.079	0.00416
No	CAYP-SSD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.026	MG_KG	UL	SSL	0.017	0.026	0.044	0.00416
No	CAYP-SSD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.030	MG_KG	UL	SSL	0.020	0.030	0.052	0.00416
No	CAYP-SSD02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.033	MG_KG	UL	SSL	0.022	0.033	0.056	0.00416
No	CAYP-SSD03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.033	MG_KG	UL	SSL	0.022	0.033	0.057	0.00416
No	CAYP-SSD04-1112	PEST/PCB	4,4'-DDT	50-29-3	0.017	MG_KG	UL	SSL	0.011	0.017	0.029	0.00416
No	CAYP-SSD05-1112	PEST/PCB	4,4'-DDT	50-29-3	0.026	MG_KG	UL	SSL	0.017	0.026	0.044	0.00416
No	CAYP-SSD06-1112	PEST/PCB	4,4'-DDT	50-29-3	0.013	MG_KG	UL	SSL	0.0088	0.013	0.023	0.00416
No	CAYP-SSD07-1012	PEST/PCB	4,4'-DDT	50-29-3	0.029	MG_KG	UL	SSL	0.019	0.029	0.050	0.00416
No	CAYP-SSD08-1012	PEST/PCB	4,4'-DDT	50-29-3	0.014	MG_KG	UL	SSL	0.0095	0.014	0.024	0.00416
No	CAYP-SSD09-1012	PEST/PCB	4,4'-DDT	50-29-3	0.023	MG_KG	UL	SSL	0.015	0.023	0.039	0.00416
No	CAYP-SSD10-1012	PEST/PCB	4,4'-DDT	50-29-3	0.031	MG_KG	UL	SSL	0.020	0.031	0.053	0.00416
No	CAYP-SSD11-1012	PEST/PCB	4,4'-DDT	50-29-3	0.026	MG_KG	UL	SSL	0.017	0.026	0.043	0.00416
No	CAYP-SSD12-1012	PEST/PCB	4,4'-DDT	50-29-3	0.051	MG_KG	UL	SSL	0.034	0.051	0.087	0.00416
No	CAYP-SSD13-1012	PEST/PCB	4,4'-DDT	50-29-3	0.051	MG_KG	UL	SSL	0.034	0.051	0.087	0.00416
No	CAYP-SD01-1012	PEST/PCB	Aldrin	309-00-2	0.033	MG_KG	UL	MSL	0.016	0.033	0.056	0.002
No	CAYP-SD02-1012	PEST/PCB	Aldrin	309-00-2	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.002
No	CAYP-SD02P-1012	PEST/PCB	Aldrin	309-00-2	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.002
No	CAYP-SD03-1012	PEST/PCB	Aldrin	309-00-2	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.002
No	CAYP-SD04-1112	PEST/PCB	Aldrin	309-00-2	0.022	MG_KG	UL	SSL	0.011	0.022	0.038	0.002

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD05-1112	PEST/PCB	Aldrin	309-00-2	0.038	MG_KG	UL	SSL	0.018	0.038	0.064	0.002
No	CAYP-SD06-1112	PEST/PCB	Aldrin	309-00-2	0.014	MG_KG	UL	SSL	0.0069	0.014	0.024	0.002
No	CAYP-SD07-1012	PEST/PCB	Aldrin	309-00-2	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.002
No	CAYP-SD08-1012	PEST/PCB	Aldrin	309-00-2	0.050	MG_KG	UL	SSL	0.024	0.050	0.085	0.002
No	CAYP-SD10-1012	PEST/PCB	Aldrin	309-00-2	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.002
No	CAYP-SD11-1012	PEST/PCB	Aldrin	309-00-2	0.027	MG_KG	UL	SSL	0.013	0.027	0.047	0.002
No	CAYP-SD12-1012	PEST/PCB	Aldrin	309-00-2	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.002
No	CAYP-SD12P-1012	PEST/PCB	Aldrin	309-00-2	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.002
No	CAYP-SD13-1012	PEST/PCB	Aldrin	309-00-2	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.002
No	CAYP-SSD01-1012	PEST/PCB	Aldrin	309-00-2	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.002
No	CAYP-SSD02-1012	PEST/PCB	Aldrin	309-00-2	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.002
No	CAYP-SSD02P-1012	PEST/PCB	Aldrin	309-00-2	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.002
No	CAYP-SSD03-1012	PEST/PCB	Aldrin	309-00-2	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.002
No	CAYP-SSD04-1112	PEST/PCB	Aldrin	309-00-2	0.017	MG_KG	UL	SSL	0.0084	0.017	0.029	0.002
No	CAYP-SSD05-1112	PEST/PCB	Aldrin	309-00-2	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.002
No	CAYP-SSD06-1112	PEST/PCB	Aldrin	309-00-2	0.013	MG_KG	UL	SSL	0.0065	0.013	0.023	0.002
No	CAYP-SSD07-1012	PEST/PCB	Aldrin	309-00-2	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.002
No	CAYP-SSD08-1012	PEST/PCB	Aldrin	309-00-2	0.014	MG_KG	UL	SSL	0.0070	0.014	0.024	0.002
No	CAYP-SSD09-1012	PEST/PCB	Aldrin	309-00-2	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.002
No	CAYP-SSD10-1012	PEST/PCB	Aldrin	309-00-2	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.002
No	CAYP-SSD11-1012	PEST/PCB	Aldrin	309-00-2	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.002
No	CAYP-SSD12-1012	PEST/PCB	Aldrin	309-00-2	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.002
No	CAYP-SSD13-1012	PEST/PCB	Aldrin	309-00-2	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.002
No	CAYP-SD01-1012	PEST/PCB	alpha-BHC	319-84-6	0.033	MG_KG	UL	MSL	0.016	0.033	0.056	0.006
No	CAYP-SD02-1012	PEST/PCB	alpha-BHC	319-84-6	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.006
No	CAYP-SD02P-1012	PEST/PCB	alpha-BHC	319-84-6	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.006
No	CAYP-SD03-1012	PEST/PCB	alpha-BHC	319-84-6	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.006
No	CAYP-SD04-1112	PEST/PCB	alpha-BHC	319-84-6	0.022	MG_KG	UL	SSL	0.011	0.022	0.038	0.006
No	CAYP-SD05-1112	PEST/PCB	alpha-BHC	319-84-6	0.038	MG_KG	UL	SSL	0.018	0.038	0.064	0.006
No	CAYP-SD06-1112	PEST/PCB	alpha-BHC	319-84-6	0.014	MG_KG	UL	SSL	0.0069	0.014	0.024	0.006
No	CAYP-SD07-1012	PEST/PCB	alpha-BHC	319-84-6	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.006
No	CAYP-SD08-1012	PEST/PCB	alpha-BHC	319-84-6	0.050	MG_KG	UL	SSL	0.024	0.050	0.085	0.006
No	CAYP-SD10-1012	PEST/PCB	alpha-BHC	319-84-6	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.006
No	CAYP-SD11-1012	PEST/PCB	alpha-BHC	319-84-6	0.027	MG_KG	UL	SSL	0.013	0.027	0.047	0.006
No	CAYP-SD12-1012	PEST/PCB	alpha-BHC	319-84-6	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.006
No	CAYP-SD12P-1012	PEST/PCB	alpha-BHC	319-84-6	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.006
No	CAYP-SD13-1012	PEST/PCB	alpha-BHC	319-84-6	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.006
No	CAYP-SSD01-1012	PEST/PCB	alpha-BHC	319-84-6	0.026	MG_KG	UL	MSL	0.013	0.026	0.044	0.006
No	CAYP-SSD02-1012	PEST/PCB	alpha-BHC	319-84-6	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.006
No	CAYP-SSD02P-1012	PEST/PCB	alpha-BHC	319-84-6	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.006
No	CAYP-SSD03-1012	PEST/PCB	alpha-BHC	319-84-6	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.006
No	CAYP-SSD04-1112	PEST/PCB	alpha-BHC	319-84-6	0.017	MG_KG	UL	SSL	0.0084	0.017	0.029	0.006
No	CAYP-SSD05-1112	PEST/PCB	alpha-BHC	319-84-6	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.006
No	CAYP-SSD06-1112	PEST/PCB	alpha-BHC	319-84-6	0.013	MG_KG	UL	SSL	0.0065	0.013	0.023	0.006
No	CAYP-SSD07-1012	PEST/PCB	alpha-BHC	319-84-6	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.006
No	CAYP-SSD08-1012	PEST/PCB	alpha-BHC	319-84-6	0.014	MG_KG	UL	SSL	0.0070	0.014	0.024	0.006
No	CAYP-SSD09-1012	PEST/PCB	alpha-BHC	319-84-6	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.006
No	CAYP-SSD10-1012	PEST/PCB	alpha-BHC	319-84-6	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.006
No	CAYP-SSD11-1012	PEST/PCB	alpha-BHC	319-84-6	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.006
No	CAYP-SSD12-1012	PEST/PCB	alpha-BHC	319-84-6	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.006
No	CAYP-SSD13-1012	PEST/PCB	alpha-BHC	319-84-6	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.006
No	CAYP-SD01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.033	MG_KG	UL	MSL	0.015	0.033	0.056	0.00324
No	CAYP-SD02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00324
No	CAYP-SD02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00324
No	CAYP-SD03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.066	MG_KG	UL	SSL	0.030	0.066	0.11	0.00324
No	CAYP-SD04-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.022	MG_KG	UL	SSL	0.010	0.022	0.038	0.00324
No	CAYP-SD05-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.064	0.00324
No	CAYP-SD06-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.014	MG_KG	UL	SSL	0.0064	0.014	0.024	0.00324
No	CAYP-SD07-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.035	MG_KG	UL	SSL	0.016	0.035	0.060	0.00324
No	CAYP-SD08-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.050	MG_KG	UL	SSL	0.022	0.050	0.085	0.00324
No	CAYP-SD10-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.077	0.00324
No	CAYP-SD11-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.027	MG_KG	UL	SSL	0.012	0.027	0.047	0.00324
No	CAYP-SD12-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.060	MG_KG	UL	SSL	0.027	0.060	0.10	0.00324
No	CAYP-SD12P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.045	MG_KG	UL	SSL	0.020	0.045	0.077	0.00324
No	CAYP-SD13-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00324
No	CAYP-SSD01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00324
No	CAYP-SSD02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.030	MG_KG	UL	SSL	0.014	0.030	0.052	0.00324
No	CAYP-SSD02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.033	MG_KG	UL	SSL	0.015	0.033	0.056	0.00324
No	CAYP-SSD03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.033	MG_KG	UL	SSL	0.015	0.033	0.057	0.00324
No	CAYP-SSD04-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.017	MG_KG	UL	SSL	0.0077	0.017	0.029	0.00324
No	CAYP-SSD05-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00324
No	CAYP-SSD06-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.013	MG_KG	UL	SSL	0.0060	0.013	0.023	0.00324
No	CAYP-SSD07-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.029	MG_KG	UL	SSL	0.013	0.029	0.050	0.00324
No	CAYP-SSD08-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.014	MG_KG	UL	SSL	0.0065	0.014	0.024	0.00324
No	CAYP-SSD09-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.023	MG_KG	UL	SSL	0.010	0.023	0.039	0.00324
No	CAYP-SSD10-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.031	MG_KG	UL	SSL	0.014	0.031	0.053	0.00324
No	CAYP-SSD11-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.026	MG_KG	UL	SSL	0.011	0.026	0.043	0.00324
No	CAYP-SSD12-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00324
No	CAYP-SSD13-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00324
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.15	MG_KG	UL	SSL	0.11	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.15	MG_KG	UL	SSL	0.11	0.15	0.31	0.0598
No	CAYP-SD03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.13	MG_KG	U		0.092	0.13	0.26	0.0598
No	CAYP-SD04-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.089	MG_KG	U		0.062	0.089	0.18	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.15	MG_KG	UL	SSL	0.11	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.14	MG_KG	UL	SSL	0.099	0.14	0.28	0.0598

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD08-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.10	MG_KG	U		0.070	0.10	0.20	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.12	MG_KG	UL	SSL	0.085	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.24	MG_KG	UL	SSL	0.17	0.24	0.48	0.0598
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.18	MG_KG	UL	SSL	0.13	0.18	0.36	0.0598
No	CAYP-SD13-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.093	MG_KG	U		0.065	0.093	0.19	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.12	MG_KG	UL	SSL	0.085	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.13	MG_KG	UL	SSL	0.092	0.13	0.26	0.0598
No	CAYP-SSD05-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.10	MG_KG	UL	SSL	0.072	0.10	0.20	0.0598
No	CAYP-SSD07-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.12	MG_KG	UL	SSL	0.082	0.12	0.24	0.0598
No	CAYP-SSD09-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.091	MG_KG	UL	SSL	0.064	0.091	0.18	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.12	MG_KG	UL	SSL	0.087	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.21	MG_KG	UL	SSL	0.14	0.21	0.41	0.0598
No	CAYP-SSD13-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.10	MG_KG	U		0.071	0.10	0.20	0.0598
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.15	MG_KG	UL	SSL	0.099	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.15	MG_KG	UL	SSL	0.10	0.15	0.31	0.0598
No	CAYP-SD03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.13	MG_KG	U		0.085	0.13	0.26	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.15	MG_KG	UL	SSL	0.098	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.14	MG_KG	UL	SSL	0.092	0.14	0.28	0.0598
No	CAYP-SD08-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.10	MG_KG	U		0.065	0.10	0.20	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.12	MG_KG	UL	SSL	0.079	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.24	MG_KG	UL	SSL	0.16	0.24	0.48	0.0598
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.18	MG_KG	UL	SSL	0.12	0.18	0.36	0.0598
No	CAYP-SD13-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.093	MG_KG	U		0.060	0.093	0.19	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.12	MG_KG	UL	SSL	0.079	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.13	MG_KG	UL	SSL	0.086	0.13	0.26	0.0598
No	CAYP-SSD05-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.10	MG_KG	UL	SSL	0.067	0.10	0.20	0.0598
No	CAYP-SSD07-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.12	MG_KG	UL	SSL	0.076	0.12	0.24	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.12	MG_KG	UL	SSL	0.080	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.21	MG_KG	UL	SSL	0.13	0.21	0.41	0.0598
No	CAYP-SSD13-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.10	MG_KG	U		0.066	0.10	0.20	0.0598
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.15	MG_KG	UL	SSL	0.099	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.15	MG_KG	UL	SSL	0.10	0.15	0.31	0.0598
No	CAYP-SD03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.13	MG_KG	U		0.085	0.13	0.26	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.15	MG_KG	UL	SSL	0.098	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.14	MG_KG	UL	SSL	0.092	0.14	0.28	0.0598
No	CAYP-SD08-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.10	MG_KG	U		0.065	0.10	0.20	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.12	MG_KG	UL	SSL	0.079	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.24	MG_KG	UL	SSL	0.16	0.24	0.48	0.0598
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.18	MG_KG	UL	SSL	0.12	0.18	0.36	0.0598
No	CAYP-SD13-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.093	MG_KG	U		0.060	0.093	0.19	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.12	MG_KG	UL	SSL	0.079	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.13	MG_KG	UL	SSL	0.086	0.13	0.26	0.0598
No	CAYP-SSD05-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.10	MG_KG	UL	SSL	0.067	0.10	0.20	0.0598
No	CAYP-SSD07-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.12	MG_KG	UL	SSL	0.076	0.12	0.24	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.12	MG_KG	UL	SSL	0.080	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.21	MG_KG	UL	SSL	0.13	0.21	0.41	0.0598
No	CAYP-SSD13-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.10	MG_KG	U		0.066	0.10	0.20	0.0598
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.15	MG_KG	UL	SSL	0.076	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.15	MG_KG	UL	SSL	0.077	0.15	0.31	0.0598
No	CAYP-SD03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.13	MG_KG	U		0.066	0.13	0.26	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.15	MG_KG	UL	SSL	0.075	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.14	MG_KG	UL	SSL	0.071	0.14	0.28	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.12	MG_KG	UL	SSL	0.061	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.24	MG_KG	UL	SSL	0.12	0.24	0.48	0.0598
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.18	MG_KG	UL	SSL	0.090	0.18	0.36	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.12	MG_KG	UL	SSL	0.061	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.13	MG_KG	UL	SSL	0.066	0.13	0.26	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.12	MG_KG	UL	SSL	0.062	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.21	MG_KG	UL	SSL	0.10	0.21	0.41	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.24	MG_KG	UL	SSL	0.068	0.24	0.48	0.0598
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.15	MG_KG	UL	SSL	0.11	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.15	MG_KG	UL	SSL	0.11	0.15	0.31	0.0598
No	CAYP-SD03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.13	MG_KG	U		0.099	0.13	0.26	0.0598
No	CAYP-SD04-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.089	MG_KG	U		0.067	0.089	0.18	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.15	MG_KG	UL	SSL	0.11	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.14	MG_KG	UL	SSL	0.11	0.14	0.28	0.0598
No	CAYP-SD08-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.10	MG_KG	U		0.075	0.10	0.20	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.12	MG_KG	UL	SSL	0.091	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.24	MG_KG	UL	SSL	0.18	0.24	0.48	0.0598
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.18	MG_KG	UL	SSL	0.14	0.18	0.36	0.0598
No	CAYP-SD13-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.093	MG_KG	U		0.070	0.093	0.19	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.12	MG_KG	UL	SSL	0.091	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.13	MG_KG	UL	SSL	0.099	0.13	0.26	0.0598
No	CAYP-SSD05-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.10	MG_KG	UL	SSL	0.077	0.10	0.20	0.0598
No	CAYP-SSD07-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.12	MG_KG	UL	SSL	0.088	0.12	0.24	0.0598
No	CAYP-SSD09-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.091	MG_KG	UL	SSL	0.069	0.091	0.18	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.12	MG_KG	UL	SSL	0.093	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.21	MG_KG	UL	SSL	0.15	0.21	0.41	0.0598
No	CAYP-SSD13-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.10	MG_KG	U		0.076	0.10	0.20	0.0598
No	CAYP-SD02-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.15	MG_KG	UL	SSL	0.084	0.15	0.31	0.0598
No	CAYP-SD02P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.15	MG_KG	UL	SSL	0.084	0.15	0.31	0.0598
No	CAYP-SD05-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.15	MG_KG	UL	SSL	0.083	0.15	0.30	0.0598
No	CAYP-SD07-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.14	MG_KG	UL	SSL	0.078	0.14	0.28	0.0598
No	CAYP-SD09-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.12	MG_KG	UL	SSL	0.067	0.12	0.24	0.0598
No	CAYP-SD12-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.24	MG_KG	UL	SSL	0.13	0.24	0.48	0.0598

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD12P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.18	MG_KG	UL	SSL	0.099	0.18	0.36	0.0598
No	CAYP-SSD02-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.12	MG_KG	UL	SSL	0.067	0.12	0.24	0.0598
No	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.13	MG_KG	UL	SSL	0.073	0.13	0.26	0.0598
No	CAYP-SSD07-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.12	MG_KG	UL	SSL	0.065	0.12	0.24	0.0598
No	CAYP-SSD10-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.12	MG_KG	UL	SSL	0.068	0.12	0.25	0.0598
No	CAYP-SSD12-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.21	MG_KG	UL	SSL	0.11	0.21	0.41	0.0598
No	CAYP-SD01-1012	PEST/PCB	beta-BHC	319-85-7	0.033	MG_KG	UL	MSL	0.033	0.033	0.056	0.005
No	CAYP-SD02-1012	PEST/PCB	beta-BHC	319-85-7	0.038	MG_KG	UL	SSL	0.038	0.038	0.065	0.005
No	CAYP-SD02P-1012	PEST/PCB	beta-BHC	319-85-7	0.038	MG_KG	UL	SSL	0.038	0.038	0.065	0.005
No	CAYP-SD03-1012	PEST/PCB	beta-BHC	319-85-7	0.066	MG_KG	UL	SSL	0.066	0.066	0.11	0.005
No	CAYP-SD04-1112	PEST/PCB	beta-BHC	319-85-7	0.022	MG_KG	UL	SSL	0.022	0.022	0.038	0.005
No	CAYP-SD05-1112	PEST/PCB	beta-BHC	319-85-7	0.038	MG_KG	UL	SSL	0.038	0.038	0.064	0.005
No	CAYP-SD06-1112	PEST/PCB	beta-BHC	319-85-7	0.014	MG_KG	UL	SSL	0.014	0.014	0.024	0.005
No	CAYP-SD07-1012	PEST/PCB	beta-BHC	319-85-7	0.035	MG_KG	UL	SSL	0.035	0.035	0.060	0.005
No	CAYP-SD08-1012	PEST/PCB	beta-BHC	319-85-7	0.050	MG_KG	UL	SSL	0.050	0.050	0.085	0.005
No	CAYP-SD10-1012	PEST/PCB	beta-BHC	319-85-7	0.046	MG_KG	UL	SSL	0.046	0.046	0.077	0.005
No	CAYP-SD11-1012	PEST/PCB	beta-BHC	319-85-7	0.027	MG_KG	UL	SSL	0.027	0.027	0.047	0.005
No	CAYP-SD12-1012	PEST/PCB	beta-BHC	319-85-7	0.060	MG_KG	UL	SSL	0.060	0.060	0.10	0.005
No	CAYP-SD12P-1012	PEST/PCB	beta-BHC	319-85-7	0.045	MG_KG	UL	SSL	0.045	0.045	0.077	0.005
No	CAYP-SD13-1012	PEST/PCB	beta-BHC	319-85-7	0.046	MG_KG	UL	SSL	0.046	0.046	0.079	0.005
No	CAYP-SSD01-1012	PEST/PCB	beta-BHC	319-85-7	0.026	MG_KG	UL	SSL	0.026	0.026	0.044	0.005
No	CAYP-SSD02-1012	PEST/PCB	beta-BHC	319-85-7	0.030	MG_KG	UL	SSL	0.030	0.030	0.052	0.005
No	CAYP-SSD02P-1012	PEST/PCB	beta-BHC	319-85-7	0.033	MG_KG	UL	SSL	0.033	0.033	0.056	0.005
No	CAYP-SSD03-1012	PEST/PCB	beta-BHC	319-85-7	0.033	MG_KG	UL	SSL	0.033	0.033	0.057	0.005
No	CAYP-SSD04-1112	PEST/PCB	beta-BHC	319-85-7	0.017	MG_KG	UL	SSL	0.017	0.017	0.029	0.005
No	CAYP-SSD05-1112	PEST/PCB	beta-BHC	319-85-7	0.026	MG_KG	UL	SSL	0.026	0.026	0.044	0.005
No	CAYP-SSD06-1112	PEST/PCB	beta-BHC	319-85-7	0.013	MG_KG	UL	SSL	0.013	0.013	0.023	0.005
No	CAYP-SSD07-1012	PEST/PCB	beta-BHC	319-85-7	0.029	MG_KG	UL	SSL	0.029	0.029	0.050	0.005
No	CAYP-SSD08-1012	PEST/PCB	beta-BHC	319-85-7	0.014	MG_KG	UL	SSL	0.014	0.014	0.024	0.005
No	CAYP-SSD09-1012	PEST/PCB	beta-BHC	319-85-7	0.023	MG_KG	UL	SSL	0.023	0.023	0.039	0.005
No	CAYP-SSD10-1012	PEST/PCB	beta-BHC	319-85-7	0.031	MG_KG	UL	SSL	0.031	0.031	0.053	0.005
No	CAYP-SSD11-1012	PEST/PCB	beta-BHC	319-85-7	0.026	MG_KG	UL	SSL	0.026	0.026	0.043	0.005
No	CAYP-SSD12-1012	PEST/PCB	beta-BHC	319-85-7	0.051	MG_KG	UL	SSL	0.051	0.051	0.087	0.005
No	CAYP-SSD13-1012	PEST/PCB	beta-BHC	319-85-7	0.051	MG_KG	UL	SSL	0.051	0.051	0.087	0.005
No	CAYP-SD01-1012	PEST/PCB	delta-BHC	319-86-8	0.033	MG_KG	UL	MSL	0.016	0.033	0.056	0.003
No	CAYP-SD02-1012	PEST/PCB	delta-BHC	319-86-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.003
No	CAYP-SD02P-1012	PEST/PCB	delta-BHC	319-86-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.003
No	CAYP-SD03-1012	PEST/PCB	delta-BHC	319-86-8	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.003
No	CAYP-SD04-1112	PEST/PCB	delta-BHC	319-86-8	0.022	MG_KG	UL	SSL	0.011	0.022	0.038	0.003
No	CAYP-SD05-1112	PEST/PCB	delta-BHC	319-86-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.064	0.003
No	CAYP-SD06-1112	PEST/PCB	delta-BHC	319-86-8	0.014	MG_KG	UL	SSL	0.0068	0.014	0.024	0.003
No	CAYP-SD07-1012	PEST/PCB	delta-BHC	319-86-8	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.003
No	CAYP-SD08-1012	PEST/PCB	delta-BHC	319-86-8	0.050	MG_KG	UL	SSL	0.024	0.050	0.085	0.003
No	CAYP-SD10-1012	PEST/PCB	delta-BHC	319-86-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.003
No	CAYP-SD11-1012	PEST/PCB	delta-BHC	319-86-8	0.027	MG_KG	UL	SSL	0.013	0.027	0.047	0.003
No	CAYP-SD12-1012	PEST/PCB	delta-BHC	319-86-8	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.003
No	CAYP-SD12P-1012	PEST/PCB	delta-BHC	319-86-8	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.003
No	CAYP-SD13-1012	PEST/PCB	delta-BHC	319-86-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.003
No	CAYP-SSD01-1012	PEST/PCB	delta-BHC	319-86-8	0.026	MG_KG	UL	MSL	0.012	0.026	0.044	0.003
No	CAYP-SSD02-1012	PEST/PCB	delta-BHC	319-86-8	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.003
No	CAYP-SSD02P-1012	PEST/PCB	delta-BHC	319-86-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.003
No	CAYP-SSD03-1012	PEST/PCB	delta-BHC	319-86-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.003
No	CAYP-SSD04-1112	PEST/PCB	delta-BHC	319-86-8	0.017	MG_KG	UL	SSL	0.0082	0.017	0.029	0.003
No	CAYP-SSD05-1112	PEST/PCB	delta-BHC	319-86-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.003
No	CAYP-SSD06-1112	PEST/PCB	delta-BHC	319-86-8	0.013	MG_KG	UL	SSL	0.0064	0.013	0.023	0.003
No	CAYP-SSD07-1012	PEST/PCB	delta-BHC	319-86-8	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.003
No	CAYP-SSD08-1012	PEST/PCB	delta-BHC	319-86-8	0.014	MG_KG	UL	SSL	0.0069	0.014	0.024	0.003
No	CAYP-SSD09-1012	PEST/PCB	delta-BHC	319-86-8	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.003
No	CAYP-SSD10-1012	PEST/PCB	delta-BHC	319-86-8	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.003
No	CAYP-SSD11-1012	PEST/PCB	delta-BHC	319-86-8	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.003
No	CAYP-SSD12-1012	PEST/PCB	delta-BHC	319-86-8	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.003
No	CAYP-SSD13-1012	PEST/PCB	delta-BHC	319-86-8	0.051	MG_KG	UL	SSL	0.024	0.051	0.087	0.003
No	CAYP-SD01-1012	PEST/PCB	Dieldrin	60-57-1	0.033	MG_KG	UL	MSL	0.015	0.033	0.056	0.0019
No	CAYP-SD02-1012	PEST/PCB	Dieldrin	60-57-1	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.0019
No	CAYP-SD02P-1012	PEST/PCB	Dieldrin	60-57-1	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.0019
No	CAYP-SD03-1012	PEST/PCB	Dieldrin	60-57-1	0.066	MG_KG	UL	SSL	0.030	0.066	0.11	0.0019
No	CAYP-SD04-1112	PEST/PCB	Dieldrin	60-57-1	0.022	MG_KG	UL	SSL	0.010	0.022	0.038	0.0019
No	CAYP-SD05-1112	PEST/PCB	Dieldrin	60-57-1	0.038	MG_KG	UL	SSL	0.017	0.038	0.064	0.0019
No	CAYP-SD06-1112	PEST/PCB	Dieldrin	60-57-1	0.014	MG_KG	UL	SSL	0.0064	0.014	0.024	0.0019
No	CAYP-SD07-1012	PEST/PCB	Dieldrin	60-57-1	0.035	MG_KG	UL	SSL	0.016	0.035	0.060	0.0019
No	CAYP-SD08-1012	PEST/PCB	Dieldrin	60-57-1	0.050	MG_KG	UL	SSL	0.022	0.050	0.085	0.0019
No	CAYP-SD10-1012	PEST/PCB	Dieldrin	60-57-1	0.046	MG_KG	UL	SSL	0.021	0.046	0.077	0.0019
No	CAYP-SD11-1012	PEST/PCB	Dieldrin	60-57-1	0.027	MG_KG	UL	SSL	0.012	0.027	0.047	0.0019
No	CAYP-SD12-1012	PEST/PCB	Dieldrin	60-57-1	0.060	MG_KG	UL	SSL	0.027	0.060	0.10	0.0019
No	CAYP-SD12P-1012	PEST/PCB	Dieldrin	60-57-1	0.045	MG_KG	UL	SSL	0.020	0.045	0.077	0.0019
No	CAYP-SD13-1012	PEST/PCB	Dieldrin	60-57-1	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.0019
No	CAYP-SSD01-1012	PEST/PCB	Dieldrin	60-57-1	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.0019
No	CAYP-SSD02-1012	PEST/PCB	Dieldrin	60-57-1	0.030	MG_KG	UL	SSL	0.014	0.030	0.052	0.0019
No	CAYP-SSD02P-1012	PEST/PCB	Dieldrin	60-57-1	0.033	MG_KG	UL	SSL	0.015	0.033	0.056	0.0019
No	CAYP-SSD03-1012	PEST/PCB	Dieldrin	60-57-1	0.033	MG_KG	UL	SSL	0.015	0.033	0.057	0.0019
No	CAYP-SSD04-1112	PEST/PCB	Dieldrin	60-57-1	0.017	MG_KG	UL	SSL	0.0077	0.017	0.029	0.0019
No	CAYP-SSD05-1112	PEST/PCB	Dieldrin	60-57-1	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.0019
No	CAYP-SSD06-1112	PEST/PCB	Dieldrin	60-57-1	0.013	MG_KG	UL	SSL	0.0060	0.013	0.023	0.0019
No	CAYP-SSD07-1012	PEST/PCB	Dieldrin	60-57-1	0.029	MG_KG	UL	SSL	0.013	0.029	0.050	0.0019
No	CAYP-SSD08-1012	PEST/PCB	Dieldrin	60-57-1	0.014	MG_KG	UL	SSL	0.0065	0.014	0.024	0.0019

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD09-1012	PEST/PCB	Dieldrin	60-57-1	0.023	MG_KG	UL	SSL	0.010	0.023	0.039	0.0019
No	CAYP-SSD10-1012	PEST/PCB	Dieldrin	60-57-1	0.031	MG_KG	UL	SSL	0.014	0.031	0.053	0.0019
No	CAYP-SSD11-1012	PEST/PCB	Dieldrin	60-57-1	0.026	MG_KG	UL	SSL	0.011	0.026	0.043	0.0019
No	CAYP-SSD12-1012	PEST/PCB	Dieldrin	60-57-1	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.0019
No	CAYP-SSD13-1012	PEST/PCB	Dieldrin	60-57-1	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.0019
No	CAYP-SD03-1012	PEST/PCB	Endosulfan I	959-98-8	0.066	MG_KG	UL	SSL	0.026	0.066	0.11	0.0155
No	CAYP-SD08-1012	PEST/PCB	Endosulfan I	959-98-8	0.050	MG_KG	UL	SSL	0.019	0.050	0.085	0.0155
No	CAYP-SD10-1012	PEST/PCB	Endosulfan I	959-98-8	0.046	MG_KG	UL	SSL	0.018	0.046	0.077	0.0155
No	CAYP-SD12-1012	PEST/PCB	Endosulfan I	959-98-8	0.060	MG_KG	UL	SSL	0.023	0.060	0.10	0.0155
No	CAYP-SD12P-1012	PEST/PCB	Endosulfan I	959-98-8	0.045	MG_KG	UL	SSL	0.018	0.045	0.077	0.0155
No	CAYP-SD13-1012	PEST/PCB	Endosulfan I	959-98-8	0.046	MG_KG	UL	SSL	0.018	0.046	0.079	0.0155
No	CAYP-SSD12-1012	PEST/PCB	Endosulfan I	959-98-8	0.051	MG_KG	UL	SSL	0.020	0.051	0.087	0.0155
No	CAYP-SSD13-1012	PEST/PCB	Endosulfan I	959-98-8	0.051	MG_KG	UL	SSL	0.020	0.051	0.087	0.0155
No	CAYP-SD03-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.0289
No	CAYP-SD12-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.0289
No	CAYP-SD01-1012	PEST/PCB	Endrin	72-20-8	0.033	MG_KG	UL	MSL	0.025	0.033	0.056	0.00222
No	CAYP-SD02-1012	PEST/PCB	Endrin	72-20-8	0.038	MG_KG	UL	SSL	0.028	0.038	0.065	0.00222
No	CAYP-SD02P-1012	PEST/PCB	Endrin	72-20-8	0.038	MG_KG	UL	SSL	0.028	0.038	0.065	0.00222
No	CAYP-SD03-1012	PEST/PCB	Endrin	72-20-8	0.066	MG_KG	UL	SSL	0.049	0.066	0.11	0.00222
No	CAYP-SD04-1112	PEST/PCB	Endrin	72-20-8	0.022	MG_KG	UL	SSL	0.016	0.022	0.038	0.00222
No	CAYP-SD05-1112	PEST/PCB	Endrin	72-20-8	0.038	MG_KG	UL	SSL	0.028	0.038	0.064	0.00222
No	CAYP-SD06-1112	PEST/PCB	Endrin	72-20-8	0.014	MG_KG	UL	SSL	0.010	0.014	0.024	0.00222
No	CAYP-SD07-1012	PEST/PCB	Endrin	72-20-8	0.035	MG_KG	UL	SSL	0.026	0.035	0.060	0.00222
No	CAYP-SD08-1012	PEST/PCB	Endrin	72-20-8	0.050	MG_KG	UL	SSL	0.037	0.050	0.085	0.00222
No	CAYP-SD10-1012	PEST/PCB	Endrin	72-20-8	0.046	MG_KG	UL	SSL	0.034	0.046	0.077	0.00222
No	CAYP-SD11-1012	PEST/PCB	Endrin	72-20-8	0.027	MG_KG	UL	SSL	0.020	0.027	0.047	0.00222
No	CAYP-SD12-1012	PEST/PCB	Endrin	72-20-8	0.060	MG_KG	UL	SSL	0.044	0.060	0.10	0.00222
No	CAYP-SD12P-1012	PEST/PCB	Endrin	72-20-8	0.045	MG_KG	UL	SSL	0.033	0.045	0.077	0.00222
No	CAYP-SD13-1012	PEST/PCB	Endrin	72-20-8	0.046	MG_KG	UL	SSL	0.034	0.046	0.079	0.00222
No	CAYP-SSD01-1012	PEST/PCB	Endrin	72-20-8	0.026	MG_KG	UL	SSL	0.019	0.026	0.044	0.00222
No	CAYP-SSD02-1012	PEST/PCB	Endrin	72-20-8	0.030	MG_KG	UL	SSL	0.022	0.030	0.052	0.00222
No	CAYP-SSD02P-1012	PEST/PCB	Endrin	72-20-8	0.033	MG_KG	UL	SSL	0.024	0.033	0.056	0.00222
No	CAYP-SSD03-1012	PEST/PCB	Endrin	72-20-8	0.033	MG_KG	UL	SSL	0.025	0.033	0.057	0.00222
No	CAYP-SSD04-1112	PEST/PCB	Endrin	72-20-8	0.017	MG_KG	UL	SSL	0.013	0.017	0.029	0.00222
No	CAYP-SSD05-1112	PEST/PCB	Endrin	72-20-8	0.026	MG_KG	UL	SSL	0.019	0.026	0.044	0.00222
No	CAYP-SSD06-1112	PEST/PCB	Endrin	72-20-8	0.013	MG_KG	UL	SSL	0.0098	0.013	0.023	0.00222
No	CAYP-SSD07-1012	PEST/PCB	Endrin	72-20-8	0.029	MG_KG	UL	SSL	0.022	0.029	0.050	0.00222
No	CAYP-SSD08-1012	PEST/PCB	Endrin	72-20-8	0.014	MG_KG	UL	SSL	0.011	0.014	0.024	0.00222
No	CAYP-SSD09-1012	PEST/PCB	Endrin	72-20-8	0.023	MG_KG	UL	SSL	0.017	0.023	0.039	0.00222
No	CAYP-SSD10-1012	PEST/PCB	Endrin	72-20-8	0.031	MG_KG	UL	SSL	0.023	0.031	0.053	0.00222
No	CAYP-SSD11-1012	PEST/PCB	Endrin	72-20-8	0.026	MG_KG	UL	SSL	0.019	0.026	0.043	0.00222
No	CAYP-SSD12-1012	PEST/PCB	Endrin	72-20-8	0.051	MG_KG	UL	SSL	0.038	0.051	0.087	0.00222
No	CAYP-SSD13-1012	PEST/PCB	Endrin	72-20-8	0.051	MG_KG	UL	SSL	0.038	0.051	0.087	0.00222
No	CAYP-SD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.033	MG_KG	UL	SSL	0.017	0.033	0.056	0.00222
No	CAYP-SD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.00222
No	CAYP-SD02P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.00222
No	CAYP-SD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.066	MG_KG	UL	SSL	0.033	0.066	0.11	0.00222
No	CAYP-SD04-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.022	MG_KG	UL	SSL	0.011	0.022	0.038	0.00222
No	CAYP-SD05-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.038	MG_KG	UL	SSL	0.019	0.038	0.064	0.00222
No	CAYP-SD06-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.014	MG_KG	UL	SSL	0.0071	0.014	0.024	0.00222
No	CAYP-SD07-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.035	MG_KG	UL	SSL	0.018	0.035	0.060	0.00222
No	CAYP-SD08-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.050	MG_KG	UL	SSL	0.025	0.050	0.085	0.00222
No	CAYP-SD10-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.046	MG_KG	UL	SSL	0.023	0.046	0.077	0.00222
No	CAYP-SD11-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.027	MG_KG	UL	SSL	0.014	0.027	0.047	0.00222
No	CAYP-SD12-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.060	MG_KG	UL	SSL	0.030	0.060	0.10	0.00222
No	CAYP-SD12P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.045	MG_KG	UL	SSL	0.023	0.045	0.077	0.00222
No	CAYP-SD13-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.00222
No	CAYP-SSD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.00222
No	CAYP-SSD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.00222
No	CAYP-SSD02P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.033	MG_KG	UL	SSL	0.017	0.033	0.056	0.00222
No	CAYP-SSD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.033	MG_KG	UL	SSL	0.017	0.033	0.057	0.00222
No	CAYP-SSD04-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.017	MG_KG	UL	SSL	0.0086	0.017	0.029	0.00222
No	CAYP-SSD05-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.026	MG_KG	UL	SSL	0.013	0.026	0.044	0.00222
No	CAYP-SSD06-1112	PEST/PCB	Endrin aldehyde	7421-93-4	0.013	MG_KG	UL	SSL	0.0066	0.013	0.023	0.00222
No	CAYP-SSD07-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.029	MG_KG	UL	SSL	0.015	0.029	0.050	0.00222
No	CAYP-SSD08-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.014	MG_KG	UL	SSL	0.0072	0.014	0.024	0.00222
No	CAYP-SSD09-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.00222
No	CAYP-SSD10-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.00222
No	CAYP-SSD11-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.026	MG_KG	UL	SSL	0.013	0.026	0.043	0.00222
No	CAYP-SSD12-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.051	MG_KG	UL	SSL	0.026	0.051	0.087	0.00222
No	CAYP-SSD13-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.00222
No	CAYP-SD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.033	MG_KG	UL	MSL	0.015	0.033	0.056	0.00222
No	CAYP-SD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00222
No	CAYP-SD02P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00222
No	CAYP-SD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.066	MG_KG	UL	SSL	0.030	0.066	0.11	0.00222
No	CAYP-SD04-1112	PEST/PCB	Endrin ketone	53494-70-5	0.022	MG_KG	UL	SSL	0.010	0.022	0.038	0.00222
No	CAYP-SD05-1112	PEST/PCB	Endrin ketone	53494-70-5	0.038	MG_KG	UL	SSL	0.017	0.038	0.064	0.00222
No	CAYP-SD06-1112	PEST/PCB	Endrin ketone	53494-70-5	0.014	MG_KG	UL	SSL	0.0064	0.014	0.024	0.00222
No	CAYP-SD07-1012	PEST/PCB	Endrin ketone	53494-70-5	0.035	MG_KG	UL	SSL	0.016	0.035	0.060	0.00222
No	CAYP-SD08-1012	PEST/PCB	Endrin ketone	53494-70-5	0.050	MG_KG	UL	SSL	0.022	0.050	0.085	0.00222
No	CAYP-SD10-1012	PEST/PCB	Endrin ketone	53494-70-5	0.046	MG_KG	UL	SSL	0.021	0.046	0.077	0.00222
No	CAYP-SD11-1012	PEST/PCB	Endrin ketone	53494-70-5	0.027	MG_KG	UL	SSL	0.012	0.027	0.047	0.00222
No	CAYP-SD12-1012	PEST/PCB	Endrin ketone	53494-70-5	0.060	MG_KG	UL	SSL	0.027	0.060	0.10	0.00222
No	CAYP-SD12P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.045	MG_KG	UL	SSL	0.020	0.045	0.077	0.00222
No	CAYP-SD13-1012	PEST/PCB	Endrin ketone	53494-70-5	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00222

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.026	MG_KG	UL	MSL	0.012	0.026	0.044	0.00222
No	CAYP-SSD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.030	MG_KG	UL	SSL	0.014	0.030	0.052	0.00222
No	CAYP-SSD02P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.033	MG_KG	UL	SSL	0.015	0.033	0.056	0.00222
No	CAYP-SSD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.033	MG_KG	UL	SSL	0.015	0.033	0.057	0.00222
No	CAYP-SSD04-1112	PEST/PCB	Endrin ketone	53494-70-5	0.017	MG_KG	UL	SSL	0.0077	0.017	0.029	0.00222
No	CAYP-SSD05-1112	PEST/PCB	Endrin ketone	53494-70-5	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00222
No	CAYP-SSD06-1112	PEST/PCB	Endrin ketone	53494-70-5	0.013	MG_KG	UL	SSL	0.0060	0.013	0.023	0.00222
No	CAYP-SSD07-1012	PEST/PCB	Endrin ketone	53494-70-5	0.029	MG_KG	UL	SSL	0.013	0.029	0.050	0.00222
No	CAYP-SSD08-1012	PEST/PCB	Endrin ketone	53494-70-5	0.014	MG_KG	UL	SSL	0.0065	0.014	0.024	0.00222
No	CAYP-SSD09-1012	PEST/PCB	Endrin ketone	53494-70-5	0.023	MG_KG	UL	SSL	0.010	0.023	0.039	0.00222
No	CAYP-SSD10-1012	PEST/PCB	Endrin ketone	53494-70-5	0.031	MG_KG	UL	SSL	0.014	0.031	0.053	0.00222
No	CAYP-SSD11-1012	PEST/PCB	Endrin ketone	53494-70-5	0.026	MG_KG	UL	SSL	0.011	0.026	0.043	0.00222
No	CAYP-SSD12-1012	PEST/PCB	Endrin ketone	53494-70-5	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00222
No	CAYP-SSD13-1012	PEST/PCB	Endrin ketone	53494-70-5	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00222
No	CAYP-SD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.033	MG_KG	UL	MSL	0.015	0.033	0.056	0.00237
No	CAYP-SD02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00237
No	CAYP-SD02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00237
No	CAYP-SD03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.066	MG_KG	UL	SSL	0.030	0.066	0.11	0.00237
No	CAYP-SD04-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.022	MG_KG	UL	SSL	0.010	0.022	0.038	0.00237
No	CAYP-SD05-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.038	MG_KG	UL	SSL	0.017	0.038	0.064	0.00237
No	CAYP-SD06-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.014	MG_KG	UL	SSL	0.0064	0.014	0.024	0.00237
No	CAYP-SD07-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.035	MG_KG	UL	SSL	0.016	0.035	0.060	0.00237
No	CAYP-SD08-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.050	MG_KG	UL	SSL	0.022	0.050	0.085	0.00237
No	CAYP-SD10-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.077	0.00237
No	CAYP-SD11-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.027	MG_KG	UL	SSL	0.012	0.027	0.047	0.00237
No	CAYP-SD12-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.060	MG_KG	UL	SSL	0.027	0.060	0.10	0.00237
No	CAYP-SD12P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.045	MG_KG	UL	SSL	0.020	0.045	0.077	0.00237
No	CAYP-SD13-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00237
No	CAYP-SSD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.026	MG_KG	UL	MSL	0.012	0.026	0.044	0.00237
No	CAYP-SSD02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.030	MG_KG	UL	SSL	0.014	0.030	0.052	0.00237
No	CAYP-SSD02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.033	MG_KG	UL	SSL	0.015	0.033	0.056	0.00237
No	CAYP-SSD03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.033	MG_KG	UL	SSL	0.015	0.033	0.057	0.00237
No	CAYP-SSD04-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.017	MG_KG	UL	SSL	0.0077	0.017	0.029	0.00237
No	CAYP-SSD05-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00237
No	CAYP-SSD06-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.013	MG_KG	UL	SSL	0.0060	0.013	0.023	0.00237
No	CAYP-SSD07-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.029	MG_KG	UL	SSL	0.013	0.029	0.050	0.00237
No	CAYP-SSD08-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.014	MG_KG	UL	SSL	0.0065	0.014	0.024	0.00237
No	CAYP-SSD09-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.023	MG_KG	UL	SSL	0.010	0.023	0.039	0.00237
No	CAYP-SSD10-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.031	MG_KG	UL	SSL	0.014	0.031	0.053	0.00237
No	CAYP-SSD11-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.026	MG_KG	UL	SSL	0.011	0.026	0.043	0.00237
No	CAYP-SSD12-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00237
No	CAYP-SSD13-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00237
No	CAYP-SD01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.033	MG_KG	UL	MSL	0.015	0.033	0.056	0.00324
No	CAYP-SD02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00324
No	CAYP-SD02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.038	MG_KG	UL	SSL	0.017	0.038	0.065	0.00324
No	CAYP-SD03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.066	MG_KG	UL	SSL	0.030	0.066	0.11	0.00324
No	CAYP-SD04-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.022	MG_KG	UL	SSL	0.010	0.022	0.038	0.00324
No	CAYP-SD05-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.038	MG_KG	UL	SSL	0.017	0.038	0.064	0.00324
No	CAYP-SD06-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.014	MG_KG	UL	SSL	0.0064	0.014	0.024	0.00324
No	CAYP-SD07-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.035	MG_KG	UL	SSL	0.016	0.035	0.060	0.00324
No	CAYP-SD08-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.050	MG_KG	UL	SSL	0.022	0.050	0.085	0.00324
No	CAYP-SD10-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.046	MG_KG	UL	SSL	0.021	0.046	0.077	0.00324
No	CAYP-SD11-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.027	MG_KG	UL	SSL	0.012	0.027	0.047	0.00324
No	CAYP-SD12-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.060	MG_KG	UL	SSL	0.027	0.060	0.10	0.00324
No	CAYP-SD12P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.045	MG_KG	UL	SSL	0.020	0.045	0.077	0.00324
No	CAYP-SD13-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00324
No	CAYP-SSD01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00324
No	CAYP-SSD02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.030	MG_KG	UL	SSL	0.014	0.030	0.052	0.00324
No	CAYP-SSD02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.033	MG_KG	UL	SSL	0.015	0.033	0.056	0.00324
No	CAYP-SSD03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.033	MG_KG	UL	SSL	0.015	0.033	0.057	0.00324
No	CAYP-SSD04-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.017	MG_KG	UL	SSL	0.0077	0.017	0.029	0.00324
No	CAYP-SSD05-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00324
No	CAYP-SSD06-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.013	MG_KG	UL	SSL	0.0060	0.013	0.023	0.00324
No	CAYP-SSD07-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.029	MG_KG	UL	SSL	0.013	0.029	0.050	0.00324
No	CAYP-SSD08-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.014	MG_KG	UL	SSL	0.0065	0.014	0.024	0.00324
No	CAYP-SSD09-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.023	MG_KG	UL	SSL	0.010	0.023	0.039	0.00324
No	CAYP-SSD10-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.031	MG_KG	UL	SSL	0.014	0.031	0.053	0.00324
No	CAYP-SSD11-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.026	MG_KG	UL	SSL	0.011	0.026	0.043	0.00324
No	CAYP-SSD12-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00324
No	CAYP-SSD13-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.051	MG_KG	UL	SSL	0.023	0.051	0.087	0.00324
No	CAYP-SD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.033	MG_KG	UL	MSL	0.016	0.033	0.056	0.00247
No	CAYP-SD02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.00247
No	CAYP-SD02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.038	MG_KG	UL	SSL	0.018	0.038	0.065	0.00247
No	CAYP-SD03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.066	MG_KG	UL	SSL	0.032	0.066	0.11	0.00247
No	CAYP-SD04-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.022	MG_KG	UL	SSL	0.011	0.022	0.038	0.00247
No	CAYP-SD05-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.038	MG_KG	UL	SSL	0.018	0.038	0.064	0.00247
No	CAYP-SD06-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.014	MG_KG	UL	SSL	0.0068	0.014	0.024	0.00247
No	CAYP-SD07-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.00247
No	CAYP-SD08-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.050	MG_KG	UL	SSL	0.024	0.050	0.085	0.00247
No	CAYP-SD10-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.00247
No	CAYP-SD11-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.027	MG_KG	UL	SSL	0.013	0.027	0.047	0.00247
No	CAYP-SD12-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.060	MG_KG	UL	SSL	0.029	0.060	0.10	0.00247
No	CAYP-SD12P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.00247
No	CAYP-SD13-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.00247
No	CAYP-SSD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00247

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.00247
No	CAYP-SSD02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.00247
No	CAYP-SSD03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.00247
No	CAYP-SSD04-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.017	MG_KG	UL	SSL	0.0082	0.017	0.029	0.00247
No	CAYP-SSD05-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.026	MG_KG	UL	SSL	0.012	0.026	0.044	0.00247
No	CAYP-SSD06-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.013	MG_KG	UL	SSL	0.0064	0.013	0.023	0.00247
No	CAYP-SSD07-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.00247
No	CAYP-SSD08-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.014	MG_KG	UL	SSL	0.0069	0.014	0.024	0.00247
No	CAYP-SSD09-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.023	MG_KG	UL	SSL	0.011	0.023	0.039	0.00247
No	CAYP-SSD10-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.00247
No	CAYP-SSD11-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.026	MG_KG	UL	SSL	0.012	0.026	0.043	0.00247
No	CAYP-SSD12-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.00247
No	CAYP-SSD13-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.051	MG_KG	UL	SSL	0.024	0.051	0.087	0.00247
No	CAYP-SD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.66	MG_KG	UL	SSL	0.27	0.66	1.1	0.00054
No	CAYP-SD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.76	MG_KG	UL	SSL	0.31	0.76	1.3	0.00054
No	CAYP-SD02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.77	MG_KG	UL	SSL	0.31	0.77	1.3	0.00054
No	CAYP-SD03-1012	PEST/PCB	Toxaphene	8001-35-2	1.3	MG_KG	UL	SSL	0.53	1.3	2.2	0.00054
No	CAYP-SD04-1112	PEST/PCB	Toxaphene	8001-35-2	0.44	MG_KG	UL	SSL	0.22	0.44	0.73	0.00054
No	CAYP-SD05-1112	PEST/PCB	Toxaphene	8001-35-2	0.75	MG_KG	UL	SSL	0.30	0.75	1.2	0.00054
No	CAYP-SD06-1112	PEST/PCB	Toxaphene	8001-35-2	0.28	MG_KG	UL	SSL	0.11	0.28	0.47	0.00054
No	CAYP-SD07-1012	PEST/PCB	Toxaphene	8001-35-2	0.71	MG_KG	UL	SSL	0.28	0.71	1.2	0.00054
No	CAYP-SD08-1012	PEST/PCB	Toxaphene	8001-35-2	1.0	MG_KG	UL	SSL	0.40	1.0	1.6	0.00054
No	CAYP-SD10-1012	PEST/PCB	Toxaphene	8001-35-2	0.91	MG_KG	UL	SSL	0.36	0.91	1.5	0.00054
No	CAYP-SD11-1012	PEST/PCB	Toxaphene	8001-35-2	0.55	MG_KG	UL	SSL	0.22	0.55	0.91	0.00054
No	CAYP-SD12-1012	PEST/PCB	Toxaphene	8001-35-2	1.2	MG_KG	UL	SSL	0.48	1.2	2.0	0.00054
No	CAYP-SD12P-1012	PEST/PCB	Toxaphene	8001-35-2	0.90	MG_KG	UL	SSL	0.36	0.90	1.5	0.00054
No	CAYP-SD13-1012	PEST/PCB	Toxaphene	8001-35-2	0.93	MG_KG	UL	SSL	0.46	0.93	1.5	0.00054
No	CAYP-SSD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.51	MG_KG	UL	SSL	0.20	0.51	0.85	0.00054
No	CAYP-SSD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.61	MG_KG	UL	SSL	0.24	0.61	1.0	0.00054
No	CAYP-SSD02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.66	MG_KG	UL	SSL	0.26	0.66	1.1	0.00054
No	CAYP-SSD03-1012	PEST/PCB	Toxaphene	8001-35-2	0.67	MG_KG	UL	SSL	0.33	0.67	1.1	0.00054
No	CAYP-SSD04-1112	PEST/PCB	Toxaphene	8001-35-2	0.34	MG_KG	UL	SSL	0.14	0.34	0.57	0.00054
No	CAYP-SSD05-1112	PEST/PCB	Toxaphene	8001-35-2	0.51	MG_KG	UL	SSL	0.20	0.51	0.84	0.00054
No	CAYP-SSD06-1112	PEST/PCB	Toxaphene	8001-35-2	0.27	MG_KG	UL	SSL	0.11	0.27	0.44	0.00054
No	CAYP-SSD07-1012	PEST/PCB	Toxaphene	8001-35-2	0.59	MG_KG	UL	SSL	0.24	0.59	0.97	0.00054
No	CAYP-SSD08-1012	PEST/PCB	Toxaphene	8001-35-2	0.29	MG_KG	UL	SSL	0.12	0.29	0.47	0.00054
No	CAYP-SSD09-1012	PEST/PCB	Toxaphene	8001-35-2	0.46	MG_KG	UL	SSL	0.18	0.46	0.75	0.00054
No	CAYP-SSD10-1012	PEST/PCB	Toxaphene	8001-35-2	0.62	MG_KG	UL	SSL	0.25	0.62	1.0	0.00054
No	CAYP-SSD11-1012	PEST/PCB	Toxaphene	8001-35-2	0.51	MG_KG	UL	SSL	0.20	0.51	0.84	0.00054
No	CAYP-SSD12-1012	PEST/PCB	Toxaphene	8001-35-2	1.0	MG_KG	UL	SSL	0.41	1.0	1.7	0.00054
No	CAYP-SSD13-1012	PEST/PCB	Toxaphene	8001-35-2	1.0	MG_KG	UL	SSL	0.51	1.0	1.7	0.00054
No	CAYP-SD10-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.91	MG_KG	U		0.64	0.91	3.0	0.626
No	CAYP-SD12-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.2	MG_KG	U		0.83	1.2	3.9	0.626
No	CAYP-SD12P-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.90	MG_KG	U		0.64	0.90	3.0	0.626
No	CAYP-SSD12-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.0	MG_KG	U		0.72	1.0	3.4	0.626
No	CAYP-SD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.66	MG_KG	U		0.49	0.66	2.2	0.029
No	CAYP-SD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.75	MG_KG	U		0.56	0.75	2.5	0.029
No	CAYP-SD02P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.77	MG_KG	U		0.57	0.77	2.5	0.029
No	CAYP-SD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.65	MG_KG	U		0.48	0.65	2.2	0.029
No	CAYP-SD04-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.44	MG_KG	UL	SSL	0.33	0.44	1.5	0.029
No	CAYP-SD05-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.38	MG_KG	UL	SSL	0.28	0.38	1.3	0.029
No	CAYP-SD06-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.28	MG_KG	UL	SSL	0.21	0.28	0.93	0.029
No	CAYP-SD07-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.70	MG_KG	U		0.52	0.70	2.3	0.029
No	CAYP-SD08-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.50	MG_KG	U		0.37	0.50	1.6	0.029
No	CAYP-SD09-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.61	MG_KG	U		0.45	0.61	2.0	0.029
No	CAYP-SD10-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.91	MG_KG	U		0.67	0.91	3.0	0.029
No	CAYP-SD11-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.28	MG_KG	U		0.21	0.28	0.93	0.029
No	CAYP-SD12-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.2	MG_KG	U		0.87	1.2	3.9	0.029
No	CAYP-SD12P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.90	MG_KG	U		0.66	0.90	3.0	0.029
No	CAYP-SD13-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.47	MG_KG	U		0.35	0.47	1.6	0.029
No	CAYP-SSD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.25	MG_KG	U		0.19	0.25	0.83	0.029
No	CAYP-SSD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.63	MG_KG	U		0.46	0.63	2.1	0.029
No	CAYP-SSD02P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.65	MG_KG	U		0.48	0.65	2.1	0.029
No	CAYP-SSD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.33	MG_KG	UL	SSL	0.24	0.33	1.1	0.029
No	CAYP-SSD04-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.34	MG_KG	UL	SSL	0.25	0.34	1.1	0.029
No	CAYP-SSD05-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.51	MG_KG	UL	SSL	0.38	0.51	1.7	0.029
No	CAYP-SSD06-1112	SVOC	2,4-Dimethylphenol	105-67-9	0.27	MG_KG	UL	SSL	0.20	0.27	0.88	0.029
No	CAYP-SSD07-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.59	MG_KG	U		0.44	0.59	1.9	0.029
No	CAYP-SSD08-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.28	MG_KG	U		0.21	0.28	0.94	0.029
No	CAYP-SSD09-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.46	MG_KG	U		0.34	0.46	1.5	0.029
No	CAYP-SSD10-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.63	MG_KG	U		0.46	0.63	2.1	0.029
No	CAYP-SSD11-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.26	MG_KG	U		0.19	0.26	0.86	0.029
No	CAYP-SSD12-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.0	MG_KG	U		0.75	1.0	3.4	0.029
No	CAYP-SSD13-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.50	MG_KG	U		0.37	0.50	1.6	0.029
No	CAYP-SD01-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.66	MG_KG	U		0.48	0.66	2.2	0.223
No	CAYP-SD02-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.75	MG_KG	U		0.54	0.75	2.5	0.223
No	CAYP-SD02P-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.77	MG_KG	U		0.55	0.77	2.5	0.223
No	CAYP-SD03-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.65	MG_KG	U		0.47	0.65	2.2	0.223
No	CAYP-SD04-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.44	MG_KG	UL	SSL	0.32	0.44	1.5	0.223
No	CAYP-SD05-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.38	MG_KG	UL	SSL	0.28	0.38	1.3	0.223
No	CAYP-SD07-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.70	MG_KG	U		0.51	0.70	2.3	0.223
No	CAYP-SD08-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.50	MG_KG	U		0.36	0.50	1.6	0.223
No	CAYP-SD09-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.61	MG_KG	U		0.44	0.61	2.0	0.223
No	CAYP-SD10-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.91	MG_KG	U		0.65	0.91	3.0	0.223
No	CAYP-SD12-1012	SVOC	2,4-Dinitrotoluene	121-14-2	1.2	MG_KG	U		0.84	1.2	3.9	0.223

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD12P-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.90	MG_KG	U		0.65	0.90	3.0	0.223
No	CAYP-SD13-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.47	MG_KG	U		0.34	0.47	1.6	0.223
No	CAYP-SSD02-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.63	MG_KG	U		0.45	0.63	2.1	0.223
No	CAYP-SSD02P-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.65	MG_KG	U		0.47	0.65	2.1	0.223
No	CAYP-SSD03-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.33	MG_KG	UL	SSL	0.24	0.33	1.1	0.223
No	CAYP-SSD04-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.34	MG_KG	UL	SSL	0.25	0.34	1.1	0.223
No	CAYP-SSD05-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.51	MG_KG	UL	SSL	0.37	0.51	1.7	0.223
No	CAYP-SSD07-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.59	MG_KG	U		0.42	0.59	1.9	0.223
No	CAYP-SSD09-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.46	MG_KG	U		0.33	0.46	1.5	0.223
No	CAYP-SSD10-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.63	MG_KG	U		0.45	0.63	2.1	0.223
No	CAYP-SSD12-1012	SVOC	2,4-Dinitrotoluene	121-14-2	1.0	MG_KG	U		0.73	1.0	3.4	0.223
No	CAYP-SSD13-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.50	MG_KG	U		0.36	0.50	1.6	0.223
No	CAYP-SD01-1012	SVOC	2-Chlorophenol	95-57-8	0.66	MG_KG	U		0.54	0.66	2.2	0.167
No	CAYP-SD02-1012	SVOC	2-Chlorophenol	95-57-8	0.75	MG_KG	U		0.62	0.75	2.5	0.167
No	CAYP-SD02P-1012	SVOC	2-Chlorophenol	95-57-8	0.77	MG_KG	U		0.63	0.77	2.5	0.167
No	CAYP-SD03-1012	SVOC	2-Chlorophenol	95-57-8	0.65	MG_KG	U		0.54	0.65	2.2	0.167
No	CAYP-SD04-1112	SVOC	2-Chlorophenol	95-57-8	0.44	MG_KG	UL	SSL	0.36	0.44	1.5	0.167
No	CAYP-SD05-1112	SVOC	2-Chlorophenol	95-57-8	0.38	MG_KG	UL	SSL	0.31	0.38	1.3	0.167
No	CAYP-SD06-1112	SVOC	2-Chlorophenol	95-57-8	0.28	MG_KG	UL	SSL	0.23	0.28	0.93	0.167
No	CAYP-SD07-1012	SVOC	2-Chlorophenol	95-57-8	0.70	MG_KG	U		0.58	0.70	2.3	0.167
No	CAYP-SD08-1012	SVOC	2-Chlorophenol	95-57-8	0.50	MG_KG	U		0.41	0.50	1.6	0.167
No	CAYP-SD09-1012	SVOC	2-Chlorophenol	95-57-8	0.61	MG_KG	U		0.50	0.61	2.0	0.167
No	CAYP-SD10-1012	SVOC	2-Chlorophenol	95-57-8	0.91	MG_KG	U		0.74	0.91	3.0	0.167
No	CAYP-SD11-1012	SVOC	2-Chlorophenol	95-57-8	0.28	MG_KG	U		0.23	0.28	0.93	0.167
No	CAYP-SD12-1012	SVOC	2-Chlorophenol	95-57-8	1.2	MG_KG	U		0.96	1.2	3.9	0.167
No	CAYP-SD12P-1012	SVOC	2-Chlorophenol	95-57-8	0.90	MG_KG	U		0.74	0.90	3.0	0.167
No	CAYP-SD13-1012	SVOC	2-Chlorophenol	95-57-8	0.47	MG_KG	U		0.39	0.47	1.6	0.167
No	CAYP-SSD01-1012	SVOC	2-Chlorophenol	95-57-8	0.25	MG_KG	U		0.21	0.25	0.83	0.167
No	CAYP-SSD02-1012	SVOC	2-Chlorophenol	95-57-8	0.63	MG_KG	U		0.51	0.63	2.1	0.167
No	CAYP-SSD02P-1012	SVOC	2-Chlorophenol	95-57-8	0.65	MG_KG	U		0.53	0.65	2.1	0.167
No	CAYP-SSD03-1012	SVOC	2-Chlorophenol	95-57-8	0.33	MG_KG	UL	SSL	0.27	0.33	1.1	0.167
No	CAYP-SSD04-1112	SVOC	2-Chlorophenol	95-57-8	0.34	MG_KG	UL	SSL	0.28	0.34	1.1	0.167
No	CAYP-SSD05-1112	SVOC	2-Chlorophenol	95-57-8	0.51	MG_KG	UL	SSL	0.42	0.51	1.7	0.167
No	CAYP-SSD06-1112	SVOC	2-Chlorophenol	95-57-8	0.27	MG_KG	UL	SSL	0.22	0.27	0.88	0.167
No	CAYP-SSD07-1012	SVOC	2-Chlorophenol	95-57-8	0.59	MG_KG	U		0.48	0.59	1.9	0.167
No	CAYP-SSD08-1012	SVOC	2-Chlorophenol	95-57-8	0.28	MG_KG	U		0.23	0.28	0.94	0.167
No	CAYP-SSD09-1012	SVOC	2-Chlorophenol	95-57-8	0.46	MG_KG	U		0.38	0.46	1.5	0.167
No	CAYP-SSD10-1012	SVOC	2-Chlorophenol	95-57-8	0.63	MG_KG	U		0.51	0.63	2.1	0.167
No	CAYP-SSD11-1012	SVOC	2-Chlorophenol	95-57-8	0.26	MG_KG	U		0.21	0.26	0.86	0.167
No	CAYP-SSD12-1012	SVOC	2-Chlorophenol	95-57-8	1.0	MG_KG	U		0.84	1.0	3.4	0.167
No	CAYP-SSD13-1012	SVOC	2-Chlorophenol	95-57-8	0.50	MG_KG	U		0.41	0.50	1.6	0.167
No	CAYP-SD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.084	MG_KG	U		0.070	0.084	0.11	0.0202
No	CAYP-SD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.095	MG_KG	UL	SSL	0.080	0.095	0.13	0.0202
No	CAYP-SD02P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.098	MG_KG	UL	SSL	0.082	0.098	0.13	0.0202
No	CAYP-SD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.084	MG_KG	U		0.070	0.084	0.11	0.0202
No	CAYP-SD04-1112	SVOC	2-Methylnaphthalene	91-57-6	0.056	MG_KG	U		0.047	0.056	0.074	0.0202
No	CAYP-SD05-1112	SVOC	2-Methylnaphthalene	91-57-6	0.096	MG_KG	UL	SSL	0.080	0.096	0.13	0.0202
No	CAYP-SD06-1112	SVOC	2-Methylnaphthalene	91-57-6	0.036	MG_KG	U		0.030	0.036	0.047	0.0202
No	CAYP-SD07-1012	SVOC	2-Methylnaphthalene	91-57-6	0.089	MG_KG	U		0.075	0.089	0.12	0.0202
No	CAYP-SD08-1012	SVOC	2-Methylnaphthalene	91-57-6	0.064	MG_KG	U		0.053	0.064	0.084	0.0202
No	CAYP-SD09-1012	SVOC	2-Methylnaphthalene	91-57-6	0.078	MG_KG	U		0.065	0.078	0.10	0.0202
No	CAYP-SD10-1012	SVOC	2-Methylnaphthalene	91-57-6	0.11	MG_KG	UL	SSL	0.096	0.11	0.15	0.0202
No	CAYP-SD11-1012	SVOC	2-Methylnaphthalene	91-57-6	0.035	MG_KG	U		0.030	0.035	0.047	0.0202
No	CAYP-SD12-1012	SVOC	2-Methylnaphthalene	91-57-6	0.15	MG_KG	UL	SSL	0.13	0.15	0.20	0.0202
No	CAYP-SD12P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.11	MG_KG	UL	SSL	0.095	0.11	0.15	0.0202
No	CAYP-SD13-1012	SVOC	2-Methylnaphthalene	91-57-6	0.060	MG_KG	U		0.050	0.060	0.079	0.0202
No	CAYP-SSD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.032	MG_KG	U		0.027	0.032	0.043	0.0202
No	CAYP-SSD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.078	MG_KG	U		0.066	0.078	0.10	0.0202
No	CAYP-SSD02P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.083	MG_KG	U		0.069	0.083	0.11	0.0202
No	CAYP-SSD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.042	MG_KG	U		0.035	0.042	0.055	0.0202
No	CAYP-SSD04-1112	SVOC	2-Methylnaphthalene	91-57-6	0.044	MG_KG	UL	SSL	0.037	0.044	0.057	0.0202
No	CAYP-SSD05-1112	SVOC	2-Methylnaphthalene	91-57-6	0.064	MG_KG	UL	SSL	0.054	0.064	0.085	0.0202
No	CAYP-SSD06-1112	SVOC	2-Methylnaphthalene	91-57-6	0.033	MG_KG	U		0.028	0.033	0.044	0.0202
No	CAYP-SSD07-1012	SVOC	2-Methylnaphthalene	91-57-6	0.073	MG_KG	UL	SSL	0.062	0.073	0.097	0.0202
No	CAYP-SSD08-1012	SVOC	2-Methylnaphthalene	91-57-6	0.036	MG_KG	U		0.030	0.036	0.047	0.0202
No	CAYP-SSD09-1012	SVOC	2-Methylnaphthalene	91-57-6	0.059	MG_KG	U		0.049	0.059	0.078	0.0202
No	CAYP-SSD10-1012	SVOC	2-Methylnaphthalene	91-57-6	0.079	MG_KG	U		0.066	0.079	0.10	0.0202
No	CAYP-SSD11-1012	SVOC	2-Methylnaphthalene	91-57-6	0.033	MG_KG	U		0.028	0.033	0.043	0.0202
No	CAYP-SSD12-1012	SVOC	2-Methylnaphthalene	91-57-6	0.13	MG_KG	UL	SSL	0.11	0.13	0.17	0.0202
No	CAYP-SSD13-1012	SVOC	2-Methylnaphthalene	91-57-6	0.064	MG_KG	U		0.054	0.064	0.085	0.0202
No	CAYP-SD01-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		1.1	1.3	2.2	0.67
No	CAYP-SD02-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.5	MG_KG	U		1.2	1.5	2.5	0.67
No	CAYP-SD02P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.5	MG_KG	U		1.2	1.5	2.5	0.67
No	CAYP-SD03-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		1.0	1.3	2.2	0.67
No	CAYP-SD04-1112	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.89	MG_KG	UL	SSL	0.71	0.89	1.5	0.67
No	CAYP-SD07-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.4	MG_KG	U		1.1	1.4	2.3	0.67
No	CAYP-SD08-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.0	MG_KG	U		0.80	1.0	1.6	0.67
No	CAYP-SD09-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.2	MG_KG	U		0.98	1.2	2.0	0.67
No	CAYP-SD10-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.8	MG_KG	U		1.4	1.8	3.0	0.67
No	CAYP-SD12-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	2.3	MG_KG	U		1.9	2.3	3.9	0.67
No	CAYP-SD12P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.8	MG_KG	U		1.4	1.8	3.0	0.67
No	CAYP-SD13-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.94	MG_KG	U		0.75	0.94	1.6	0.67
No	CAYP-SSD02-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		1.0	1.3	2.1	0.67
No	CAYP-SSD02P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		1.0	1.3	2.1	0.67
No	CAYP-SSD05-1112	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.0	MG_KG	UL	SSL	0.81	1.0	1.7	0.67

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD07-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.2	MG_KG	U		0.94	1.2	1.9	0.67
No	CAYP-SSD09-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.92	MG_KG	U		0.74	0.92	1.5	0.67
No	CAYP-SSD10-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		1.0	1.3	2.1	0.67
No	CAYP-SSD12-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	2.0	MG_KG	U		1.6	2.0	3.4	0.67
No	CAYP-SSD13-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.0	MG_KG	U		0.80	1.0	1.6	0.67
No	CAYP-SD02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.75	MG_KG	U		0.69	0.75	2.5	0.68
No	CAYP-SD02P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.77	MG_KG	U		0.70	0.77	2.5	0.68
No	CAYP-SD10-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.91	MG_KG	U		0.82	0.91	3.0	0.68
No	CAYP-SD12-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.2	MG_KG	U		1.1	1.2	3.9	0.68
No	CAYP-SD12P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.90	MG_KG	U		0.82	0.90	3.0	0.68
No	CAYP-SSD12-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.0	MG_KG	U		0.93	1.0	3.4	0.68
No	CAYP-SD01-1012	SVOC	Acenaphthene	83-32-9	0.084	MG_KG	U		0.074	0.084	0.11	0.0067
No	CAYP-SD02-1012	SVOC	Acenaphthene	83-32-9	0.095	MG_KG	UL	SSL	0.084	0.095	0.13	0.0067
No	CAYP-SD02P-1012	SVOC	Acenaphthene	83-32-9	0.098	MG_KG	UL	SSL	0.086	0.098	0.13	0.0067
No	CAYP-SD03-1012	SVOC	Acenaphthene	83-32-9	0.084	MG_KG	U		0.074	0.084	0.11	0.0067
No	CAYP-SD04-1112	SVOC	Acenaphthene	83-32-9	0.056	MG_KG	U		0.050	0.056	0.074	0.0067
No	CAYP-SD05-1112	SVOC	Acenaphthene	83-32-9	0.096	MG_KG	UL	SSL	0.084	0.096	0.13	0.0067
No	CAYP-SD06-1112	SVOC	Acenaphthene	83-32-9	0.036	MG_KG	U		0.031	0.036	0.047	0.0067
No	CAYP-SD07-1012	SVOC	Acenaphthene	83-32-9	0.089	MG_KG	U		0.078	0.089	0.12	0.0067
No	CAYP-SD08-1012	SVOC	Acenaphthene	83-32-9	0.064	MG_KG	U		0.056	0.064	0.084	0.0067
No	CAYP-SD09-1012	SVOC	Acenaphthene	83-32-9	0.078	MG_KG	U		0.068	0.078	0.10	0.0067
No	CAYP-SD10-1012	SVOC	Acenaphthene	83-32-9	0.11	MG_KG	UL	SSL	0.10	0.11	0.15	0.0067
No	CAYP-SD12-1012	SVOC	Acenaphthene	83-32-9	0.15	MG_KG	UL	SSL	0.13	0.15	0.20	0.0067
No	CAYP-SD12P-1012	SVOC	Acenaphthene	83-32-9	0.11	MG_KG	UL	SSL	0.10	0.11	0.15	0.0067
No	CAYP-SD13-1012	SVOC	Acenaphthene	83-32-9	0.060	MG_KG	U		0.052	0.060	0.079	0.0067
No	CAYP-SSD01-1012	SVOC	Acenaphthene	83-32-9	0.032	MG_KG	U		0.028	0.032	0.043	0.0067
No	CAYP-SSD02-1012	SVOC	Acenaphthene	83-32-9	0.078	MG_KG	U		0.069	0.078	0.10	0.0067
No	CAYP-SSD02P-1012	SVOC	Acenaphthene	83-32-9	0.083	MG_KG	U		0.073	0.083	0.11	0.0067
No	CAYP-SSD03-1012	SVOC	Acenaphthene	83-32-9	0.042	MG_KG	U		0.037	0.042	0.055	0.0067
No	CAYP-SSD04-1112	SVOC	Acenaphthene	83-32-9	0.044	MG_KG	UL	SSL	0.038	0.044	0.057	0.0067
No	CAYP-SSD05-1112	SVOC	Acenaphthene	83-32-9	0.064	MG_KG	UL	SSL	0.057	0.064	0.085	0.0067
No	CAYP-SSD06-1112	SVOC	Acenaphthene	83-32-9	0.033	MG_KG	U		0.029	0.033	0.044	0.0067
No	CAYP-SSD07-1012	SVOC	Acenaphthene	83-32-9	0.073	MG_KG	UL	SSL	0.065	0.073	0.097	0.0067
No	CAYP-SSD08-1012	SVOC	Acenaphthene	83-32-9	0.036	MG_KG	U		0.032	0.036	0.047	0.0067
No	CAYP-SSD09-1012	SVOC	Acenaphthene	83-32-9	0.059	MG_KG	U		0.052	0.059	0.078	0.0067
No	CAYP-SSD10-1012	SVOC	Acenaphthene	83-32-9	0.079	MG_KG	U		0.069	0.079	0.10	0.0067
No	CAYP-SSD12-1012	SVOC	Acenaphthene	83-32-9	0.13	MG_KG	UL	SSL	0.11	0.13	0.17	0.0067
No	CAYP-SSD13-1012	SVOC	Acenaphthene	83-32-9	0.064	MG_KG	U		0.056	0.064	0.085	0.0067
No	CAYP-SD01-1012	SVOC	Acenaphthylene	208-96-8	0.084	MG_KG	U		0.063	0.084	0.11	0.0059
No	CAYP-SD02-1012	SVOC	Acenaphthylene	208-96-8	0.095	MG_KG	UL	SSL	0.072	0.095	0.13	0.0059
No	CAYP-SD02P-1012	SVOC	Acenaphthylene	208-96-8	0.098	MG_KG	UL	SSL	0.074	0.098	0.13	0.0059
No	CAYP-SD03-1012	SVOC	Acenaphthylene	208-96-8	0.084	MG_KG	U		0.064	0.084	0.11	0.0059
No	CAYP-SD04-1112	SVOC	Acenaphthylene	208-96-8	0.056	MG_KG	U		0.043	0.056	0.074	0.0059
No	CAYP-SD05-1112	SVOC	Acenaphthylene	208-96-8	0.096	MG_KG	UL	SSL	0.073	0.096	0.13	0.0059
No	CAYP-SD06-1112	SVOC	Acenaphthylene	208-96-8	0.036	MG_KG	U		0.027	0.036	0.047	0.0059
No	CAYP-SD07-1012	SVOC	Acenaphthylene	208-96-8	0.089	MG_KG	U		0.068	0.089	0.12	0.0059
No	CAYP-SD08-1012	SVOC	Acenaphthylene	208-96-8	0.064	MG_KG	U		0.048	0.064	0.084	0.0059
No	CAYP-SD09-1012	SVOC	Acenaphthylene	208-96-8	0.078	MG_KG	U		0.059	0.078	0.10	0.0059
No	CAYP-SD10-1012	SVOC	Acenaphthylene	208-96-8	0.11	MG_KG	UL	SSL	0.087	0.11	0.15	0.0059
No	CAYP-SD12-1012	SVOC	Acenaphthylene	208-96-8	0.15	MG_KG	UL	SSL	0.11	0.15	0.20	0.0059
No	CAYP-SD12P-1012	SVOC	Acenaphthylene	208-96-8	0.11	MG_KG	UL	SSL	0.086	0.11	0.15	0.0059
No	CAYP-SD13-1012	SVOC	Acenaphthylene	208-96-8	0.060	MG_KG	U		0.045	0.060	0.079	0.0059
No	CAYP-SSD01-1012	SVOC	Acenaphthylene	208-96-8	0.032	MG_KG	U		0.025	0.032	0.043	0.0059
No	CAYP-SSD02-1012	SVOC	Acenaphthylene	208-96-8	0.078	MG_KG	U		0.060	0.078	0.10	0.0059
No	CAYP-SSD02P-1012	SVOC	Acenaphthylene	208-96-8	0.083	MG_KG	U		0.063	0.083	0.11	0.0059
No	CAYP-SSD03-1012	SVOC	Acenaphthylene	208-96-8	0.042	MG_KG	U		0.032	0.042	0.055	0.0059
No	CAYP-SSD04-1112	SVOC	Acenaphthylene	208-96-8	0.044	MG_KG	UL	SSL	0.033	0.044	0.057	0.0059
No	CAYP-SSD05-1112	SVOC	Acenaphthylene	208-96-8	0.064	MG_KG	UL	SSL	0.049	0.064	0.085	0.0059
No	CAYP-SSD06-1112	SVOC	Acenaphthylene	208-96-8	0.033	MG_KG	U		0.025	0.033	0.044	0.0059
No	CAYP-SSD07-1012	SVOC	Acenaphthylene	208-96-8	0.073	MG_KG	UL	SSL	0.056	0.073	0.097	0.0059
No	CAYP-SSD08-1012	SVOC	Acenaphthylene	208-96-8	0.036	MG_KG	U		0.027	0.036	0.047	0.0059
No	CAYP-SSD09-1012	SVOC	Acenaphthylene	208-96-8	0.059	MG_KG	U		0.045	0.059	0.078	0.0059
No	CAYP-SSD10-1012	SVOC	Acenaphthylene	208-96-8	0.079	MG_KG	U		0.060	0.079	0.10	0.0059
No	CAYP-SSD12-1012	SVOC	Acenaphthylene	208-96-8	0.13	MG_KG	UL	SSL	0.099	0.13	0.17	0.0059
No	CAYP-SSD13-1012	SVOC	Acenaphthylene	208-96-8	0.064	MG_KG	U		0.049	0.064	0.085	0.0059
No	CAYP-SD10-1012	SVOC	Anthracene	120-12-7	0.11	MG_KG	UL	SSL	0.064	0.11	0.15	0.0572
No	CAYP-SD12-1012	SVOC	Anthracene	120-12-7	0.15	MG_KG	UL	SSL	0.084	0.15	0.20	0.0572
No	CAYP-SD12P-1012	SVOC	Anthracene	120-12-7	0.11	MG_KG	UL	SSL	0.064	0.11	0.15	0.0572
No	CAYP-SSD12-1012	SVOC	Anthracene	120-12-7	0.13	MG_KG	UL	SSL	0.073	0.13	0.17	0.0572
No	CAYP-SD01-1012	SVOC	Atrazine	1912-24-9	0.66	MG_KG	U		0.49	0.66	2.2	0.035
No	CAYP-SD02-1012	SVOC	Atrazine	1912-24-9	0.75	MG_KG	U		0.56	0.75	2.5	0.035
No	CAYP-SD02P-1012	SVOC	Atrazine	1912-24-9	0.77	MG_KG	U		0.57	0.77	2.5	0.035
No	CAYP-SD03-1012	SVOC	Atrazine	1912-24-9	0.65	MG_KG	U		0.48	0.65	2.2	0.035
No	CAYP-SD04-1112	SVOC	Atrazine	1912-24-9	0.44	MG_KG	UL	SSL	0.33	0.44	1.5	0.035
No	CAYP-SD05-1112	SVOC	Atrazine	1912-24-9	0.38	MG_KG	UL	SSL	0.28	0.38	1.3	0.035
No	CAYP-SD06-1112	SVOC	Atrazine	1912-24-9	0.28	MG_KG	UL	SSL	0.21	0.28	0.93	0.035
No	CAYP-SD07-1012	SVOC	Atrazine	1912-24-9	0.70	MG_KG	U		0.52	0.70	2.3	0.035
No	CAYP-SD08-1012	SVOC	Atrazine	1912-24-9	0.50	MG_KG	U		0.37	0.50	1.6	0.035
No	CAYP-SD09-1012	SVOC	Atrazine	1912-24-9	0.61	MG_KG	U		0.45	0.61	2.0	0.035
No	CAYP-SD10-1012	SVOC	Atrazine	1912-24-9	0.91	MG_KG	U		0.67	0.91	3.0	0.035
No	CAYP-SD11-1012	SVOC	Atrazine	1912-24-9	0.28	MG_KG	U		0.21	0.28	0.93	0.035
No	CAYP-SD12-1012	SVOC	Atrazine	1912-24-9	1.2	MG_KG	U		0.87	1.2	3.9	0.035
No	CAYP-SD12P-1012	SVOC	Atrazine	1912-24-9	0.90	MG_KG	U		0.66	0.90	3.0	0.035
No	CAYP-SD13-1012	SVOC	Atrazine	1912-24-9	0.47	MG_KG	U		0.35	0.47	1.6	0.035
No	CAYP-SSD01-1012	SVOC	Atrazine	1912-24-9	0.25	MG_KG	U		0.19	0.25	0.83	0.035

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SSD02-1012	SVOC	Atrazine	1912-24-9	0.63	MG_KG	U		0.46	0.63	2.1	0.035
No	CAYP-SSD02P-1012	SVOC	Atrazine	1912-24-9	0.65	MG_KG	U		0.48	0.65	2.1	0.035
No	CAYP-SSD03-1012	SVOC	Atrazine	1912-24-9	0.33	MG_KG	UL	SSL	0.24	0.33	1.1	0.035
No	CAYP-SSD04-1112	SVOC	Atrazine	1912-24-9	0.34	MG_KG	UL	SSL	0.25	0.34	1.1	0.035
No	CAYP-SSD05-1112	SVOC	Atrazine	1912-24-9	0.51	MG_KG	UL	SSL	0.38	0.51	1.7	0.035
No	CAYP-SSD06-1112	SVOC	Atrazine	1912-24-9	0.27	MG_KG	UL	SSL	0.20	0.27	0.88	0.035
No	CAYP-SSD07-1012	SVOC	Atrazine	1912-24-9	0.59	MG_KG	U		0.44	0.59	1.9	0.035
No	CAYP-SSD08-1012	SVOC	Atrazine	1912-24-9	0.28	MG_KG	U		0.21	0.28	0.94	0.035
No	CAYP-SSD09-1012	SVOC	Atrazine	1912-24-9	0.46	MG_KG	U		0.34	0.46	1.5	0.035
No	CAYP-SSD10-1012	SVOC	Atrazine	1912-24-9	0.63	MG_KG	U		0.46	0.63	2.1	0.035
No	CAYP-SSD11-1012	SVOC	Atrazine	1912-24-9	0.26	MG_KG	U		0.19	0.26	0.86	0.035
No	CAYP-SSD12-1012	SVOC	Atrazine	1912-24-9	1.0	MG_KG	U		0.75	1.0	3.4	0.035
No	CAYP-SSD13-1012	SVOC	Atrazine	1912-24-9	0.50	MG_KG	U		0.37	0.50	1.6	0.035
No	CAYP-SD02-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.095	MG_KG	UL	SSL	0.050	0.095	0.13	0.0272
No	CAYP-SD02P-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.098	MG_KG	UL	SSL	0.051	0.098	0.13	0.0272
No	CAYP-SD04-1112	SVOC	Benzo(b)fluoranthene	205-99-2	0.056	MG_KG	U		0.029	0.056	0.074	0.0272
No	CAYP-SD12-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.15	MG_KG	UL	SSL	0.078	0.15	0.20	0.0272
No	CAYP-SD12P-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.11	MG_KG	UL	SSL	0.059	0.11	0.15	0.0272
No	CAYP-SSD02-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.078	MG_KG	U		0.041	0.078	0.10	0.0272
No	CAYP-SSD02P-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.083	MG_KG	U		0.043	0.083	0.11	0.0272
No	CAYP-SSD09-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.059	MG_KG	U		0.031	0.059	0.078	0.0272
No	CAYP-SSD10-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.079	MG_KG	U		0.041	0.079	0.10	0.0272
No	CAYP-SSD12-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.13	MG_KG	UL	SSL	0.068	0.13	0.17	0.0272
No	CAYP-SD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.75	MG_KG	U		0.64	0.75	2.5	0.18
No	CAYP-SD02P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.77	MG_KG	U		0.65	0.77	2.5	0.18
No	CAYP-SD03-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.65	MG_KG	UJ	CCL	0.55	0.65	2.2	0.18
No	CAYP-SD04-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.44	MG_KG	UL	SSL	0.38	0.44	1.5	0.18
No	CAYP-SD05-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.38	MG_KG	UL	SSL	0.32	0.38	1.3	0.18
No	CAYP-SD06-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.28	MG_KG	UL	SSL	0.24	0.28	0.93	0.18
No	CAYP-SD07-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.70	MG_KG	U		0.60	0.70	2.3	0.18
No	CAYP-SD08-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.50	MG_KG	UJ	CCL	0.42	0.50	1.6	0.18
No	CAYP-SD09-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.61	MG_KG	U		0.52	0.61	2.0	0.18
No	CAYP-SD10-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.91	MG_KG	U		0.77	0.91	3.0	0.18
No	CAYP-SD11-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.28	MG_KG	UJ	CCL	0.24	0.28	0.93	0.18
No	CAYP-SD12-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.2	MG_KG	U		1.0	1.2	3.9	0.18
No	CAYP-SD12P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.90	MG_KG	U		0.76	0.90	3.0	0.18
No	CAYP-SD13-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.47	MG_KG	UJ	CCL	0.40	0.47	1.6	0.18
No	CAYP-SSD01-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.25	MG_KG	UJ	CCL	0.21	0.25	0.83	0.18
No	CAYP-SSD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.63	MG_KG	U		0.53	0.63	2.1	0.18
No	CAYP-SSD02P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.65	MG_KG	U		0.55	0.65	2.1	0.18
No	CAYP-SSD03-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.33	MG_KG	UJ	CCL	0.28	0.33	1.1	0.18
No	CAYP-SSD04-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.34	MG_KG	UL	SSL	0.29	0.34	1.1	0.18
No	CAYP-SSD05-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.51	MG_KG	UL	SSL	0.43	0.51	1.7	0.18
No	CAYP-SSD06-1112	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.27	MG_KG	UL	SSL	0.23	0.27	0.88	0.18
No	CAYP-SSD07-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.59	MG_KG	U		0.50	0.59	1.9	0.18
No	CAYP-SSD08-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.28	MG_KG	UJ	CCL	0.24	0.28	0.94	0.18
No	CAYP-SSD09-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.46	MG_KG	U		0.39	0.46	1.5	0.18
No	CAYP-SSD10-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.63	MG_KG	U		0.53	0.63	2.1	0.18
No	CAYP-SSD11-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.26	MG_KG	UJ	CCL	0.22	0.26	0.86	0.18
No	CAYP-SSD12-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.0	MG_KG	U		0.87	1.0	3.4	0.18
No	CAYP-SSD13-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.50	MG_KG	UJ	CCL	0.42	0.50	1.6	0.18
No	CAYP-SD01-1012	SVOC	Carbazole	86-74-8	0.66	MG_KG	U		0.45	0.66	2.2	0.14
No	CAYP-SD02-1012	SVOC	Carbazole	86-74-8	0.75	MG_KG	U		0.51	0.75	2.5	0.14
No	CAYP-SD02P-1012	SVOC	Carbazole	86-74-8	0.77	MG_KG	U		0.52	0.77	2.5	0.14
No	CAYP-SD03-1012	SVOC	Carbazole	86-74-8	0.65	MG_KG	U		0.44	0.65	2.2	0.14
No	CAYP-SD04-1112	SVOC	Carbazole	86-74-8	0.44	MG_KG	UL	SSL	0.30	0.44	1.5	0.14
No	CAYP-SD05-1112	SVOC	Carbazole	86-74-8	0.38	MG_KG	UL	SSL	0.26	0.38	1.3	0.14
No	CAYP-SD06-1112	SVOC	Carbazole	86-74-8	0.28	MG_KG	UL	SSL	0.19	0.28	0.93	0.14
No	CAYP-SD07-1012	SVOC	Carbazole	86-74-8	0.70	MG_KG	U		0.48	0.70	2.3	0.14
No	CAYP-SD08-1012	SVOC	Carbazole	86-74-8	0.50	MG_KG	U		0.34	0.50	1.6	0.14
No	CAYP-SD09-1012	SVOC	Carbazole	86-74-8	0.61	MG_KG	U		0.42	0.61	2.0	0.14
No	CAYP-SD10-1012	SVOC	Carbazole	86-74-8	0.91	MG_KG	U		0.62	0.91	3.0	0.14
No	CAYP-SD11-1012	SVOC	Carbazole	86-74-8	0.28	MG_KG	U		0.19	0.28	0.93	0.14
No	CAYP-SD12-1012	SVOC	Carbazole	86-74-8	1.2	MG_KG	U		0.80	1.2	3.9	0.14
No	CAYP-SD12P-1012	SVOC	Carbazole	86-74-8	0.90	MG_KG	U		0.61	0.90	3.0	0.14
No	CAYP-SD13-1012	SVOC	Carbazole	86-74-8	0.47	MG_KG	U		0.32	0.47	1.6	0.14
No	CAYP-SSD01-1012	SVOC	Carbazole	86-74-8	0.25	MG_KG	U		0.17	0.25	0.83	0.14
No	CAYP-SSD02-1012	SVOC	Carbazole	86-74-8	0.63	MG_KG	U		0.43	0.63	2.1	0.14
No	CAYP-SSD02P-1012	SVOC	Carbazole	86-74-8	0.65	MG_KG	U		0.44	0.65	2.1	0.14
No	CAYP-SSD03-1012	SVOC	Carbazole	86-74-8	0.33	MG_KG	UL	SSL	0.22	0.33	1.1	0.14
No	CAYP-SSD04-1112	SVOC	Carbazole	86-74-8	0.34	MG_KG	UL	SSL	0.23	0.34	1.1	0.14
No	CAYP-SSD05-1112	SVOC	Carbazole	86-74-8	0.51	MG_KG	UL	SSL	0.35	0.51	1.7	0.14
No	CAYP-SSD06-1112	SVOC	Carbazole	86-74-8	0.27	MG_KG	UL	SSL	0.18	0.27	0.88	0.14
No	CAYP-SSD07-1012	SVOC	Carbazole	86-74-8	0.59	MG_KG	U		0.40	0.59	1.9	0.14
No	CAYP-SSD08-1012	SVOC	Carbazole	86-74-8	0.28	MG_KG	U		0.19	0.28	0.94	0.14
No	CAYP-SSD09-1012	SVOC	Carbazole	86-74-8	0.46	MG_KG	U		0.31	0.46	1.5	0.14
No	CAYP-SSD10-1012	SVOC	Carbazole	86-74-8	0.63	MG_KG	U		0.43	0.63	2.1	0.14
No	CAYP-SSD11-1012	SVOC	Carbazole	86-74-8	0.26	MG_KG	U		0.18	0.26	0.86	0.14
No	CAYP-SSD12-1012	SVOC	Carbazole	86-74-8	1.0	MG_KG	U		0.69	1.0	3.4	0.14
No	CAYP-SSD13-1012	SVOC	Carbazole	86-74-8	0.50	MG_KG	U		0.34	0.50	1.6	0.14
No	CAYP-SD01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.084	MG_KG	U		0.043	0.084	0.11	0.033
No	CAYP-SD02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.095	MG_KG	UL	SSL	0.050	0.095	0.13	0.033
No	CAYP-SD02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.098	MG_KG	UL	SSL	0.051	0.098	0.13	0.033
No	CAYP-SD03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.084	MG_KG	U		0.044	0.084	0.11	0.033
No	CAYP-SD05-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.096	MG_KG	UL	SSL	0.050	0.096	0.13	0.033

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD07-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.089	MG_KG	U		0.046	0.089	0.12	0.033
No	CAYP-SD08-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.064	MG_KG	U		0.033	0.064	0.084	0.033
No	CAYP-SD09-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.078	MG_KG	U		0.040	0.078	0.10	0.033
No	CAYP-SD10-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.11	MG_KG	UL	SSL	0.059	0.11	0.15	0.033
No	CAYP-SD12-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.15	MG_KG	UL	SSL	0.078	0.15	0.20	0.033
No	CAYP-SD12P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.11	MG_KG	UL	SSL	0.059	0.11	0.15	0.033
No	CAYP-SSD02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.078	MG_KG	U		0.041	0.078	0.10	0.033
No	CAYP-SSD02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.083	MG_KG	U		0.043	0.083	0.11	0.033
No	CAYP-SSD05-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.064	MG_KG	UL	SSL	0.033	0.064	0.085	0.033
No	CAYP-SSD07-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.073	MG_KG	UL	SSL	0.038	0.073	0.097	0.033
No	CAYP-SSD10-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.079	MG_KG	U		0.041	0.079	0.10	0.033
No	CAYP-SSD12-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.13	MG_KG	UL	SSL	0.068	0.13	0.17	0.033
No	CAYP-SSD13-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.064	MG_KG	U		0.033	0.064	0.085	0.033
No	CAYP-SD10-1012	SVOC	Diethylphthalate	84-66-2	0.91	MG_KG	U		0.68	0.91	3.0	0.63
No	CAYP-SD12-1012	SVOC	Diethylphthalate	84-66-2	1.2	MG_KG	U		0.88	1.2	3.9	0.63
No	CAYP-SD12P-1012	SVOC	Diethylphthalate	84-66-2	0.90	MG_KG	U		0.67	0.90	3.0	0.63
No	CAYP-SSD12-1012	SVOC	Diethylphthalate	84-66-2	1.0	MG_KG	U		0.77	1.0	3.4	0.63
No	CAYP-SD01-1012	SVOC	Di-n-butylphthalate	84-74-2	0.66	MG_KG	U		0.52	0.66	2.2	0.11
No	CAYP-SD02-1012	SVOC	Di-n-butylphthalate	84-74-2	0.75	MG_KG	U		0.59	0.75	2.5	0.11
No	CAYP-SD02P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.77	MG_KG	U		0.60	0.77	2.5	0.11
No	CAYP-SD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.65	MG_KG	U		0.52	0.65	2.2	0.11
No	CAYP-SD04-1112	SVOC	Di-n-butylphthalate	84-74-2	0.44	MG_KG	UL	SSL	0.35	0.44	1.5	0.11
No	CAYP-SD05-1112	SVOC	Di-n-butylphthalate	84-74-2	0.38	MG_KG	UL	SSL	0.30	0.38	1.3	0.11
No	CAYP-SD06-1112	SVOC	Di-n-butylphthalate	84-74-2	0.28	MG_KG	UL	SSL	0.22	0.28	0.93	0.11
No	CAYP-SD07-1012	SVOC	Di-n-butylphthalate	84-74-2	0.70	MG_KG	U		0.55	0.70	2.3	0.11
No	CAYP-SD08-1012	SVOC	Di-n-butylphthalate	84-74-2	0.50	MG_KG	U		0.39	0.50	1.6	0.11
No	CAYP-SD09-1012	SVOC	Di-n-butylphthalate	84-74-2	0.61	MG_KG	U		0.49	0.61	2.0	0.11
No	CAYP-SD10-1012	SVOC	Di-n-butylphthalate	84-74-2	0.91	MG_KG	U		0.72	0.91	3.0	0.11
No	CAYP-SD11-1012	SVOC	Di-n-butylphthalate	84-74-2	0.28	MG_KG	U		0.22	0.28	0.93	0.11
No	CAYP-SD12-1012	SVOC	Di-n-butylphthalate	84-74-2	1.2	MG_KG	U		0.93	1.2	3.9	0.11
No	CAYP-SD12P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.90	MG_KG	U		0.71	0.90	3.0	0.11
No	CAYP-SD13-1012	SVOC	Di-n-butylphthalate	84-74-2	0.47	MG_KG	U		0.37	0.47	1.6	0.11
No	CAYP-SSD01-1012	SVOC	Di-n-butylphthalate	84-74-2	0.25	MG_KG	U		0.20	0.25	0.83	0.11
No	CAYP-SSD02-1012	SVOC	Di-n-butylphthalate	84-74-2	0.63	MG_KG	U		0.49	0.63	2.1	0.11
No	CAYP-SSD02P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.65	MG_KG	U		0.51	0.65	2.1	0.11
No	CAYP-SSD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.33	MG_KG	UL	SSL	0.26	0.33	1.1	0.11
No	CAYP-SSD04-1112	SVOC	Di-n-butylphthalate	84-74-2	0.34	MG_KG	UL	SSL	0.27	0.34	1.1	0.11
No	CAYP-SSD05-1112	SVOC	Di-n-butylphthalate	84-74-2	0.51	MG_KG	UL	SSL	0.40	0.51	1.7	0.11
No	CAYP-SSD06-1112	SVOC	Di-n-butylphthalate	84-74-2	0.27	MG_KG	UL	SSL	0.21	0.27	0.88	0.11
No	CAYP-SSD07-1012	SVOC	Di-n-butylphthalate	84-74-2	0.59	MG_KG	U		0.46	0.59	1.9	0.11
No	CAYP-SSD08-1012	SVOC	Di-n-butylphthalate	84-74-2	0.28	MG_KG	U		0.22	0.28	0.94	0.11
No	CAYP-SSD09-1012	SVOC	Di-n-butylphthalate	84-74-2	0.46	MG_KG	U		0.36	0.46	1.5	0.11
No	CAYP-SSD10-1012	SVOC	Di-n-butylphthalate	84-74-2	0.63	MG_KG	U		0.49	0.63	2.1	0.11
No	CAYP-SSD11-1012	SVOC	Di-n-butylphthalate	84-74-2	0.26	MG_KG	U		0.21	0.26	0.86	0.11
No	CAYP-SSD12-1012	SVOC	Di-n-butylphthalate	84-74-2	1.0	MG_KG	U		0.81	1.0	3.4	0.11
No	CAYP-SSD13-1012	SVOC	Di-n-butylphthalate	84-74-2	0.50	MG_KG	U		0.39	0.50	1.6	0.11
No	CAYP-SD02-1012	SVOC	Fluorene	86-73-7	0.095	MG_KG	UL	SSL	0.080	0.095	0.13	0.0774
No	CAYP-SD02P-1012	SVOC	Fluorene	86-73-7	0.098	MG_KG	UL	SSL	0.082	0.098	0.13	0.0774
No	CAYP-SD05-1112	SVOC	Fluorene	86-73-7	0.096	MG_KG	UL	SSL	0.080	0.096	0.13	0.0774
No	CAYP-SD10-1012	SVOC	Fluorene	86-73-7	0.11	MG_KG	UL	SSL	0.096	0.11	0.15	0.0774
No	CAYP-SD12-1012	SVOC	Fluorene	86-73-7	0.15	MG_KG	UL	SSL	0.13	0.15	0.20	0.0774
No	CAYP-SD12P-1012	SVOC	Fluorene	86-73-7	0.11	MG_KG	UL	SSL	0.095	0.11	0.15	0.0774
No	CAYP-SSD12-1012	SVOC	Fluorene	86-73-7	0.13	MG_KG	UL	SSL	0.11	0.13	0.17	0.0774
No	CAYP-SD01-1012	SVOC	Hexachlorobenzene	118-74-1	0.66	MG_KG	U		0.54	0.66	2.2	0.02
No	CAYP-SD02-1012	SVOC	Hexachlorobenzene	118-74-1	0.75	MG_KG	U		0.61	0.75	2.5	0.02
No	CAYP-SD02P-1012	SVOC	Hexachlorobenzene	118-74-1	0.77	MG_KG	U		0.62	0.77	2.5	0.02
No	CAYP-SD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.65	MG_KG	U		0.53	0.65	2.2	0.02
No	CAYP-SD04-1112	SVOC	Hexachlorobenzene	118-74-1	0.44	MG_KG	UL	SSL	0.36	0.44	1.5	0.02
No	CAYP-SD05-1112	SVOC	Hexachlorobenzene	118-74-1	0.38	MG_KG	UL	SSL	0.31	0.38	1.3	0.02
No	CAYP-SD06-1112	SVOC	Hexachlorobenzene	118-74-1	0.28	MG_KG	UL	SSL	0.23	0.28	0.93	0.02
No	CAYP-SD07-1012	SVOC	Hexachlorobenzene	118-74-1	0.70	MG_KG	U		0.57	0.70	2.3	0.02
No	CAYP-SD08-1012	SVOC	Hexachlorobenzene	118-74-1	0.50	MG_KG	U		0.40	0.50	1.6	0.02
No	CAYP-SD09-1012	SVOC	Hexachlorobenzene	118-74-1	0.61	MG_KG	U		0.50	0.61	2.0	0.02
No	CAYP-SD10-1012	SVOC	Hexachlorobenzene	118-74-1	0.91	MG_KG	U		0.73	0.91	3.0	0.02
No	CAYP-SD11-1012	SVOC	Hexachlorobenzene	118-74-1	0.28	MG_KG	U		0.23	0.28	0.93	0.02
No	CAYP-SD12-1012	SVOC	Hexachlorobenzene	118-74-1	1.2	MG_KG	U		0.95	1.2	3.9	0.02
No	CAYP-SD12P-1012	SVOC	Hexachlorobenzene	118-74-1	0.90	MG_KG	U		0.73	0.90	3.0	0.02
No	CAYP-SD13-1012	SVOC	Hexachlorobenzene	118-74-1	0.47	MG_KG	U		0.38	0.47	1.6	0.02
No	CAYP-SSD01-1012	SVOC	Hexachlorobenzene	118-74-1	0.25	MG_KG	U		0.20	0.25	0.83	0.02
No	CAYP-SSD02-1012	SVOC	Hexachlorobenzene	118-74-1	0.63	MG_KG	U		0.51	0.63	2.1	0.02
No	CAYP-SSD02P-1012	SVOC	Hexachlorobenzene	118-74-1	0.65	MG_KG	U		0.52	0.65	2.1	0.02
No	CAYP-SSD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.33	MG_KG	UL	SSL	0.27	0.33	1.1	0.02
No	CAYP-SSD04-1112	SVOC	Hexachlorobenzene	118-74-1	0.34	MG_KG	UL	SSL	0.28	0.34	1.1	0.02
No	CAYP-SSD05-1112	SVOC	Hexachlorobenzene	118-74-1	0.51	MG_KG	UL	SSL	0.41	0.51	1.7	0.02
No	CAYP-SSD06-1112	SVOC	Hexachlorobenzene	118-74-1	0.27	MG_KG	UL	SSL	0.21	0.27	0.88	0.02
No	CAYP-SSD07-1012	SVOC	Hexachlorobenzene	118-74-1	0.59	MG_KG	U		0.48	0.59	1.9	0.02
No	CAYP-SSD08-1012	SVOC	Hexachlorobenzene	118-74-1	0.28	MG_KG	U		0.23	0.28	0.94	0.02
No	CAYP-SSD09-1012	SVOC	Hexachlorobenzene	118-74-1	0.46	MG_KG	U		0.37	0.46	1.5	0.02
No	CAYP-SSD10-1012	SVOC	Hexachlorobenzene	118-74-1	0.63	MG_KG	U		0.51	0.63	2.1	0.02
No	CAYP-SSD11-1012	SVOC	Hexachlorobenzene	118-74-1	0.26	MG_KG	U		0.21	0.26	0.86	0.02
No	CAYP-SSD12-1012	SVOC	Hexachlorobenzene	118-74-1	1.0	MG_KG	U		0.83	1.0	3.4	0.02
No	CAYP-SSD13-1012	SVOC	Hexachlorobenzene	118-74-1	0.50	MG_KG	U		0.40	0.50	1.6	0.02
No	CAYP-SD02-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.095	MG_KG	UL	SSL	0.046	0.095	0.13	0.017
No	CAYP-SD02P-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.098	MG_KG	UL	SSL	0.047	0.098	0.13	0.017
No	CAYP-SD03-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.084	MG_KG	U		0.040	0.084	0.11	0.017

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD04-1112	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.056	MG_KG	U		0.027	0.056	0.074	0.017
No	CAYP-SD06-1112	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.036	MG_KG	U		0.017	0.036	0.047	0.017
No	CAYP-SD07-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.089	MG_KG	U		0.043	0.089	0.12	0.017
No	CAYP-SD08-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.064	MG_KG	U		0.031	0.064	0.084	0.017
No	CAYP-SD09-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.078	MG_KG	U		0.037	0.078	0.10	0.017
No	CAYP-SD10-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.11	MG_KG	UL	SSL	0.055	0.11	0.15	0.017
No	CAYP-SD12-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.15	MG_KG	UL	SSL	0.072	0.15	0.20	0.017
No	CAYP-SD12P-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.11	MG_KG	UL	SSL	0.055	0.11	0.15	0.017
No	CAYP-SSD02-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.078	MG_KG	U		0.038	0.078	0.10	0.017
No	CAYP-SSD02P-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.083	MG_KG	U		0.040	0.083	0.11	0.017
No	CAYP-SSD03-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.042	MG_KG	U		0.020	0.042	0.055	0.017
No	CAYP-SSD04-1112	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.044	MG_KG	UL	SSL	0.021	0.044	0.057	0.017
No	CAYP-SSD05-1112	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.064	MG_KG	UL	SSL	0.031	0.064	0.085	0.017
No	CAYP-SSD07-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.073	MG_KG	UL	SSL	0.035	0.073	0.097	0.017
No	CAYP-SSD08-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.036	MG_KG	U		0.017	0.036	0.047	0.017
No	CAYP-SSD09-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.059	MG_KG	U		0.028	0.059	0.078	0.017
No	CAYP-SSD10-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.079	MG_KG	U		0.038	0.079	0.10	0.017
No	CAYP-SSD12-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.13	MG_KG	UL	SSL	0.062	0.13	0.17	0.017
No	CAYP-SD02P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.77	MG_KG	U		0.69	0.77	2.5	0.69
No	CAYP-SD10-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.91	MG_KG	U		0.81	0.91	3.0	0.69
No	CAYP-SD12-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.2	MG_KG	U		1.1	1.2	3.9	0.69
No	CAYP-SD12P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.90	MG_KG	U		0.81	0.90	3.0	0.69
No	CAYP-SSD12-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.0	MG_KG	U		0.92	1.0	3.4	0.69
No	CAYP-SD01-1012	SVOC	Phenol	108-95-2	0.66	MG_KG	U		0.50	0.66	2.2	0.048
No	CAYP-SD02-1012	SVOC	Phenol	108-95-2	0.75	MG_KG	U		0.57	0.75	2.5	0.048
No	CAYP-SD02P-1012	SVOC	Phenol	108-95-2	0.77	MG_KG	U		0.58	0.77	2.5	0.048
No	CAYP-SD03-1012	SVOC	Phenol	108-95-2	0.65	MG_KG	U		0.50	0.65	2.2	0.048
No	CAYP-SD04-1112	SVOC	Phenol	108-95-2	0.44	MG_KG	UL	SSL	0.34	0.44	1.5	0.048
No	CAYP-SD05-1112	SVOC	Phenol	108-95-2	0.38	MG_KG	UL	SSL	0.29	0.38	1.3	0.048
No	CAYP-SD06-1112	SVOC	Phenol	108-95-2	0.28	MG_KG	UL	SSL	0.21	0.28	0.93	0.048
No	CAYP-SD07-1012	SVOC	Phenol	108-95-2	0.70	MG_KG	U		0.53	0.70	2.3	0.048
No	CAYP-SD08-1012	SVOC	Phenol	108-95-2	0.50	MG_KG	U		0.38	0.50	1.6	0.048
No	CAYP-SD09-1012	SVOC	Phenol	108-95-2	0.61	MG_KG	U		0.47	0.61	2.0	0.048
No	CAYP-SD10-1012	SVOC	Phenol	108-95-2	0.91	MG_KG	U		0.69	0.91	3.0	0.048
No	CAYP-SD11-1012	SVOC	Phenol	108-95-2	0.28	MG_KG	U		0.21	0.28	0.93	0.048
No	CAYP-SD12-1012	SVOC	Phenol	108-95-2	1.2	MG_KG	U		0.89	1.2	3.9	0.048
No	CAYP-SD12P-1012	SVOC	Phenol	108-95-2	0.90	MG_KG	U		0.68	0.90	3.0	0.048
No	CAYP-SD13-1012	SVOC	Phenol	108-95-2	0.47	MG_KG	U		0.36	0.47	1.6	0.048
No	CAYP-SSD01-1012	SVOC	Phenol	108-95-2	0.25	MG_KG	U		0.19	0.25	0.83	0.048
No	CAYP-SSD02-1012	SVOC	Phenol	108-95-2	0.63	MG_KG	U		0.48	0.63	2.1	0.048
No	CAYP-SSD02P-1012	SVOC	Phenol	108-95-2	0.65	MG_KG	U		0.49	0.65	2.1	0.048
No	CAYP-SSD03-1012	SVOC	Phenol	108-95-2	0.33	MG_KG	UL	SSL	0.25	0.33	1.1	0.048
No	CAYP-SSD04-1112	SVOC	Phenol	108-95-2	0.34	MG_KG	UL	SSL	0.26	0.34	1.1	0.048
No	CAYP-SSD05-1112	SVOC	Phenol	108-95-2	0.51	MG_KG	UL	SSL	0.39	0.51	1.7	0.048
No	CAYP-SSD06-1112	SVOC	Phenol	108-95-2	0.27	MG_KG	UL	SSL	0.20	0.27	0.88	0.048
No	CAYP-SSD07-1012	SVOC	Phenol	108-95-2	0.59	MG_KG	U		0.45	0.59	1.9	0.048
No	CAYP-SSD08-1012	SVOC	Phenol	108-95-2	0.28	MG_KG	U		0.22	0.28	0.94	0.048
No	CAYP-SSD09-1012	SVOC	Phenol	108-95-2	0.46	MG_KG	U		0.35	0.46	1.5	0.048
No	CAYP-SSD10-1012	SVOC	Phenol	108-95-2	0.63	MG_KG	U		0.48	0.63	2.1	0.048
No	CAYP-SSD11-1012	SVOC	Phenol	108-95-2	0.26	MG_KG	U		0.20	0.26	0.86	0.048
No	CAYP-SSD12-1012	SVOC	Phenol	108-95-2	1.0	MG_KG	U		0.78	1.0	3.4	0.048
No	CAYP-SSD13-1012	SVOC	Phenol	108-95-2	0.50	MG_KG	U		0.38	0.50	1.6	0.048
No	CAYP-SD02-1012	VOC	Carbon disulfide	75-15-0	0.024	MG_KG	U		0.010	0.024	0.048	0.0045
No	CAYP-SD02P-1012	VOC	Carbon disulfide	75-15-0	0.025	MG_KG	U		0.011	0.025	0.051	0.0045
No	CAYP-SD03-1012	VOC	Carbon disulfide	75-15-0	0.019	MG_KG	U		0.0080	0.019	0.038	0.0045
No	CAYP-SD04-1112	VOC	Carbon disulfide	75-15-0	0.011	MG_KG	U		0.0047	0.011	0.023	0.0045
No	CAYP-SD05-1112	VOC	Carbon disulfide	75-15-0	0.023	MG_KG	U		0.0097	0.023	0.046	0.0045
No	CAYP-SD07-1012	VOC	Carbon disulfide	75-15-0	0.018	MG_KG	U		0.0075	0.018	0.036	0.0045
No	CAYP-SD08-1012	VOC	Carbon disulfide	75-15-0	0.013	MG_KG	U		0.0053	0.013	0.025	0.0045
No	CAYP-SD09-1012	VOC	Carbon disulfide	75-15-0	0.019	MG_KG	U		0.0080	0.019	0.038	0.0045
No	CAYP-SD10-1012	VOC	Carbon disulfide	75-15-0	0.029	MG_KG	U		0.012	0.029	0.058	0.0045
No	CAYP-SD12-1012	VOC	Carbon disulfide	75-15-0	0.056	MG_KG	U		0.024	0.056	0.11	0.0045
No	CAYP-SD12P-1012	VOC	Carbon disulfide	75-15-0	0.030	MG_KG	U		0.013	0.030	0.061	0.0045
No	CAYP-SD13-1012	VOC	Carbon disulfide	75-15-0	0.012	MG_KG	U		0.0050	0.012	0.024	0.0045
No	CAYP-SSD02-1012	VOC	Carbon disulfide	75-15-0	0.018	MG_KG	U		0.0077	0.018	0.037	0.0045
No	CAYP-SSD02P-1012	VOC	Carbon disulfide	75-15-0	0.023	MG_KG	U		0.0095	0.023	0.045	0.0045
No	CAYP-SSD05-1112	VOC	Carbon disulfide	75-15-0	0.016	MG_KG	U		0.0065	0.016	0.031	0.0045
No	CAYP-SSD07-1012	VOC	Carbon disulfide	75-15-0	0.019	MG_KG	U		0.0081	0.019	0.038	0.0045
No	CAYP-SSD09-1012	VOC	Carbon disulfide	75-15-0	0.012	MG_KG	U		0.0049	0.012	0.023	0.0045
No	CAYP-SSD10-1012	VOC	Carbon disulfide	75-15-0	0.020	MG_KG	U		0.0082	0.020	0.039	0.0045
No	CAYP-SSD12-1012	VOC	Carbon disulfide	75-15-0	0.036	MG_KG	U		0.015	0.036	0.071	0.0045
No	CAYP-SSD13-1012	VOC	Carbon disulfide	75-15-0	0.013	MG_KG	U		0.0054	0.013	0.026	0.0045
No	CAYP-SD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0015	MG_KG	UL	MSL	0.0004	0.0015	0.0030	0.00027
No	CAYP-SD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0048	MG_KG	U		0.0015	0.0048	0.0097	0.00027
No	CAYP-SD02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0051	MG_KG	U		0.0015	0.0051	0.010	0.00027
No	CAYP-SD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0038	MG_KG	U		0.0011	0.0038	0.0076	0.00027
No	CAYP-SD04-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0023	MG_KG	U		0.0007	0.0023	0.0045	0.00027
No	CAYP-SD05-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0046	MG_KG	U		0.0014	0.0046	0.0092	0.00027
No	CAYP-SD06-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0011	MG_KG	U		0.0003	0.0011	0.0023	0.00027
No	CAYP-SD07-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0036	MG_KG	U		0.0011	0.0036	0.0071	0.00027
No	CAYP-SD08-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0025	MG_KG	U		0.0008	0.0025	0.0051	0.00027
No	CAYP-SD09-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0038	MG_KG	U		0.0011	0.0038	0.0076	0.00027
No	CAYP-SD10-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0058	MG_KG	U		0.0017	0.0058	0.012	0.00027
No	CAYP-SD11-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0014	MG_KG	U		0.0004	0.0014	0.0028	0.00027
No	CAYP-SD12-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.011	MG_KG	U		0.0034	0.011	0.022	0.00027

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD12P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0061	MG_KG	U		0.0018	0.0061	0.012	0.00027
No	CAYP-SD13-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0024	MG_KG	U		0.0007	0.0024	0.0048	0.00027
No	CAYP-SSD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0010	MG_KG	U		0.0003	0.0010	0.0020	0.00028
No	CAYP-SSD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0037	MG_KG	U		0.0011	0.0037	0.0073	0.00028
No	CAYP-SSD02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0045	MG_KG	U		0.0014	0.0045	0.0091	0.00028
No	CAYP-SSD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0013	MG_KG	U		0.0004	0.0013	0.0025	0.00028
No	CAYP-SSD04-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0016	MG_KG	U		0.0005	0.0016	0.0031	0.00028
No	CAYP-SSD05-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0031	MG_KG	U		0.0009	0.0031	0.0062	0.00028
No	CAYP-SSD07-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0038	MG_KG	U		0.0012	0.0038	0.0077	0.00028
No	CAYP-SSD08-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0012	MG_KG	U		0.0004	0.0012	0.0024	0.00028
No	CAYP-SSD09-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0023	MG_KG	U		0.0007	0.0023	0.0047	0.00028
No	CAYP-SSD10-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0039	MG_KG	U		0.0012	0.0039	0.0078	0.00028
No	CAYP-SSD11-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0010	MG_KG	U		0.0003	0.0010	0.0020	0.00028
No	CAYP-SSD12-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0071	MG_KG	U		0.0021	0.0071	0.014	0.00028
No	CAYP-SSD13-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0026	MG_KG	U		0.0008	0.0026	0.0051	0.00028
No	CAYP-SD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0015	MG_KG	U		0.0005	0.0015	0.0030	0.00027
No	CAYP-SD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0048	MG_KG	U		0.0015	0.0048	0.0097	0.00027
No	CAYP-SD02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0051	MG_KG	U		0.0016	0.0051	0.010	0.00027
No	CAYP-SD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0038	MG_KG	U		0.0012	0.0038	0.0076	0.00027
No	CAYP-SD04-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0023	MG_KG	U		0.0007	0.0023	0.0045	0.00027
No	CAYP-SD05-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0046	MG_KG	U		0.0014	0.0046	0.0092	0.00027
No	CAYP-SD06-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0011	MG_KG	U		0.0004	0.0011	0.0023	0.00027
No	CAYP-SD07-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0036	MG_KG	U		0.0011	0.0036	0.0071	0.00027
No	CAYP-SD08-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0025	MG_KG	U		0.0008	0.0025	0.0051	0.00027
No	CAYP-SD09-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0038	MG_KG	U		0.0012	0.0038	0.0076	0.00027
No	CAYP-SD10-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0058	MG_KG	U		0.0018	0.0058	0.012	0.00027
No	CAYP-SD11-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0014	MG_KG	U		0.0004	0.0014	0.0028	0.00027
No	CAYP-SD12-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.011	MG_KG	U		0.0035	0.011	0.022	0.00027
No	CAYP-SD12P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0061	MG_KG	U		0.0019	0.0061	0.012	0.00027
No	CAYP-SD13-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0024	MG_KG	U		0.0007	0.0024	0.0048	0.00027
No	CAYP-SSD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0010	MG_KG	U		0.0003	0.0010	0.0020	0.00028
No	CAYP-SSD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0037	MG_KG	U		0.0011	0.0037	0.0073	0.00028
No	CAYP-SSD02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0045	MG_KG	U		0.0014	0.0045	0.0091	0.00028
No	CAYP-SSD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0013	MG_KG	U		0.0004	0.0013	0.0025	0.00028
No	CAYP-SSD04-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0016	MG_KG	U		0.0005	0.0016	0.0031	0.00028
No	CAYP-SSD05-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0031	MG_KG	U		0.0010	0.0031	0.0062	0.00028
No	CAYP-SSD07-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0038	MG_KG	U		0.0012	0.0038	0.0077	0.00028
No	CAYP-SSD08-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0012	MG_KG	U		0.0004	0.0012	0.0024	0.00028
No	CAYP-SSD09-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0023	MG_KG	U		0.0007	0.0023	0.0047	0.00028
No	CAYP-SSD10-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0039	MG_KG	U		0.0012	0.0039	0.0078	0.00028
No	CAYP-SSD11-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0010	MG_KG	U		0.0003	0.0010	0.0020	0.00028
No	CAYP-SSD12-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0071	MG_KG	U		0.0022	0.0071	0.014	0.00028
No	CAYP-SSD13-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0026	MG_KG	U		0.0008	0.0026	0.0051	0.00028
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.066	MG_KG	U		0.046	0.066	0.13	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.067	MG_KG	U		0.047	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.069	MG_KG	U		0.048	0.069	0.14	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.066	MG_KG	U		0.043	0.066	0.13	0.0598
Yes	CAYP-SD04-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.089	MG_KG	U		0.058	0.089	0.18	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.067	MG_KG	U		0.043	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.069	MG_KG	U		0.045	0.069	0.14	0.0598
Yes	CAYP-SSD09-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.091	MG_KG	UL	SSL	0.059	0.091	0.18	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.066	MG_KG	U		0.043	0.066	0.13	0.0598
Yes	CAYP-SD04-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.089	MG_KG	U		0.058	0.089	0.18	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.067	MG_KG	U		0.043	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.069	MG_KG	U		0.045	0.069	0.14	0.0598
Yes	CAYP-SSD09-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.091	MG_KG	UL	SSL	0.059	0.091	0.18	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.066	MG_KG	U		0.033	0.066	0.13	0.0598
Yes	CAYP-SD04-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.089	MG_KG	U		0.044	0.089	0.18	0.0598
Yes	CAYP-SD08-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.10	MG_KG	U		0.050	0.10	0.20	0.0598
Yes	CAYP-SD13-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.093	MG_KG	U		0.046	0.093	0.19	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.067	MG_KG	U		0.033	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.069	MG_KG	U		0.034	0.069	0.14	0.0598
Yes	CAYP-SSD05-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.10	MG_KG	UL	SSL	0.051	0.10	0.20	0.0598
Yes	CAYP-SSD07-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.12	MG_KG	UL	SSL	0.059	0.12	0.24	0.0598
Yes	CAYP-SSD09-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.091	MG_KG	UL	SSL	0.046	0.091	0.18	0.0598
Yes	CAYP-SSD13-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.10	MG_KG	U		0.051	0.10	0.20	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.066	MG_KG	U		0.019	0.066	0.13	0.0598
Yes	CAYP-SD02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.15	MG_KG	UL	SSL	0.043	0.15	0.31	0.0598
Yes	CAYP-SD02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.15	MG_KG	UL	SSL	0.044	0.15	0.31	0.0598
Yes	CAYP-SD03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.13	MG_KG	U		0.037	0.13	0.26	0.0598
Yes	CAYP-SD04-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.089	MG_KG	U		0.025	0.089	0.18	0.0598
Yes	CAYP-SD05-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.15	MG_KG	UL	SSL	0.043	0.15	0.30	0.0598
Yes	CAYP-SD07-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.14	MG_KG	UL	SSL	0.040	0.14	0.28	0.0598
Yes	CAYP-SD08-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.10	MG_KG	U		0.028	0.10	0.20	0.0598
Yes	CAYP-SD09-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.12	MG_KG	UL	SSL	0.035	0.12	0.24	0.0598
Yes	CAYP-SD12P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.18	MG_KG	UL	SSL	0.051	0.18	0.36	0.0598
Yes	CAYP-SD13-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.093	MG_KG	U		0.026	0.093	0.19	0.0598
Yes	CAYP-SSD02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.12	MG_KG	UL	SSL	0.035	0.12	0.24	0.0598
Yes	CAYP-SSD02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.13	MG_KG	UL	SSL	0.038	0.13	0.26	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.067	MG_KG	U		0.019	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.069	MG_KG	U		0.020	0.069	0.14	0.0598
Yes	CAYP-SSD05-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.10	MG_KG	UL	SSL	0.029	0.10	0.20	0.0598
Yes	CAYP-SSD07-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.12	MG_KG	UL	SSL	0.034	0.12	0.24	0.0598
Yes	CAYP-SSD09-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.091	MG_KG	UL	SSL	0.026	0.091	0.18	0.0598
Yes	CAYP-SSD10-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.12	MG_KG	UL	SSL	0.035	0.12	0.25	0.0598

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAYP-SSD12-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.21	MG_KG	UL	SSL	0.059	0.21	0.41	0.0598
Yes	CAYP-SSD13-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.10	MG_KG	U		0.029	0.10	0.20	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.066	MG_KG	U		0.050	0.066	0.13	0.0598
Yes	CAYP-SSD03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.067	MG_KG	U		0.050	0.067	0.13	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.069	MG_KG	U		0.052	0.069	0.14	0.0598
Yes	CAYP-SD04-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.089	MG_KG	U		0.049	0.089	0.18	0.0598
Yes	CAYP-SSD04-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.069	MG_KG	U		0.038	0.069	0.14	0.0598
Yes	CAYP-SSD05-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.10	MG_KG	UL	SSL	0.056	0.10	0.20	0.0598
Yes	CAYP-SSD09-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.091	MG_KG	UL	SSL	0.050	0.091	0.18	0.0598
Yes	CAYP-SSD13-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.10	MG_KG	U		0.056	0.10	0.20	0.0598
Yes	CAYP-SD01-1012	PEST/PCB	Endosulfan I	959-98-8	0.033	MG_KG	UL	SSL	0.013	0.033	0.056	0.0155
Yes	CAYP-SD02-1012	PEST/PCB	Endosulfan I	959-98-8	0.038	MG_KG	UL	SSL	0.015	0.038	0.065	0.0155
Yes	CAYP-SD02P-1012	PEST/PCB	Endosulfan I	959-98-8	0.038	MG_KG	UL	SSL	0.015	0.038	0.065	0.0155
Yes	CAYP-SD04-1112	PEST/PCB	Endosulfan I	959-98-8	0.022	MG_KG	UL	SSL	0.0087	0.022	0.038	0.0155
Yes	CAYP-SD05-1112	PEST/PCB	Endosulfan I	959-98-8	0.038	MG_KG	UL	SSL	0.015	0.038	0.064	0.0155
Yes	CAYP-SD07-1012	PEST/PCB	Endosulfan I	959-98-8	0.035	MG_KG	UL	SSL	0.014	0.035	0.060	0.0155
Yes	CAYP-SD11-1012	PEST/PCB	Endosulfan I	959-98-8	0.027	MG_KG	UL	SSL	0.011	0.027	0.047	0.0155
Yes	CAYP-SSD01-1012	PEST/PCB	Endosulfan I	959-98-8	0.026	MG_KG	UL	SSL	0.010	0.026	0.044	0.0155
Yes	CAYP-SSD02-1012	PEST/PCB	Endosulfan I	959-98-8	0.030	MG_KG	UL	SSL	0.012	0.030	0.052	0.0155
Yes	CAYP-SSD02P-1012	PEST/PCB	Endosulfan I	959-98-8	0.033	MG_KG	UL	SSL	0.013	0.033	0.056	0.0155
Yes	CAYP-SSD03-1012	PEST/PCB	Endosulfan I	959-98-8	0.033	MG_KG	UL	SSL	0.013	0.033	0.057	0.0155
Yes	CAYP-SSD04-1112	PEST/PCB	Endosulfan I	959-98-8	0.017	MG_KG	UL	SSL	0.0067	0.017	0.029	0.0155
Yes	CAYP-SSD05-1112	PEST/PCB	Endosulfan I	959-98-8	0.026	MG_KG	UL	SSL	0.010	0.026	0.044	0.0155
Yes	CAYP-SSD07-1012	PEST/PCB	Endosulfan I	959-98-8	0.029	MG_KG	UL	SSL	0.011	0.029	0.050	0.0155
Yes	CAYP-SSD09-1012	PEST/PCB	Endosulfan I	959-98-8	0.023	MG_KG	UL	SSL	0.0089	0.023	0.039	0.0155
Yes	CAYP-SSD10-1012	PEST/PCB	Endosulfan I	959-98-8	0.031	MG_KG	UL	SSL	0.012	0.031	0.053	0.0155
Yes	CAYP-SSD11-1012	PEST/PCB	Endosulfan I	959-98-8	0.026	MG_KG	UL	SSL	0.010	0.026	0.043	0.0155
Yes	CAYP-SD01-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.0289
Yes	CAYP-SD02-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.0289
Yes	CAYP-SD02P-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.038	MG_KG	UL	SSL	0.019	0.038	0.065	0.0289
Yes	CAYP-SD05-1112	PEST/PCB	Endosulfan sulfate	1031-07-8	0.038	MG_KG	UL	SSL	0.018	0.038	0.064	0.0289
Yes	CAYP-SD07-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.035	MG_KG	UL	SSL	0.017	0.035	0.060	0.0289
Yes	CAYP-SD08-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.050	MG_KG	UL	SSL	0.024	0.050	0.085	0.0289
Yes	CAYP-SD10-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.077	0.0289
Yes	CAYP-SD12P-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.045	MG_KG	UL	SSL	0.022	0.045	0.077	0.0289
Yes	CAYP-SD13-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.0289
Yes	CAYP-SSD02-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.030	MG_KG	UL	SSL	0.015	0.030	0.052	0.0289
Yes	CAYP-SSD02P-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.056	0.0289
Yes	CAYP-SSD03-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.033	MG_KG	UL	SSL	0.016	0.033	0.057	0.0289
Yes	CAYP-SSD07-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.029	MG_KG	UL	SSL	0.014	0.029	0.050	0.0289
Yes	CAYP-SSD10-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.031	MG_KG	UL	SSL	0.015	0.031	0.053	0.0289
Yes	CAYP-SSD12-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.0289
Yes	CAYP-SSD13-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.051	MG_KG	UL	SSL	0.025	0.051	0.087	0.0289
Yes	CAYP-SD10-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.8	MG_KG	UJ	CCL	0.67	1.8	3.0	1.52
Yes	CAYP-SD12-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	2.3	MG_KG	UJ	CCL	0.87	2.3	3.9	1.52
Yes	CAYP-SD12P-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.8	MG_KG	UJ	CCL	0.66	1.8	3.0	1.52
Yes	CAYP-SSD12-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	2.0	MG_KG	UJ	CCL	0.75	2.0	3.4	1.52
Yes	CAYP-SD12-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	1.2	MG_KG	U		0.70	1.2	3.9	1.14
Yes	CAYP-SD01-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.66	MG_KG	U		0.47	0.66	2.2	0.626
Yes	CAYP-SD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.75	MG_KG	U		0.53	0.75	2.5	0.626
Yes	CAYP-SD02P-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.77	MG_KG	U		0.54	0.77	2.5	0.626
Yes	CAYP-SD03-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.65	MG_KG	U		0.46	0.65	2.2	0.626
Yes	CAYP-SD07-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.70	MG_KG	U		0.50	0.70	2.3	0.626
Yes	CAYP-SSD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.63	MG_KG	U		0.44	0.63	2.1	0.626
Yes	CAYP-SSD02P-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.65	MG_KG	U		0.46	0.65	2.1	0.626
Yes	CAYP-SSD10-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.63	MG_KG	U		0.44	0.63	2.1	0.626
Yes	CAYP-SD06-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.28	MG_KG	UL	SSL	0.20	0.28	0.93	0.223
Yes	CAYP-SD11-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.28	MG_KG	U		0.20	0.28	0.93	0.223
Yes	CAYP-SSD01-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.25	MG_KG	U		0.18	0.25	0.83	0.223
Yes	CAYP-SSD06-1112	SVOC	2,4-Dinitrotoluene	121-14-2	0.27	MG_KG	UL	SSL	0.19	0.27	0.88	0.223
Yes	CAYP-SSD08-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.28	MG_KG	U		0.20	0.28	0.94	0.223
Yes	CAYP-SSD11-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.26	MG_KG	U		0.19	0.26	0.86	0.223
Yes	CAYP-SD05-1112	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.76	MG_KG	UL	SSL	0.61	0.76	1.3	0.67
Yes	CAYP-SSD04-1112	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.68	MG_KG	UL	SSL	0.55	0.68	1.1	0.67
Yes	CAYP-SD07-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.70	MG_KG	U		0.64	0.70	2.3	0.68
Yes	CAYP-SD01-1012	SVOC	Anthracene	120-12-7	0.084	MG_KG	U		0.047	0.084	0.11	0.0572
Yes	CAYP-SD02-1012	SVOC	Anthracene	120-12-7	0.095	MG_KG	UL	SSL	0.053	0.095	0.13	0.0572
Yes	CAYP-SD02P-1012	SVOC	Anthracene	120-12-7	0.098	MG_KG	UL	SSL	0.055	0.098	0.13	0.0572
Yes	CAYP-SD03-1012	SVOC	Anthracene	120-12-7	0.084	MG_KG	U		0.047	0.084	0.11	0.0572
Yes	CAYP-SD05-1112	SVOC	Anthracene	120-12-7	0.096	MG_KG	UL	SSL	0.054	0.096	0.13	0.0572
Yes	CAYP-SD07-1012	SVOC	Anthracene	120-12-7	0.089	MG_KG	U		0.050	0.089	0.12	0.0572
Yes	CAYP-SD08-1012	SVOC	Anthracene	120-12-7	0.064	MG_KG	U		0.036	0.064	0.084	0.0572
Yes	CAYP-SD09-1012	SVOC	Anthracene	120-12-7	0.078	MG_KG	U		0.044	0.078	0.10	0.0572
Yes	CAYP-SSD02-1012	SVOC	Anthracene	120-12-7	0.078	MG_KG	U		0.044	0.078	0.10	0.0572
Yes	CAYP-SSD02P-1012	SVOC	Anthracene	120-12-7	0.083	MG_KG	U		0.046	0.083	0.11	0.0572
Yes	CAYP-SSD05-1112	SVOC	Anthracene	120-12-7	0.064	MG_KG	UL	SSL	0.036	0.064	0.085	0.0572
Yes	CAYP-SSD07-1012	SVOC	Anthracene	120-12-7	0.073	MG_KG	UL	SSL	0.041	0.073	0.097	0.0572
Yes	CAYP-SSD09-1012	SVOC	Anthracene	120-12-7	0.059	MG_KG	U		0.033	0.059	0.078	0.0572
Yes	CAYP-SSD10-1012	SVOC	Anthracene	120-12-7	0.079	MG_KG	U		0.044	0.079	0.10	0.0572
Yes	CAYP-SSD13-1012	SVOC	Anthracene	120-12-7	0.064	MG_KG	U		0.036	0.064	0.085	0.0572
Yes	CAYP-SD12-1012	SVOC	Benzo(a)anthracene	56-55-3	0.15	MG_KG	UL	SSL	0.056	0.15	0.20	0.108
Yes	CAYP-SD12P-1012	SVOC	Benzo(a)anthracene	56-55-3	0.11	MG_KG	UL	SSL	0.042	0.11	0.15	0.108
Yes	CAYP-SSD12-1012	SVOC	Benzo(a)anthracene	56-55-3	0.13	MG_KG	UL	SSL	0.048	0.13	0.17	0.108
Yes	CAYP-SD12-1012	SVOC	Benzo(a)pyrene	50-32-8	0.15	MG_KG	UL	SSL	0.044	0.15	0.20	0.15
Yes	CAYP-SSD04-1112	SVOC	Benzo(b)fluoranthene	205-99-2	0.044	MG_KG	UL	SSL	0.023	0.044	0.057	0.0272

TABLE 3-9
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAYP-SSD08-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.036	MG_KG	U		0.019	0.036	0.047	0.0272
Yes	CAYP-SD04-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.056	MG_KG	U		0.029	0.056	0.074	0.033
Yes	CAYP-SD06-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.036	MG_KG	U		0.018	0.036	0.047	0.033
Yes	CAYP-SD13-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.060	MG_KG	U		0.031	0.060	0.079	0.033
Yes	CAYP-SSD03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.042	MG_KG	U		0.022	0.042	0.055	0.033
Yes	CAYP-SSD04-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.044	MG_KG	UL	SSL	0.023	0.044	0.057	0.033
Yes	CAYP-SSD06-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.033	MG_KG	U		0.017	0.033	0.044	0.033
Yes	CAYP-SSD08-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.036	MG_KG	U		0.019	0.036	0.047	0.033
Yes	CAYP-SSD09-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.059	MG_KG	U		0.031	0.059	0.078	0.033
Yes	CAYP-SD01-1012	SVOC	Diethylphthalate	84-66-2	0.66	MG_KG	U		0.50	0.66	2.2	0.63
Yes	CAYP-SD02-1012	SVOC	Diethylphthalate	84-66-2	0.75	MG_KG	U		0.56	0.75	2.5	0.63
Yes	CAYP-SD02P-1012	SVOC	Diethylphthalate	84-66-2	0.77	MG_KG	U		0.57	0.77	2.5	0.63
Yes	CAYP-SD03-1012	SVOC	Diethylphthalate	84-66-2	0.65	MG_KG	U		0.49	0.65	2.2	0.63
Yes	CAYP-SD07-1012	SVOC	Diethylphthalate	84-66-2	0.70	MG_KG	U		0.53	0.70	2.3	0.63
Yes	CAYP-SSD02-1012	SVOC	Diethylphthalate	84-66-2	0.63	MG_KG	U		0.47	0.63	2.1	0.63
Yes	CAYP-SSD02P-1012	SVOC	Diethylphthalate	84-66-2	0.65	MG_KG	U		0.49	0.65	2.1	0.63
Yes	CAYP-SSD10-1012	SVOC	Diethylphthalate	84-66-2	0.63	MG_KG	U		0.47	0.63	2.1	0.63
Yes	CAYP-SD01-1012	SVOC	Fluorene	86-73-7	0.084	MG_KG	U		0.070	0.084	0.11	0.0774
Yes	CAYP-SD03-1012	SVOC	Fluorene	86-73-7	0.084	MG_KG	U		0.070	0.084	0.11	0.0774
Yes	CAYP-SD07-1012	SVOC	Fluorene	86-73-7	0.089	MG_KG	U		0.075	0.089	0.12	0.0774
Yes	CAYP-SD09-1012	SVOC	Fluorene	86-73-7	0.078	MG_KG	U		0.065	0.078	0.10	0.0774
Yes	CAYP-SSD02-1012	SVOC	Fluorene	86-73-7	0.078	MG_KG	U		0.066	0.078	0.10	0.0774
Yes	CAYP-SSD02P-1012	SVOC	Fluorene	86-73-7	0.083	MG_KG	U		0.069	0.083	0.11	0.0774
Yes	CAYP-SSD10-1012	SVOC	Fluorene	86-73-7	0.079	MG_KG	U		0.066	0.079	0.10	0.0774
Yes	CAYP-SSD06-1112	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.033	MG_KG	U		0.016	0.033	0.044	0.017
Yes	CAYP-SD02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.75	MG_KG	U		0.68	0.75	2.5	0.69
Yes	CAYP-SD07-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.70	MG_KG	U		0.63	0.70	2.3	0.69
Yes	CAYP-SD10-1012	SVOC	Pentachlorophenol	87-86-5	2.7	MG_KG	U		1.3	2.7	3.0	2.7
Yes	CAYP-SD12-1012	SVOC	Pentachlorophenol	87-86-5	3.5	MG_KG	U		1.6	3.5	3.9	2.7
Yes	CAYP-SD12P-1012	SVOC	Pentachlorophenol	87-86-5	2.7	MG_KG	U		1.3	2.7	3.0	2.7
Yes	CAYP-SSD12-1012	SVOC	Pentachlorophenol	87-86-5	3.1	MG_KG	U		1.4	3.1	3.4	2.7
Yes	CAYP-SD01-1012	VOC	Carbon disulfide	75-15-0	0.0074	MG_KG	U		0.0031	0.0074	0.015	0.0045
Yes	CAYP-SD06-1112	VOC	Carbon disulfide	75-15-0	0.0057	MG_KG	U		0.0024	0.0057	0.011	0.0045
Yes	CAYP-SD11-1012	VOC	Carbon disulfide	75-15-0	0.0071	MG_KG	U		0.0030	0.0071	0.014	0.0045
Yes	CAYP-SSD01-1012	VOC	Carbon disulfide	75-15-0	0.0049	MG_KG	U		0.0020	0.0049	0.0098	0.0045
Yes	CAYP-SSD03-1012	VOC	Carbon disulfide	75-15-0	0.0063	MG_KG	U		0.0027	0.0063	0.013	0.0045
Yes	CAYP-SSD04-1112	VOC	Carbon disulfide	75-15-0	0.0078	MG_KG	U		0.0033	0.0078	0.016	0.0045
Yes	CAYP-SSD08-1012	VOC	Carbon disulfide	75-15-0	0.0059	MG_KG	U		0.0025	0.0059	0.012	0.0045
Yes	CAYP-SSD11-1012	VOC	Carbon disulfide	75-15-0	0.0050	MG_KG	U		0.0021	0.0050	0.0099	0.0045
Yes	CAYP-SSD06-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0007	MG_KG	U		0.0002	0.0007	0.0014	0.00028
Yes	CAYP-SSD06-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0007	MG_KG	U		0.0002	0.0007	0.0014	0.00028

TABLE 3-10
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SD02P-1012	METAL	Antimony	7440-36-0	6.40	MG_KG	U		2.18	6.40	12.8	2
No	CAYP-SSD12-1012	METAL	Antimony	7440-36-0	7.88	MG_KG	U		2.68	7.88	15.8	2
No	CAYP-SD01-1012	METAL	Cyanide	57-12-5	0.30	MG_KG	U		0.10	0.30	0.80	0.1
No	CAYP-SD02P-1012	METAL	Cyanide	57-12-5	0.70	MG_KG	U		0.24	0.70	1.9	0.1
No	CAYP-SD03-1012	METAL	Cyanide	57-12-5	0.60	MG_KG	U		0.21	0.60	1.6	0.1
No	CAYP-SD04-1112	METAL	Cyanide	57-12-5	0.41	MG_KG	U		0.14	0.41	1.1	0.1
No	CAYP-SD05-1112	METAL	Cyanide	57-12-5	0.69	MG_KG	U		0.24	0.69	1.8	0.1
No	CAYP-SD07-1012	METAL	Cyanide	57-12-5	0.64	MG_KG	U		0.22	0.64	1.7	0.1
No	CAYP-SD08-1012	METAL	Cyanide	57-12-5	0.46	MG_KG	U		0.16	0.46	1.2	0.1
No	CAYP-SD09-1012	METAL	Cyanide	57-12-5	0.56	MG_KG	U		0.19	0.56	1.5	0.1
No	CAYP-SD10-1012	METAL	Cyanide	57-12-5	0.82	MG_KG	U		0.28	0.82	2.2	0.1
No	CAYP-SD12-1012	METAL	Cyanide	57-12-5	1.1	MG_KG	U		0.37	1.1	2.9	0.1
No	CAYP-SD12P-1012	METAL	Cyanide	57-12-5	0.82	MG_KG	U		0.28	0.82	2.2	0.1
No	CAYP-SSD02-1012	METAL	Cyanide	57-12-5	0.56	MG_KG	U		0.19	0.56	1.5	0.1
No	CAYP-SSD02P-1012	METAL	Cyanide	57-12-5	0.59	MG_KG	U		0.20	0.59	1.6	0.1
No	CAYP-SSD03-1012	METAL	Cyanide	57-12-5	0.30	MG_KG	U		0.10	0.30	0.80	0.1
No	CAYP-SSD04-1112	METAL	Cyanide	57-12-5	0.31	MG_KG	U		0.11	0.31	0.84	0.1
No	CAYP-SSD05-1112	METAL	Cyanide	57-12-5	0.46	MG_KG	U		0.16	0.46	1.2	0.1
No	CAYP-SSD07-1012	METAL	Cyanide	57-12-5	0.53	MG_KG	U		0.18	0.53	1.4	0.1
No	CAYP-SSD10-1012	METAL	Cyanide	57-12-5	0.57	MG_KG	U		0.20	0.57	1.5	0.1
No	CAYP-SSD12-1012	METAL	Cyanide	57-12-5	0.94	MG_KG	U		0.32	0.94	2.5	0.1
No	CAYP-SSD13-1012	METAL	Cyanide	57-12-5	0.46	MG_KG	U		0.16	0.46	1.2	0.1
No	CAYP-SD02P-1012	METAL	Selenium	7782-49-2	6.40	MG_KG	U		2.11	6.40	12.8	2
No	CAYP-SSD12-1012	METAL	Selenium	7782-49-2	7.88	MG_KG	U		2.60	7.88	15.8	2
No	CAYP-SD01-1012	METAL	Thallium	7440-28-0	2.62	MG_KG	U		0.787	2.62	5.25	0.78
No	CAYP-SD02-1012	METAL	Thallium	7440-28-0	4.83	MG_KG	U		1.45	4.83	9.66	0.78
No	CAYP-SD02P-1012	METAL	Thallium	7440-28-0	6.40	MG_KG	U		1.92	6.40	12.8	0.78
No	CAYP-SD03-1012	METAL	Thallium	7440-28-0	4.79	MG_KG	U		1.44	4.79	9.57	0.78
No	CAYP-SD07-1012	METAL	Thallium	7440-28-0	4.72	MG_KG	U		1.42	4.72	9.44	0.78
No	CAYP-SD08-1012	METAL	Thallium	7440-28-0	3.09	MG_KG	U		0.928	3.09	6.19	0.78
No	CAYP-SD10-1012	METAL	Thallium	7440-28-0	5.42	MG_KG	U		1.63	5.42	10.8	0.78
No	CAYP-SD12-1012	METAL	Thallium	7440-28-0	10.1	MG_KG	U		3.04	10.1	20.3	0.78
No	CAYP-SD12P-1012	METAL	Thallium	7440-28-0	5.83	MG_KG	U		1.75	5.83	11.7	0.78
No	CAYP-SD13-1012	METAL	Thallium	7440-28-0	3.44	MG_KG	U		1.03	3.44	6.89	0.78
No	CAYP-SSD02-1012	METAL	Thallium	7440-28-0	5.14	MG_KG	U		1.54	5.14	10.3	0.78
No	CAYP-SSD02P-1012	METAL	Thallium	7440-28-0	4.50	MG_KG	U		1.35	4.50	9.00	0.78
No	CAYP-SSD03-1012	METAL	Thallium	7440-28-0	3.22	MG_KG	U		0.965	3.22	6.43	0.78
No	CAYP-SSD07-1012	METAL	Thallium	7440-28-0	3.46	MG_KG	U		1.04	3.46	6.92	0.78
No	CAYP-SSD09-1012	METAL	Thallium	7440-28-0	4.35	MG_KG	U		1.30	4.35	8.70	0.78
No	CAYP-SSD10-1012	METAL	Thallium	7440-28-0	5.17	MG_KG	U		1.55	5.17	10.3	0.78
No	CAYP-SSD12-1012	METAL	Thallium	7440-28-0	7.88	MG_KG	U		2.36	7.88	15.8	0.78
No	CAYP-SSD13-1012	METAL	Thallium	7440-28-0	3.22	MG_KG	U		0.966	3.22	6.44	0.78
Yes	CAYP-SD01-1012	METAL	Antimony	7440-36-0	2.62	MG_KG	U		0.892	2.62	5.25	2
Yes	CAYP-SD02-1012	METAL	Antimony	7440-36-0	4.83	MG_KG	U		1.64	4.83	9.66	2
Yes	CAYP-SD04-1112	METAL	Antimony	7440-36-0	2.53	MG_KG	U		0.860	2.53	5.06	2
Yes	CAYP-SD07-1012	METAL	Antimony	7440-36-0	4.72	MG_KG	U		1.60	4.72	9.44	2
Yes	CAYP-SD08-1012	METAL	Antimony	7440-36-0	3.09	MG_KG	U		1.05	3.09	6.19	2
Yes	CAYP-SD09-1012	METAL	Antimony	7440-36-0	3.11	MG_KG	U		1.06	3.11	6.22	2
Yes	CAYP-SD10-1012	METAL	Antimony	7440-36-0	5.42	MG_KG	U		1.84	5.42	10.8	2
Yes	CAYP-SSD01-1012	METAL	Antimony	7440-36-0	2.26	MG_KG	U		0.767	2.26	4.51	2
Yes	CAYP-SSD02-1012	METAL	Antimony	7440-36-0	5.14	MG_KG	U		1.75	5.14	10.3	2
Yes	CAYP-SSD02P-1012	METAL	Antimony	7440-36-0	4.50	MG_KG	U		1.53	4.50	9.00	2
Yes	CAYP-SSD03-1012	METAL	Antimony	7440-36-0	3.22	MG_KG	U		1.09	3.22	6.43	2
Yes	CAYP-SSD05-1112	METAL	Antimony	7440-36-0	3.03	MG_KG	U		1.03	3.03	6.06	2
Yes	CAYP-SSD07-1012	METAL	Antimony	7440-36-0	3.46	MG_KG	U		1.18	3.46	6.92	2
Yes	CAYP-SSD08-1012	METAL	Antimony	7440-36-0	2.45	MG_KG	U		0.832	2.45	4.90	2
Yes	CAYP-SSD09-1012	METAL	Antimony	7440-36-0	4.35	MG_KG	U		1.48	4.35	8.70	2
Yes	CAYP-SSD10-1012	METAL	Antimony	7440-36-0	5.17	MG_KG	U		1.76	5.17	10.3	2
Yes	CAYP-SSD11-1012	METAL	Antimony	7440-36-0	2.30	MG_KG	U		0.782	2.30	4.60	2
Yes	CAYP-SD06-1112	METAL	Cyanide	57-12-5	0.26	MG_KG	U		0.088	0.26	0.68	0.1
Yes	CAYP-SD11-1012	METAL	Cyanide	57-12-5	0.25	MG_KG	U		0.087	0.25	0.68	0.1
Yes	CAYP-SSD01-1012	METAL	Cyanide	57-12-5	0.23	MG_KG	U		0.080	0.23	0.62	0.1
Yes	CAYP-SSD06-1112	METAL	Cyanide	57-12-5	0.24	MG_KG	U		0.082	0.24	0.64	0.1
Yes	CAYP-SSD08-1012	METAL	Cyanide	57-12-5	0.26	MG_KG	U		0.089	0.26	0.69	0.1
Yes	CAYP-SSD11-1012	METAL	Cyanide	57-12-5	0.24	MG_KG	U		0.081	0.24	0.63	0.1
Yes	CAYP-SSD01-1012	METAL	Selenium	7782-49-2	2.26	MG_KG	U		0.744	2.26	4.51	2
Yes	CAYP-SSD02-1012	METAL	Selenium	7782-49-2	5.14	MG_KG	U		1.69	5.14	10.3	2
Yes	CAYP-SSD02P-1012	METAL	Selenium	7782-49-2	4.50	MG_KG	U		1.48	4.50	9.00	2
Yes	CAYP-SSD03-1012	METAL	Selenium	7782-49-2	3.22	MG_KG	U		1.06	3.22	6.43	2
Yes	CAYP-SSD07-1012	METAL	Selenium	7782-49-2	3.46	MG_KG	U		1.14	3.46	6.92	2
Yes	CAYP-SSD08-1012	METAL	Selenium	7782-49-2	2.45	MG_KG	U		0.808	2.45	4.90	2
Yes	CAYP-SSD09-1012	METAL	Selenium	7782-49-2	4.35	MG_KG	U		1.44	4.35	8.70	2
Yes	CAYP-SSD10-1012	METAL	Selenium	7782-49-2	5.17	MG_KG	U		1.70	5.17	10.3	2
Yes	CAYP-SSD02-1012	METAL	Silver	7440-22-4	1.28	MG_KG	U		0.298	1.28	2.57	1
Yes	CAYP-SSD02P-1012	METAL	Silver	7440-22-4	1.12	MG_KG	U		0.261	1.12	2.25	1
Yes	CAYP-SSD09-1012	METAL	Silver	7440-22-4	1.09	MG_KG	U		0.252	1.09	2.17	1
Yes	CAYP-SSD10-1012	METAL	Silver	7440-22-4	1.29	MG_KG	U		0.300	1.29	2.58	1
Yes	CAYP-SSD12-1012	METAL	Silver	7440-22-4	1.97	MG_KG	U		0.457	1.97	3.94	1
Yes	CAYP-SSD01-1012	METAL	Thallium	7440-28-0	2.26	MG_KG	U		0.677	2.26	4.51	0.78

TABLE 3-10
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Youth Pond Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAYP-SSD04-1112	METAL	Thallium	7440-28-0	1.74	MG_KG	U		0.522	1.74	3.48	0.78
Yes	CAYP-SSD06-1112	METAL	Thallium	7440-28-0	1.49	MG_KG	U		0.447	1.49	2.98	0.78
Yes	CAYP-SSD08-1012	METAL	Thallium	7440-28-0	2.45	MG_KG	U		0.735	2.45	4.90	0.78
Yes	CAYP-SSD11-1012	METAL	Thallium	7440-28-0	2.30	MG_KG	U		0.690	2.30	4.60	0.78

TABLE 3-11
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW01P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW03-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW04-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW05-1112	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW06-1112	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAYP-SW01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW01P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW02-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW04-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW05-1112	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW06-1112	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAYP-SW01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW01P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW04-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW05-1112	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW06-1112	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAYP-SW01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW01P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW04-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW05-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW06-1112	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW01P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW02-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW03-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW04-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW05-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW06-1112	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAYP-SW01-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW01P-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015

TABLE 3-11
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW02-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW03-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW04-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW05-1112	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW06-1112	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAYP-SW01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW01P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW04-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW05-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW06-1112	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAYP-SW01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW01P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW04-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW05-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW06-1112	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAYP-SW01-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW01P-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW02-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW03-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW04-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW05-1112	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW06-1112	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAYP-SW01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW01P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW04-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW05-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW06-1112	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAYP-SW01-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW01P-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW02-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW03-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW04-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW05-1112	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW06-1112	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAYP-SW01-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW01P-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW02-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW03-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW04-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW05-1112	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW06-1112	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAYP-SW01-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW01P-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW02-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW03-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW04-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW05-1112	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW06-1112	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAYP-SW01-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW01P-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW02-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW03-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW04-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW05-1112	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW06-1112	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAYP-SW01-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW01P-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW02-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW03-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW04-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW05-1112	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW06-1112	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAYP-SW01-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW01P-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW03-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW04-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW05-1112	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW06-1112	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAYP-SW01-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW01P-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW02-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW03-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4

TABLE 3-11
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW04-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW05-1112	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW06-1112	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAYP-SW01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW01P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW03-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW04-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW05-1112	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW06-1112	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAYP-SW01-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW01P-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW02-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW03-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW04-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW05-1112	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW06-1112	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAYP-SW01-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW01P-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW02-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW03-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW04-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW05-1112	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW06-1112	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAYP-SW01-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW01P-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW02-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW03-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW04-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW05-1112	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW06-1112	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAYP-SW01-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW01P-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW02-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW03-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW04-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW05-1112	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW06-1112	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAYP-SW01-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAYP-SW01P-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAYP-SW02-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAYP-SW03-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	UL	SSL	0.044	0.080	0.10	0.012
No	CAYP-SW04-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	UL	SSL	0.044	0.080	0.10	0.012
No	CAYP-SW05-1112	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAYP-SW06-1112	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAYP-SW01-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW01P-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW02-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW03-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW04-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW05-1112	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW06-1112	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAYP-SW01-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAYP-SW01P-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAYP-SW02-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAYP-SW03-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	UL	SSL	0.049	0.080	0.10	0.018
No	CAYP-SW04-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	UL	SSL	0.049	0.080	0.10	0.018
No	CAYP-SW05-1112	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAYP-SW06-1112	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAYP-SW01-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAYP-SW01P-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAYP-SW02-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAYP-SW03-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	UL	SSL	0.058	0.080	0.10	0.014
No	CAYP-SW04-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	UL	SSL	0.058	0.080	0.10	0.014
No	CAYP-SW05-1112	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAYP-SW06-1112	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAYP-SW01-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW01P-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW02-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW03-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW04-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW05-1112	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW06-1112	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAYP-SW01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAYP-SW01P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAYP-SW02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAYP-SW03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	UL	SSL	0.069	0.080	0.10	0.029
No	CAYP-SW04-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	UL	SSL	0.069	0.080	0.10	0.029
No	CAYP-SW05-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029

TABLE 3-11
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW06-1112	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAYP-SW01-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAYP-SW01P-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAYP-SW02-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAYP-SW03-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	UL	SSL	0.054	0.080	0.10	0.04
No	CAYP-SW04-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	UL	SSL	0.054	0.080	0.10	0.04
No	CAYP-SW05-1112	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAYP-SW06-1112	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAYP-SW01-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW01P-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW02-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW03-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW04-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW05-1112	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW06-1112	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAYP-SW01-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW01P-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW02-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW03-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW04-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW05-1112	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW06-1112	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAYP-SW01-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	UJ	CCL	3.8	6.0	10	1.04
No	CAYP-SW01P-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	UJ	CCL	3.8	6.0	10	1.04
No	CAYP-SW02-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	UJ	CCL	3.8	6.0	10	1.04
No	CAYP-SW03-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	UJ	CCL	3.8	6.0	10	1.04
No	CAYP-SW04-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	UJ	CCL	3.8	6.0	10	1.04
No	CAYP-SW05-1112	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAYP-SW06-1112	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAYP-SW01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW01P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW03-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW04-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW05-1112	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW06-1112	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAYP-SW01-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW01P-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW02-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW03-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW04-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW05-1112	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW06-1112	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAYP-SW01-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAYP-SW01P-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAYP-SW02-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAYP-SW03-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	UL	SSL	0.053	0.080	0.10	0.025
No	CAYP-SW04-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	UL	SSL	0.053	0.080	0.10	0.025
No	CAYP-SW05-1112	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAYP-SW06-1112	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAYP-SW01-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW01P-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW02-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW03-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW04-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW05-1112	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW06-1112	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAYP-SW01-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW01P-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW02-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW03-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW04-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW05-1112	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW06-1112	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAYP-SW01-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW01P-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW02-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW03-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW04-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW05-1112	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW06-1112	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAYP-SW01-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW01P-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW02-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW03-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW04-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW05-1112	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW06-1112	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAYP-SW01-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92

TABLE 3-11
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW01P-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW02-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW03-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW04-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW05-1112	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW06-1112	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAYP-SW01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW01P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW04-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW05-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW06-1112	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAYP-SW01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW01P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW04-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW05-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW06-1112	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAYP-SW01-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW01P-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW02-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW03-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW04-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW05-1112	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAYP-SW06-1112	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
Yes	CAYP-SW01-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW01P-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW02-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW03-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW04-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW05-1112	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW06-1112	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAYP-SW01-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW01P-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW02-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW03-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW04-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW05-1112	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW06-1112	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAYP-SW01-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW01P-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW02-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW03-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW04-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW05-1112	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW06-1112	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAYP-SW01-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW01P-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW02-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW03-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW04-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW05-1112	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW06-1112	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAYP-SW01-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW01P-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW02-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW03-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW04-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW05-1112	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAYP-SW06-1112	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66

TABLE 3-12
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Youth Pond Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAYP-SW01-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW01P-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW02-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW03-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW04-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW05-1112	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW06-1112	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW01-1012	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW01P-1012	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW02-1012	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW03-1012	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW04-1012	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW05-1112	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAYP-SW06-1112	METAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
Yes	CAYP-SW01-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW02-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW03-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW04-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW05-1112	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW06-1112	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAYP-SW01-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW01P-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW02-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW03-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW04-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW05-1112	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW06-1112	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW02-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAYP-SW03-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAYP-SW05-1112	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAYP-SW06-1112	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAYP-SW01-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW01P-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW02-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW03-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW04-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW05-1112	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW06-1112	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAYP-SW01-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW01P-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW02-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW03-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW04-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW05-1112	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW06-1112	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAYP-SW01-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW01P-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW02-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW03-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW04-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW05-1112	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAYP-SW06-1112	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	320	UG_KG	UL	SSL	44.	320	650	13
No	CAREFS04-SD01P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	270	UG_KG	UL	SSL	36.	270	530	13
No	CAREFS04-SD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	290	UG_KG	UL	SSL	39.	290	590	13
No	CAREFS04-SD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	100	UG_KG	UL	SSL	14.	100	210	13
No	CAREFS04-SD04-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	250	UG_KG	UL	MSL	33.	250	500	13
No	CAREFS04-SD05-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	270	UG_KG	UL	SSL	36.	270	530	13
No	CAREFS04-SSD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	160	UG_KG	U		21.	160	310	12.8
No	CAREFS04-SSD01P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	150	UG_KG	U		20.	150	300	12.8
No	CAREFS04-SSD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	120	UG_KG	U		17.	120	250	12.8
No	CAREFS04-SSD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	120	UG_KG	U		16.	120	230	12.8
No	CAREFS04-SSD04-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	200	UG_KG	UL	MSL	26.	200	400	12.8
No	CAREFS04-SSD05-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	170	UG_KG	UL	SSL	23.	170	340	12.8
No	CAREFYP-SD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAREFYP-SD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAREFYP-SD02P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAREFYP-SD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	13
No	CAREFYP-SSD01-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAREFYP-SSD02-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAREFYP-SSD02P-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAREFYP-SSD03-1012	EXPLO	1,3,5-Trinitrobenzene	99-35-4	300	UG_KG	U		150	300	500	12.8
No	CAREFS04-SD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	320	UG_KG	UL	SSL	40.	320	650	36
No	CAREFS04-SD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	290	UG_KG	UL	SSL	36.	290	590	36
No	CAREFYP-SD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SD02P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SSD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SSD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SSD02P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFYP-SSD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	300	UG_KG	U		150	300	500	36
No	CAREFS04-SD01-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	320	UG_KG	UL	SSL	98.	320	650	0.223
No	CAREFS04-SD01P-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	270	UG_KG	UL	SSL	80.	270	530	0.223
No	CAREFS04-SD02-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	290	UG_KG	UL	SSL	88.	290	590	0.223
No	CAREFS04-SD03-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	100	UG_KG	UL	SSL	31.	100	210	0.223
No	CAREFS04-SD04-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	250	UG_KG	UL	MSL	75.	250	500	0.223
No	CAREFS04-SD05-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	270	UG_KG	UL	SSL	80.	270	530	0.223
No	CAREFS04-SSD01-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	160	UG_KG	U		47.	160	310	0.223
No	CAREFS04-SSD01P-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	150	UG_KG	U		45.	150	300	0.223
No	CAREFS04-SSD02-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	120	UG_KG	U		37.	120	250	0.223
No	CAREFS04-SSD03-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	120	UG_KG	U		35.	120	230	0.223
No	CAREFS04-SSD04-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	200	UG_KG	UL	MSL	59.	200	400	0.223
No	CAREFS04-SSD05-1012	EXPLO	2,4-Dinitrotoluene	121-14-2	170	UG_KG	UL	SSL	51.	170	340	0.223
No	CAREFS04-SD01-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	320	UG_KG	UL	BSL	180	320	650	3.3
No	CAREFS04-SD01P-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	270	UG_KG	UL	BSL	140	270	530	3.3
No	CAREFS04-SD02-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	290	UG_KG	UL	BSL	160	290	590	3.3
No	CAREFS04-SD03-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	100	UG_KG	UL	BSL	56.	100	210	3.3
No	CAREFS04-SD04-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	250	UG_KG	UL	BSL	130	250	500	3.3
No	CAREFS04-SD05-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	270	UG_KG	UL	BSL	140	270	530	3.3
No	CAREFS04-SSD01-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	160	UG_KG	UL	BSL	85.	160	310	3.3
No	CAREFS04-SSD01P-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	150	UG_KG	UL	BSL	81.	150	300	3.3
No	CAREFS04-SSD02-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	120	UG_KG	UL	BSL	67.	120	250	3.3
No	CAREFS04-SSD03-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	120	UG_KG	UL	BSL	63.	120	230	3.3
No	CAREFS04-SSD04-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	200	UG_KG	UL	BSL	110	200	400	3.3
No	CAREFS04-SSD05-1012	EXPLO	2,6-Dinitrotoluene	606-20-2	170	UG_KG	UL	BSL	92.	170	340	3.3
No	CAREFS04-SD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	320	UG_KG	UL	SSL	140	320	650	70.6
No	CAREFS04-SD01P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	270	UG_KG	UL	SSL	110	270	530	70.6
No	CAREFS04-SD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	290	UG_KG	UL	SSL	120	290	590	70.6
No	CAREFS04-SD04-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	250	UG_KG	UL	MSL	100	250	500	70.6
No	CAREFS04-SD05-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	270	UG_KG	UL	SSL	110	270	530	70.6
No	CAREFS04-SSD04-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	200	UG_KG	UL	SSL	83.	200	400	70.6
No	CAREFS04-SSD05-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	170	UG_KG	UL	SSL	72.	170	340	70.6
No	CAREFYP-SD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SD02P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SSD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SSD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SSD02P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SSD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	300	UG_KG	U		150	300	500	70.6
No	CAREFYP-SD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SD02-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SD02P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SD03-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SSD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SSD02-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SSD02P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFYP-SSD03-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	300	UG_KG	U		150	300	500	124
No	CAREFS04-SD01-1012	EXPLO	HMX	2691-41-0	320	UG_KG	UL	BSL	56.	320	650	25
No	CAREFS04-SD01P-1012	EXPLO	HMX	2691-41-0	270	UG_KG	UL	BSL	46.	270	530	25
No	CAREFS04-SD02-1012	EXPLO	HMX	2691-41-0	290	UG_KG	UL	BSL	51.	290	590	25
No	CAREFS04-SD04-1012	EXPLO	HMX	2691-41-0	250	UG_KG	UL	BSL	43.	250	500	25
No	CAREFS04-SD05-1012	EXPLO	HMX	2691-41-0	270	UG_KG	UL	BSL	46.	270	530	25
No	CAREFS04-SSD01-1012	EXPLO	HMX	2691-41-0	160	UG_KG	UL	BSL	27.	160	310	25
No	CAREFS04-SSD01P-1012	EXPLO	HMX	2691-41-0	150	UG_KG	UL	BSL	26.	150	300	25
No	CAREFS04-SSD04-1012	EXPLO	HMX	2691-41-0	200	UG_KG	UL	BSL	34.	200	400	25
No	CAREFS04-SSD05-1012	EXPLO	HMX	2691-41-0	170	UG_KG	UL	BSL	29.	170	340	25

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SD01-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SD02-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SD02P-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SD03-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SSD01-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SSD02-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SSD02P-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFYP-SSD03-1012	EXPLO	HMX	2691-41-0	300	UG_KG	U		150	300	500	25
No	CAREFS04-SD01-1012	EXPLO	Nitrobenzene	98-95-3	320	UG_KG	UL	SSL	140	320	650	9.52
No	CAREFS04-SD01P-1012	EXPLO	Nitrobenzene	98-95-3	270	UG_KG	UL	SSL	120	270	530	9.52
No	CAREFS04-SD02-1012	EXPLO	Nitrobenzene	98-95-3	290	UG_KG	UL	SSL	130	290	590	9.52
No	CAREFS04-SD03-1012	EXPLO	Nitrobenzene	98-95-3	100	UG_KG	UL	SSL	46.	100	210	9.52
No	CAREFS04-SD04-1012	EXPLO	Nitrobenzene	98-95-3	250	UG_KG	UL	MSL	110	250	500	9.52
No	CAREFS04-SD05-1012	EXPLO	Nitrobenzene	98-95-3	270	UG_KG	UL	SSL	120	270	530	9.52
No	CAREFS04-SSD01-1012	EXPLO	Nitrobenzene	98-95-3	160	UG_KG	U		69.	160	310	9.5
No	CAREFS04-SSD01P-1012	EXPLO	Nitrobenzene	98-95-3	150	UG_KG	U		66.	150	300	9.5
No	CAREFS04-SSD02-1012	EXPLO	Nitrobenzene	98-95-3	120	UG_KG	U		55.	120	250	9.5
No	CAREFS04-SSD03-1012	EXPLO	Nitrobenzene	98-95-3	120	UG_KG	U		51.	120	230	9.5
No	CAREFS04-SSD04-1012	EXPLO	Nitrobenzene	98-95-3	200	UG_KG	UL	SSL	87.	200	400	9.5
No	CAREFS04-SSD05-1012	EXPLO	Nitrobenzene	98-95-3	170	UG_KG	UL	SSL	75.	170	340	9.5
No	CAREFYP-SD01-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SD02-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SD02P-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SD03-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SSD01-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SSD02-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SSD02P-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFYP-SSD03-1012	EXPLO	RDX	121-82-4	300	UG_KG	U		150	300	500	68
No	CAREFS04-SD01P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.01	MG_KG	UL	SSL	1.2	10.	20.	0.00488
No	CAREFS04-SD02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.01	MG_KG	UL	SSL	1.2	10.	20.	0.00488
No	CAREFS04-SSD01P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.0052	MG_KG	U		0.64	5.2	10.	0.00488
No	CAREFYP-SD01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.00488
No	CAREFYP-SD01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.046	MG_KG	UL	SSL	0.024	0.046	0.079	0.00316
No	CAREFYP-SD03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.017	MG_KG	UL	MSL	0.0090	0.017	0.029	0.00316
No	CAREFYP-SSD03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.030	MG_KG	UL	MSL	0.015	0.030	0.050	0.00316
No	CAREFS04-SD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.01	MG_KG	U		2.0	10.	21.	0.00416
No	CAREFS04-SD01P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.01	MG_KG	UL	SSL	1.9	10.	20.	0.00416
No	CAREFS04-SD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.01	MG_KG	UL	SSL	1.9	10.	20.	0.00416
No	CAREFS04-SD04-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0078	MG_KG	U		1.5	7.8	16.	0.00416
No	CAREFS04-SD05-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0091	MG_KG	UL	SSL	1.7	9.1	18.	0.00416
No	CAREFS04-SSD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0054	MG_KG	UL	SSL	1.0	5.4	11.	0.00416
No	CAREFS04-SSD01P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0052	MG_KG	U		0.99	5.2	10.	0.00416
No	CAREFS04-SSD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0045	MG_KG	U		0.84	4.5	9.0	0.00416
No	CAREFS04-SSD05-1012	PEST/PCB	4,4'-DDT	50-29-3	0.0058	MG_KG	UL	SSL	1.1	5.8	12.	0.00416
No	CAREFYP-SD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.046	MG_KG	UL	SSL	0.031	0.046	0.079	0.00416
No	CAREFYP-SD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.041	MG_KG	UL	SSL	0.027	0.041	0.070	0.00416
No	CAREFYP-SD02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.044	MG_KG	UL	SSL	0.029	0.044	0.075	0.00416
No	CAREFYP-SD03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.017	MG_KG	UJ	MDP	0.011	0.017	0.029	0.00416
No	CAREFYP-SSD01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.037	MG_KG	UL	SSL	0.024	0.037	0.062	0.00416
No	CAREFYP-SSD02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.041	MG_KG	UL	SSL	0.027	0.041	0.069	0.00416
No	CAREFYP-SSD02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.039	MG_KG	UL	SSL	0.026	0.039	0.066	0.00416
No	CAREFYP-SSD03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.030	MG_KG	UL	SSL	0.020	0.030	0.050	0.00416
No	CAREFS04-SD01-1012	PEST/PCB	Aldrin	309-00-2	0.0054	MG_KG	U		1.8	5.4	11.	0.002
No	CAREFS04-SD01P-1012	PEST/PCB	Aldrin	309-00-2	0.0053	MG_KG	UL	SSL	1.7	5.3	10.	0.002
No	CAREFS04-SD02-1012	PEST/PCB	Aldrin	309-00-2	0.0051	MG_KG	UL	SSL	1.7	5.1	10.	0.002
No	CAREFS04-SD04-1012	PEST/PCB	Aldrin	309-00-2	0.004	MG_KG	U		1.3	4.0	8.0	0.002
No	CAREFS04-SD05-1012	PEST/PCB	Aldrin	309-00-2	0.0047	MG_KG	UL	SSL	1.5	4.7	9.4	0.002
No	CAREFS04-SSD01-1012	PEST/PCB	Aldrin	309-00-2	0.0028	MG_KG	UL	SSL	0.91	2.8	5.5	0.002
No	CAREFS04-SSD01P-1012	PEST/PCB	Aldrin	309-00-2	0.0027	MG_KG	U		0.89	2.7	5.4	0.002
No	CAREFS04-SSD02-1012	PEST/PCB	Aldrin	309-00-2	0.0023	MG_KG	U		0.76	2.3	4.6	0.002
No	CAREFS04-SSD03-1012	PEST/PCB	Aldrin	309-00-2	0.0021	MG_KG	U		0.69	2.1	4.2	0.002
No	CAREFS04-SSD04-1012	PEST/PCB	Aldrin	309-00-2	0.0033	MG_KG	UL	MSL	1.1	3.3	6.6	0.002
No	CAREFS04-SSD05-1012	PEST/PCB	Aldrin	309-00-2	0.003	MG_KG	UL	SSL	0.98	3.0	5.9	0.002
No	CAREFYP-SD01-1012	PEST/PCB	Aldrin	309-00-2	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.002
No	CAREFYP-SD02-1012	PEST/PCB	Aldrin	309-00-2	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.002
No	CAREFYP-SD02P-1012	PEST/PCB	Aldrin	309-00-2	0.044	MG_KG	UL	SSL	0.021	0.044	0.075	0.002
No	CAREFYP-SD03-1012	PEST/PCB	Aldrin	309-00-2	0.017	MG_KG	UL	SSL	0.0085	0.017	0.029	0.002
No	CAREFYP-SSD01-1012	PEST/PCB	Aldrin	309-00-2	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.002
No	CAREFYP-SSD02-1012	PEST/PCB	Aldrin	309-00-2	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.002
No	CAREFYP-SSD02P-1012	PEST/PCB	Aldrin	309-00-2	0.039	MG_KG	UL	SSL	0.019	0.039	0.066	0.002
No	CAREFYP-SSD03-1012	PEST/PCB	Aldrin	309-00-2	0.030	MG_KG	UL	SSL	0.014	0.030	0.050	0.002
No	CAREFYP-SD01-1012	PEST/PCB	alpha-BHC	319-84-6	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.006
No	CAREFYP-SD02-1012	PEST/PCB	alpha-BHC	319-84-6	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.006
No	CAREFYP-SD02P-1012	PEST/PCB	alpha-BHC	319-84-6	0.044	MG_KG	UL	SSL	0.021	0.044	0.075	0.006
No	CAREFYP-SD03-1012	PEST/PCB	alpha-BHC	319-84-6	0.017	MG_KG	UL	SSL	0.0085	0.017	0.029	0.006
No	CAREFYP-SSD01-1012	PEST/PCB	alpha-BHC	319-84-6	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.006
No	CAREFYP-SSD02-1012	PEST/PCB	alpha-BHC	319-84-6	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.006
No	CAREFYP-SSD02P-1012	PEST/PCB	alpha-BHC	319-84-6	0.039	MG_KG	UL	SSL	0.019	0.039	0.066	0.006
No	CAREFYP-SSD03-1012	PEST/PCB	alpha-BHC	319-84-6	0.030	MG_KG	UL	SSL	0.014	0.030	0.050	0.006
No	CAREFS04-SD01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.0054	MG_KG	U		1.3	5.4	11.	0.00324
No	CAREFS04-SD01P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.0053	MG_KG	UL	SSL	1.3	5.3	10.	0.00324
No	CAREFS04-SD02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.0051	MG_KG	UL	SSL	1.3	5.1	10.	0.00324
No	CAREFS04-SD04-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.004	MG_KG	UL	MSL	0.99	4.0	8.0	0.00324
No	CAREFS04-SD05-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.0047	MG_KG	UL	SSL	1.2	4.7	9.4	0.00324
No	CAREFS04-SSD04-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.0033	MG_KG	UL	MSL	0.82	3.3	6.6	0.00324
No	CAREFYP-SD01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00324

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SD02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.041	MG_KG	UL	SSL	0.018	0.041	0.070	0.00324
No	CAREFYP-SD02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.044	MG_KG	UL	SSL	0.020	0.044	0.075	0.00324
No	CAREFYP-SD03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.017	MG_KG	UL	SSL	0.0078	0.017	0.029	0.00324
No	CAREFYP-SSD01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.037	MG_KG	UL	SSL	0.016	0.037	0.062	0.00324
No	CAREFYP-SSD02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.041	MG_KG	UL	SSL	0.018	0.041	0.069	0.00324
No	CAREFYP-SSD02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.039	MG_KG	UL	SSL	0.018	0.039	0.066	0.00324
No	CAREFYP-SSD03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.030	MG_KG	UL	SSL	0.013	0.030	0.050	0.00324
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.19	MG_KG	UL	SSL	0.13	0.19	0.37	0.0598
No	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.088	MG_KG	U		0.061	0.088	0.18	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.17	MG_KG	U		0.12	0.17	0.35	0.0598
No	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.16	MG_KG	U		0.11	0.16	0.31	0.0598
No	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.12	MG_KG	U		0.083	0.12	0.24	0.0598
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.19	MG_KG	UL	SSL	0.12	0.19	0.37	0.0598
No	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.17	MG_KG	U		0.11	0.17	0.35	0.0598
No	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.16	MG_KG	U		0.10	0.16	0.31	0.0598
No	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.12	MG_KG	U		0.077	0.12	0.24	0.0598
No	CAREFS04-SD01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.064	MG_KG	U		60.	64.	110	0.0598
No	CAREFS04-SD01P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.062	MG_KG	U		58.	62.	100	0.0598
No	CAREFS04-SD02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.06	MG_KG	U		56.	60.	100	0.0598
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.19	MG_KG	UL	SSL	0.12	0.19	0.37	0.0598
No	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.17	MG_KG	U		0.11	0.17	0.35	0.0598
No	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.16	MG_KG	U		0.11	0.16	0.33	0.0598
No	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.16	MG_KG	U		0.10	0.16	0.31	0.0598
No	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.12	MG_KG	U		0.077	0.12	0.24	0.0598
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.19	MG_KG	UL	SSL	0.093	0.19	0.37	0.0598
No	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.16	MG_KG	U		0.082	0.16	0.33	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.17	MG_KG	U		0.087	0.17	0.35	0.0598
No	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.16	MG_KG	U		0.081	0.16	0.33	0.0598
No	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.16	MG_KG	U		0.078	0.16	0.31	0.0598
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.19	MG_KG	UL	SSL	0.14	0.19	0.37	0.0598
No	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.16	MG_KG	U		0.12	0.16	0.33	0.0598
No	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.088	MG_KG	U		0.066	0.088	0.18	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.17	MG_KG	U		0.13	0.17	0.35	0.0598
No	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.16	MG_KG	U		0.12	0.16	0.33	0.0598
No	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.16	MG_KG	U		0.12	0.16	0.31	0.0598
No	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.12	MG_KG	U		0.089	0.12	0.24	0.0598
No	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.19	MG_KG	UL	SSL	0.10	0.19	0.37	0.0598
No	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.17	MG_KG	U		0.095	0.17	0.35	0.0598
No	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.12	MG_KG	U		0.065	0.12	0.24	0.0598
No	CAREFS04-SD01-1012	PEST/PCB	beta-BHC	319-85-7	0.0054	MG_KG	U		2.1	5.4	11.	0.005
No	CAREFS04-SD01P-1012	PEST/PCB	beta-BHC	319-85-7	0.0053	MG_KG	UL	SSL	2.0	5.3	10.	0.005
No	CAREFS04-SD02-1012	PEST/PCB	beta-BHC	319-85-7	0.0051	MG_KG	UL	SSL	2.0	5.1	10.	0.005
No	CAREFYP-SD01-1012	PEST/PCB	beta-BHC	319-85-7	0.046	MG_KG	UL	SSL	0.046	0.046	0.079	0.005
No	CAREFYP-SD02-1012	PEST/PCB	beta-BHC	319-85-7	0.041	MG_KG	UL	SSL	0.041	0.041	0.070	0.005
No	CAREFYP-SD02P-1012	PEST/PCB	beta-BHC	319-85-7	0.044	MG_KG	UL	SSL	0.044	0.044	0.075	0.005
No	CAREFYP-SD03-1012	PEST/PCB	beta-BHC	319-85-7	0.017	MG_KG	UJ	MDP	0.017	0.017	0.029	0.005
No	CAREFYP-SSD01-1012	PEST/PCB	beta-BHC	319-85-7	0.037	MG_KG	UL	SSL	0.037	0.037	0.062	0.005
No	CAREFYP-SSD02-1012	PEST/PCB	beta-BHC	319-85-7	0.041	MG_KG	UL	SSL	0.041	0.041	0.069	0.005
No	CAREFYP-SSD02P-1012	PEST/PCB	beta-BHC	319-85-7	0.039	MG_KG	UL	SSL	0.039	0.039	0.066	0.005
No	CAREFYP-SSD03-1012	PEST/PCB	beta-BHC	319-85-7	0.030	MG_KG	UL	SSL	0.030	0.030	0.050	0.005
No	CAREFS04-SD01-1012	PEST/PCB	delta-BHC	319-86-8	0.0054	MG_KG	U		2.0	5.4	11.	0.003
No	CAREFS04-SD01P-1012	PEST/PCB	delta-BHC	319-86-8	0.0053	MG_KG	UL	SSL	2.0	5.3	10.	0.003
No	CAREFS04-SD02-1012	PEST/PCB	delta-BHC	319-86-8	0.0051	MG_KG	UL	SSL	1.9	5.1	10.	0.003
No	CAREFS04-SD04-1012	PEST/PCB	delta-BHC	319-86-8	0.004	MG_KG	U		1.5	4.0	8.0	0.003
No	CAREFS04-SD05-1012	PEST/PCB	delta-BHC	319-86-8	0.0047	MG_KG	UL	SSL	1.8	4.7	9.4	0.003
No	CAREFS04-SSD04-1012	PEST/PCB	delta-BHC	319-86-8	0.0033	MG_KG	U		1.2	3.3	6.6	0.003
No	CAREFS04-SSD05-1012	PEST/PCB	delta-BHC	319-86-8	0.003	MG_KG	UL	SSL	1.1	3.0	5.9	0.003
No	CAREFYP-SD01-1012	PEST/PCB	delta-BHC	319-86-8	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.003
No	CAREFYP-SD02-1012	PEST/PCB	delta-BHC	319-86-8	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.003
No	CAREFYP-SD02P-1012	PEST/PCB	delta-BHC	319-86-8	0.044	MG_KG	UL	SSL	0.021	0.044	0.075	0.003
No	CAREFYP-SD03-1012	PEST/PCB	delta-BHC	319-86-8	0.017	MG_KG	UL	SSL	0.0083	0.017	0.029	0.003
No	CAREFYP-SSD01-1012	PEST/PCB	delta-BHC	319-86-8	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.003
No	CAREFYP-SSD02-1012	PEST/PCB	delta-BHC	319-86-8	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.003
No	CAREFYP-SSD02P-1012	PEST/PCB	delta-BHC	319-86-8	0.039	MG_KG	UL	SSL	0.019	0.039	0.066	0.003
No	CAREFYP-SSD03-1012	PEST/PCB	delta-BHC	319-86-8	0.030	MG_KG	UL	SSL	0.014	0.030	0.050	0.003
No	CAREFS04-SD01-1012	PEST/PCB	Dieldrin	60-57-1	0.01	MG_KG	U		1.4	10.	21.	0.0019
No	CAREFS04-SD01P-1012	PEST/PCB	Dieldrin	60-57-1	0.01	MG_KG	UL	SSL	1.4	10.	20.	0.0019
No	CAREFS04-SD02-1012	PEST/PCB	Dieldrin	60-57-1	0.01	MG_KG	UL	SSL	1.3	10.	20.	0.0019
No	CAREFS04-SD03-1012	PEST/PCB	Dieldrin	60-57-1	0.0034	MG_KG	UL	SSL	0.46	3.4	6.9	0.0019
No	CAREFS04-SD04-1012	PEST/PCB	Dieldrin	60-57-1	0.0078	MG_KG	UL	MSL	1.0	7.8	16.	0.0019
No	CAREFS04-SD05-1012	PEST/PCB	Dieldrin	60-57-1	0.0091	MG_KG	UL	SSL	1.2	9.1	18.	0.0019
No	CAREFS04-SSD01-1012	PEST/PCB	Dieldrin	60-57-1	0.0054	MG_KG	UL	SSL	0.72	5.4	11.	0.0019
No	CAREFS04-SSD01P-1012	PEST/PCB	Dieldrin	60-57-1	0.0052	MG_KG	U		0.70	5.2	10.	0.0019
No	CAREFS04-SSD02-1012	PEST/PCB	Dieldrin	60-57-1	0.0045	MG_KG	U		0.60	4.5	9.0	0.0019
No	CAREFS04-SSD03-1012	PEST/PCB	Dieldrin	60-57-1	0.004	MG_KG	U		0.54	4.0	8.1	0.0019
No	CAREFS04-SSD04-1012	PEST/PCB	Dieldrin	60-57-1	0.0064	MG_KG	UL	MSL	0.86	6.4	13.	0.0019
No	CAREFS04-SSD05-1012	PEST/PCB	Dieldrin	60-57-1	0.0058	MG_KG	UL	SSL	0.77	5.8	12.	0.0019
No	CAREFYP-SD01-1012	PEST/PCB	Dieldrin	60-57-1	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.0019
No	CAREFYP-SD02-1012	PEST/PCB	Dieldrin	60-57-1	0.041	MG_KG	UL	SSL	0.018	0.041	0.070	0.0019
No	CAREFYP-SD02P-1012	PEST/PCB	Dieldrin	60-57-1	0.044	MG_KG	UL	SSL	0.020	0.044	0.075	0.0019
No	CAREFYP-SD03-1012	PEST/PCB	Dieldrin	60-57-1	0.017	MG_KG	UL	SSL	0.0078	0.017	0.029	0.0019

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SSD01-1012	PEST/PCB	Dieldrin	60-57-1	0.037	MG_KG	UL	SSL	0.016	0.037	0.062	0.0019
No	CAREFYP-SSD02-1012	PEST/PCB	Dieldrin	60-57-1	0.041	MG_KG	UL	SSL	0.018	0.041	0.069	0.0019
No	CAREFYP-SSD02P-1012	PEST/PCB	Dieldrin	60-57-1	0.039	MG_KG	UL	SSL	0.018	0.039	0.066	0.0019
No	CAREFYP-SSD03-1012	PEST/PCB	Dieldrin	60-57-1	0.030	MG_KG	UL	SSL	0.013	0.030	0.050	0.0019
No	CAREFYP-SD01-1012	PEST/PCB	Endosulfan I	959-98-8	0.046	MG_KG	UL	SSL	0.018	0.046	0.079	0.0155
No	CAREFYP-SD02-1012	PEST/PCB	Endosulfan I	959-98-8	0.041	MG_KG	UL	SSL	0.016	0.041	0.070	0.0155
No	CAREFYP-SD02P-1012	PEST/PCB	Endosulfan I	959-98-8	0.044	MG_KG	UL	SSL	0.017	0.044	0.075	0.0155
No	CAREFYP-SSD02-1012	PEST/PCB	Endosulfan I	959-98-8	0.041	MG_KG	UL	SSL	0.016	0.041	0.069	0.0155
No	CAREFS04-SD01-1012	PEST/PCB	Endrin	72-20-8	0.01	MG_KG	U		5.4	10.	21.	0.00222
No	CAREFS04-SSD01P-1012	PEST/PCB	Endrin	72-20-8	0.01	MG_KG	UL	SSL	5.3	10.	20.	0.00222
No	CAREFS04-SD02-1012	PEST/PCB	Endrin	72-20-8	0.01	MG_KG	UL	SSL	5.1	10.	20.	0.00222
No	CAREFS04-SD03-1012	PEST/PCB	Endrin	72-20-8	0.0034	MG_KG	UL	SSL	1.8	3.4	6.9	0.00222
No	CAREFS04-SD04-1012	PEST/PCB	Endrin	72-20-8	0.0078	MG_KG	UL	MSL	4.0	7.8	16.	0.00222
No	CAREFS04-SD05-1012	PEST/PCB	Endrin	72-20-8	0.0091	MG_KG	UL	SSL	4.7	9.1	18.	0.00222
No	CAREFS04-SSD01-1012	PEST/PCB	Endrin	72-20-8	0.0054	MG_KG	UL	SSL	2.8	5.4	11.	0.00222
No	CAREFS04-SSD01P-1012	PEST/PCB	Endrin	72-20-8	0.0052	MG_KG	U		2.7	5.2	10.	0.00222
No	CAREFS04-SSD02-1012	PEST/PCB	Endrin	72-20-8	0.0045	MG_KG	U		2.3	4.5	9.0	0.00222
No	CAREFS04-SSD03-1012	PEST/PCB	Endrin	72-20-8	0.004	MG_KG	U		2.1	4.0	8.1	0.00222
No	CAREFS04-SSD05-1012	PEST/PCB	Endrin	72-20-8	0.0058	MG_KG	UL	SSL	3.0	5.8	12.	0.00222
No	CAREFYP-SD01-1012	PEST/PCB	Endrin	72-20-8	0.046	MG_KG	UL	SSL	0.034	0.046	0.079	0.00222
No	CAREFYP-SD02-1012	PEST/PCB	Endrin	72-20-8	0.041	MG_KG	UL	SSL	0.030	0.041	0.070	0.00222
No	CAREFYP-SD02P-1012	PEST/PCB	Endrin	72-20-8	0.044	MG_KG	UL	SSL	0.032	0.044	0.075	0.00222
No	CAREFYP-SD03-1012	PEST/PCB	Endrin	72-20-8	0.017	MG_KG	UL	SSL	0.013	0.017	0.029	0.00222
No	CAREFYP-SSD01-1012	PEST/PCB	Endrin	72-20-8	0.037	MG_KG	UL	SSL	0.027	0.037	0.062	0.00222
No	CAREFYP-SSD02-1012	PEST/PCB	Endrin	72-20-8	0.041	MG_KG	UL	SSL	0.030	0.041	0.069	0.00222
No	CAREFYP-SSD02P-1012	PEST/PCB	Endrin	72-20-8	0.039	MG_KG	UL	SSL	0.029	0.039	0.066	0.00222
No	CAREFYP-SSD03-1012	PEST/PCB	Endrin	72-20-8	0.030	MG_KG	UL	MSL	0.022	0.030	0.050	0.00222
No	CAREFS04-SD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.01	MG_KG	U		3.1	10.	21.	0.00222
No	CAREFS04-SD01P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.01	MG_KG	UL	SSL	3.0	10.	20.	0.00222
No	CAREFS04-SD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.01	MG_KG	UL	SSL	3.0	10.	20.	0.00222
No	CAREFS04-SD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0034	MG_KG	UL	SSL	1.0	3.4	6.9	0.00222
No	CAREFS04-SD04-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0078	MG_KG	U		2.3	7.8	16.	0.00222
No	CAREFS04-SD05-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0091	MG_KG	UL	SSL	2.7	9.1	18.	0.00222
No	CAREFS04-SSD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0054	MG_KG	UL	SSL	1.6	5.4	11.	0.00222
No	CAREFS04-SSD01P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0052	MG_KG	U		1.6	5.2	10.	0.00222
No	CAREFS04-SSD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0045	MG_KG	U		1.3	4.5	9.0	0.00222
No	CAREFS04-SSD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.004	MG_KG	U		1.2	4.0	8.1	0.00222
No	CAREFS04-SSD04-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0064	MG_KG	UL	MSL	1.9	6.4	13.	0.00222
No	CAREFS04-SSD05-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.0058	MG_KG	UL	SSL	1.7	5.8	12.	0.00222
No	CAREFYP-SD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.00222
No	CAREFYP-SD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.00222
No	CAREFYP-SD02P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.044	MG_KG	UL	SSL	0.022	0.044	0.075	0.00222
No	CAREFYP-SD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.017	MG_KG	UL	SSL	0.0087	0.017	0.029	0.00222
No	CAREFYP-SSD01-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.00222
No	CAREFYP-SSD02-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.00222
No	CAREFYP-SSD02P-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.039	MG_KG	UL	SSL	0.020	0.039	0.066	0.00222
No	CAREFYP-SSD03-1012	PEST/PCB	Endrin aldehyde	7421-93-4	0.030	MG_KG	UL	SSL	0.015	0.030	0.050	0.00222
No	CAREFS04-SD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.01	MG_KG	U		2.6	10.	21.	0.00222
No	CAREFS04-SD01P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.01	MG_KG	UL	SSL	2.5	10.	20.	0.00222
No	CAREFS04-SD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.01	MG_KG	UL	SSL	2.4	10.	20.	0.00222
No	CAREFS04-SD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0034	MG_KG	UL	SSL	0.84	3.4	6.9	0.00222
No	CAREFS04-SD04-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0078	MG_KG	U		1.9	7.8	16.	0.00222
No	CAREFS04-SD05-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0091	MG_KG	UL	SSL	2.2	9.1	18.	0.00222
No	CAREFS04-SSD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0054	MG_KG	UL	SSL	1.3	5.4	11.	0.00222
No	CAREFS04-SSD01P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0052	MG_KG	U		1.3	5.2	10.	0.00222
No	CAREFS04-SSD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0045	MG_KG	U		1.1	4.5	9.0	0.00222
No	CAREFS04-SSD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.004	MG_KG	U		0.98	4.0	8.1	0.00222
No	CAREFS04-SSD04-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0064	MG_KG	UL	MSL	1.6	6.4	13.	0.00222
No	CAREFS04-SSD05-1012	PEST/PCB	Endrin ketone	53494-70-5	0.0058	MG_KG	UL	SSL	1.4	5.8	12.	0.00222
No	CAREFYP-SD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00222
No	CAREFYP-SD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.041	MG_KG	UL	SSL	0.018	0.041	0.070	0.00222
No	CAREFYP-SD02P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.044	MG_KG	UL	SSL	0.020	0.044	0.075	0.00222
No	CAREFYP-SD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.017	MG_KG	UL	SSL	0.0078	0.017	0.029	0.00222
No	CAREFYP-SSD01-1012	PEST/PCB	Endrin ketone	53494-70-5	0.037	MG_KG	UL	SSL	0.016	0.037	0.062	0.00222
No	CAREFYP-SSD02-1012	PEST/PCB	Endrin ketone	53494-70-5	0.041	MG_KG	UL	SSL	0.018	0.041	0.069	0.00222
No	CAREFYP-SSD02P-1012	PEST/PCB	Endrin ketone	53494-70-5	0.039	MG_KG	UL	SSL	0.018	0.039	0.066	0.00222
No	CAREFYP-SSD03-1012	PEST/PCB	Endrin ketone	53494-70-5	0.030	MG_KG	UL	MSL	0.013	0.030	0.050	0.00222
No	CAREFS04-SD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0054	MG_KG	U		1.7	5.4	11.	0.00237
No	CAREFS04-SD01P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0053	MG_KG	UL	SSL	1.7	5.3	10.	0.00237
No	CAREFS04-SD02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0051	MG_KG	UL	SSL	1.6	5.1	10.	0.00237
No	CAREFS04-SD04-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.004	MG_KG	U		1.3	4.0	8.0	0.00237
No	CAREFS04-SD05-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0047	MG_KG	UL	SSL	1.5	4.7	9.4	0.00237
No	CAREFS04-SSD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0028	MG_KG	UL	SSL	0.88	2.8	5.5	0.00237
No	CAREFS04-SSD01P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0027	MG_KG	U		0.86	2.7	5.4	0.00237
No	CAREFS04-SSD04-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.0033	MG_KG	U		1.0	3.3	6.6	0.00237
No	CAREFS04-SSD05-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.003	MG_KG	UL	SSL	0.94	3.0	5.9	0.00237
No	CAREFYP-SD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00237
No	CAREFYP-SD02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.041	MG_KG	UL	SSL	0.018	0.041	0.070	0.00237
No	CAREFYP-SD02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.044	MG_KG	UL	SSL	0.020	0.044	0.075	0.00237
No	CAREFYP-SD03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.017	MG_KG	UJ	MDP	0.0078	0.017	0.029	0.00237
No	CAREFYP-SSD01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.037	MG_KG	UL	SSL	0.016	0.037	0.062	0.00237
No	CAREFYP-SSD02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.041	MG_KG	UL	SSL	0.018	0.041	0.069	0.00237
No	CAREFYP-SSD02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.039	MG_KG	UL	SSL	0.018	0.039	0.066	0.00237
No	CAREFYP-SSD03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.030	MG_KG	UL	MSL	0.013	0.030	0.050	0.00237
No	CAREFS04-SD01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.0054	MG_KG	U		1.5	5.4	11.	0.00324
No	CAREFS04-SD01P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.0053	MG_KG	UL	SSL	1.4	5.3	10.	0.00324

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SD02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.0051	MG_KG	UL	SSL	1.4	5.1	10.	0.00324
No	CAREFS04-SD04-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.004	MG_KG	UL	MSL	1.1	4.0	8.0	0.00324
No	CAREFS04-SD05-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.0047	MG_KG	UL	SSL	1.3	4.7	9.4	0.00324
No	CAREFS04-SSD04-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.0033	MG_KG	UL	MSL	0.90	3.3	6.6	0.00324
No	CAREFYP-SD01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.046	MG_KG	UL	SSL	0.021	0.046	0.079	0.00324
No	CAREFYP-SD02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.041	MG_KG	UL	SSL	0.018	0.041	0.070	0.00324
No	CAREFYP-SD02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.044	MG_KG	UL	SSL	0.020	0.044	0.075	0.00324
No	CAREFYP-SD03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.017	MG_KG	UL	SSL	0.0078	0.017	0.029	0.00324
No	CAREFYP-SSD01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.037	MG_KG	UL	SSL	0.016	0.037	0.062	0.00324
No	CAREFYP-SSD02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.041	MG_KG	UL	SSL	0.018	0.041	0.069	0.00324
No	CAREFYP-SSD02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.039	MG_KG	UL	SSL	0.018	0.039	0.066	0.00324
No	CAREFYP-SSD03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.030	MG_KG	UL	SSL	0.013	0.030	0.050	0.00324
No	CAREFS04-SD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0054	MG_KG	U		1.4	5.4	11.	0.00247
No	CAREFS04-SD01P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0053	MG_KG	UL	SSL	1.4	5.3	10.	0.00247
No	CAREFS04-SD02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0051	MG_KG	UL	SSL	1.3	5.1	10.	0.00247
No	CAREFS04-SD04-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.004	MG_KG	UL	MSL	1.0	4.0	8.0	0.00247
No	CAREFS04-SD05-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0047	MG_KG	UL	SSL	1.2	4.7	9.4	0.00247
No	CAREFS04-SSD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0028	MG_KG	UL	SSL	0.72	2.8	5.5	0.00247
No	CAREFS04-SSD01P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0027	MG_KG	U		0.70	2.7	5.4	0.00247
No	CAREFS04-SSD04-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.0033	MG_KG	UL	MSL	0.86	3.3	6.6	0.00247
No	CAREFS04-SSD05-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.003	MG_KG	UL	SSL	0.77	3.0	5.9	0.00247
No	CAREFYP-SD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.046	MG_KG	UL	SSL	0.022	0.046	0.079	0.00247
No	CAREFYP-SD02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.00247
No	CAREFYP-SD02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.044	MG_KG	UL	SSL	0.021	0.044	0.075	0.00247
No	CAREFYP-SD03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.017	MG_KG	UL	SSL	0.0083	0.017	0.029	0.00247
No	CAREFYP-SSD01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.00247
No	CAREFYP-SSD02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.00247
No	CAREFYP-SSD02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.039	MG_KG	UL	SSL	0.019	0.039	0.066	0.00247
No	CAREFYP-SSD03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.030	MG_KG	UL	SSL	0.014	0.030	0.050	0.00247
No	CAREFS04-SD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.1	MG_KG	U		45.	100	210	0.00054
No	CAREFS04-SD01P-1012	PEST/PCB	Toxaphene	8001-35-2	0.1	MG_KG	UL	SSL	43.	100	200	0.00054
No	CAREFS04-SD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.1	MG_KG	UL	SSL	42.	100	200	0.00054
No	CAREFS04-SD03-1012	PEST/PCB	Toxaphene	8001-35-2	0.034	MG_KG	UL	SSL	15.	34.	69.	0.00054
No	CAREFS04-SD04-1012	PEST/PCB	Toxaphene	8001-35-2	0.078	MG_KG	U		33.	78.	160	0.00054
No	CAREFS04-SD05-1012	PEST/PCB	Toxaphene	8001-35-2	0.091	MG_KG	UL	SSL	38.	91.	180	0.00054
No	CAREFS04-SSD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.054	MG_KG	UL	SSL	23.	54.	110	0.00054
No	CAREFS04-SSD01P-1012	PEST/PCB	Toxaphene	8001-35-2	0.052	MG_KG	U		22.	52.	100	0.00054
No	CAREFS04-SSD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.045	MG_KG	U		19.	45.	90.	0.00054
No	CAREFS04-SSD03-1012	PEST/PCB	Toxaphene	8001-35-2	0.04	MG_KG	U		17.	40.	81.	0.00054
No	CAREFS04-SSD04-1012	PEST/PCB	Toxaphene	8001-35-2	0.064	MG_KG	U		27.	64.	130	0.00054
No	CAREFS04-SSD05-1012	PEST/PCB	Toxaphene	8001-35-2	0.058	MG_KG	UL	SSL	24.	58.	120	0.00054
No	CAREFYP-SD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.93	MG_KG	UL	SSL	0.37	0.93	1.5	0.00054
No	CAREFYP-SD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.82	MG_KG	UL	SSL	0.33	0.82	1.4	0.00054
No	CAREFYP-SD02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.88	MG_KG	UL	SSL	0.35	0.88	1.4	0.00054
No	CAREFYP-SD03-1012	PEST/PCB	Toxaphene	8001-35-2	0.35	MG_KG	UL	SSL	0.14	0.35	0.57	0.00054
No	CAREFYP-SSD01-1012	PEST/PCB	Toxaphene	8001-35-2	0.73	MG_KG	UL	SSL	0.29	0.73	1.2	0.00054
No	CAREFYP-SSD02-1012	PEST/PCB	Toxaphene	8001-35-2	0.81	MG_KG	UL	SSL	0.33	0.81	1.3	0.00054
No	CAREFYP-SSD02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.78	MG_KG	UL	SSL	0.31	0.78	1.3	0.00054
No	CAREFYP-SSD03-1012	PEST/PCB	Toxaphene	8001-35-2	0.59	MG_KG	UL	SSL	0.24	0.59	0.98	0.00054
No	CAREFS04-SD01-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.6	MG_KG	U		910	1600	2100	1.52
No	CAREFS04-SD02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.6	MG_KG	U		900	1600	2100	1.52
No	CAREFS04-SD01-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	1.6	MG_KG	U		1000	1600	2100	1.14
No	CAREFS04-SD01P-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	1.3	MG_KG	U		800	1300	1700	1.14
No	CAREFS04-SD02-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	1.6	MG_KG	U		1000	1600	2100	1.14
No	CAREFS04-SD05-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	1.4	MG_KG	U		850	1400	1800	1.14
No	CAREFS04-SD01-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.6	MG_KG	U		980	1600	2100	0.626
No	CAREFS04-SD01P-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.3	MG_KG	U		770	1300	1700	0.626
No	CAREFS04-SD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.6	MG_KG	U		970	1600	2100	0.626
No	CAREFS04-SD03-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.63	MG_KG	U		380	630	840	0.626
No	CAREFS04-SD04-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.1	MG_KG	U		670	1100	1500	0.626
No	CAREFS04-SD05-1012	SVOC	2,4-Dichlorophenol	120-83-2	1.4	MG_KG	U		820	1400	1800	0.626
No	CAREFS04-SSD01-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.82	MG_KG	U		490	820	1100	0.626
No	CAREFS04-SSD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.64	MG_KG	U		390	640	850	0.626
No	CAREFS04-SSD03-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.65	MG_KG	U		400	650	870	0.626
No	CAREFS04-SSD04-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.95	MG_KG	U		570	950	1200	0.626
No	CAREFS04-SSD05-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.82	MG_KG	U		490	820	1100	0.626
No	CAREFS04-SD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.6	MG_KG	U		1100	1600	2100	0.029
No	CAREFS04-SD01P-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.3	MG_KG	U		850	1300	1700	0.029
No	CAREFS04-SD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.6	MG_KG	U		1100	1600	2100	0.029
No	CAREFS04-SD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.63	MG_KG	U		420	630	840	0.029
No	CAREFS04-SD04-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.1	MG_KG	U		730	1100	1500	0.029
No	CAREFS04-SD05-1012	SVOC	2,4-Dimethylphenol	105-67-9	1.4	MG_KG	U		900	1400	1800	0.029
No	CAREFS04-SSD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.82	MG_KG	U		540	820	1100	0.029
No	CAREFS04-SSD01P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.62	MG_KG	U		410	620	830	0.029
No	CAREFS04-SSD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.64	MG_KG	U		430	640	850	0.029
No	CAREFS04-SSD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.65	MG_KG	U		440	650	870	0.029
No	CAREFS04-SSD04-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.95	MG_KG	U		630	950	1200	0.029
No	CAREFS04-SSD05-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.82	MG_KG	U		540	820	1100	0.029
No	CAREFYP-SD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.47	MG_KG	U		0.35	0.47	1.6	0.029
No	CAREFYP-SD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.83	MG_KG	U		0.61	0.83	2.7	0.029
No	CAREFYP-SD02P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.44	MG_KG	U		0.32	0.44	1.4	0.029
No	CAREFYP-SD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.87	MG_KG	U		0.64	0.87	2.9	0.029
No	CAREFYP-SSD01-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.72	MG_KG	U		0.53	0.72	2.4	0.029
No	CAREFYP-SSD02-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.80	MG_KG	U		0.59	0.80	2.6	0.029
No	CAREFYP-SSD02P-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.77	MG_KG	U		0.57	0.77	2.5	0.029
No	CAREFYP-SSD03-1012	SVOC	2,4-Dimethylphenol	105-67-9	0.60	MG_KG	U		0.44	0.60	2.0	0.029

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SD01-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.47	MG_KG	U		0.34	0.47	1.6	0.223
No	CAREFYP-SD02-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.83	MG_KG	U		0.60	0.83	2.7	0.223
No	CAREFYP-SD02P-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.44	MG_KG	U		0.32	0.44	1.4	0.223
No	CAREFYP-SD03-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.87	MG_KG	U		0.62	0.87	2.9	0.223
No	CAREFYP-SSD01-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.72	MG_KG	U		0.52	0.72	2.4	0.223
No	CAREFYP-SSD02-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.80	MG_KG	U		0.58	0.80	2.6	0.223
No	CAREFYP-SSD02P-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.77	MG_KG	U		0.56	0.77	2.5	0.223
No	CAREFYP-SSD03-1012	SVOC	2,4-Dinitrotoluene	121-14-2	0.60	MG_KG	U		0.43	0.60	2.0	0.223
No	CAREFS04-SD01-1012	SVOC	2-Chlorophenol	95-57-8	1.6	MG_KG	U		1100	1600	2100	0.167
No	CAREFS04-SD01P-1012	SVOC	2-Chlorophenol	95-57-8	1.3	MG_KG	U		850	1300	1700	0.167
No	CAREFS04-SD02-1012	SVOC	2-Chlorophenol	95-57-8	1.6	MG_KG	U		1000	1600	2100	0.167
No	CAREFS04-SD03-1012	SVOC	2-Chlorophenol	95-57-8	0.63	MG_KG	U		420	630	840	0.167
No	CAREFS04-SD04-1012	SVOC	2-Chlorophenol	95-57-8	1.1	MG_KG	U		730	1100	1500	0.167
No	CAREFS04-SD05-1012	SVOC	2-Chlorophenol	95-57-8	1.4	MG_KG	U		900	1400	1800	0.167
No	CAREFS04-SSD01-1012	SVOC	2-Chlorophenol	95-57-8	0.82	MG_KG	U		540	820	1100	0.167
No	CAREFS04-SSD01P-1012	SVOC	2-Chlorophenol	95-57-8	0.62	MG_KG	U		410	620	830	0.167
No	CAREFS04-SSD02-1012	SVOC	2-Chlorophenol	95-57-8	0.64	MG_KG	U		420	640	850	0.167
No	CAREFS04-SSD03-1012	SVOC	2-Chlorophenol	95-57-8	0.65	MG_KG	U		430	650	870	0.167
No	CAREFS04-SSD04-1012	SVOC	2-Chlorophenol	95-57-8	0.95	MG_KG	U		620	950	1200	0.167
No	CAREFS04-SSD05-1012	SVOC	2-Chlorophenol	95-57-8	0.82	MG_KG	U		540	820	1100	0.167
No	CAREFYP-SD01-1012	SVOC	2-Chlorophenol	95-57-8	0.47	MG_KG	U		0.39	0.47	1.6	0.167
No	CAREFYP-SD02-1012	SVOC	2-Chlorophenol	95-57-8	0.83	MG_KG	U		0.68	0.83	2.7	0.167
No	CAREFYP-SD02P-1012	SVOC	2-Chlorophenol	95-57-8	0.44	MG_KG	U		0.36	0.44	1.4	0.167
No	CAREFYP-SD03-1012	SVOC	2-Chlorophenol	95-57-8	0.87	MG_KG	U		0.71	0.87	2.9	0.167
No	CAREFYP-SSD01-1012	SVOC	2-Chlorophenol	95-57-8	0.72	MG_KG	U		0.59	0.72	2.4	0.167
No	CAREFYP-SSD02-1012	SVOC	2-Chlorophenol	95-57-8	0.80	MG_KG	U		0.66	0.80	2.6	0.167
No	CAREFYP-SSD02P-1012	SVOC	2-Chlorophenol	95-57-8	0.77	MG_KG	U		0.63	0.77	2.5	0.167
No	CAREFYP-SSD03-1012	SVOC	2-Chlorophenol	95-57-8	0.60	MG_KG	U		0.49	0.60	2.0	0.167
No	CAREFS04-SD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.075	MG_KG	U		16.	75.	150	0.0202
No	CAREFS04-SD01P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.06	MG_KG	U		13.	60.	120	0.0202
No	CAREFS04-SD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.064	MG_KG	U		14.	64.	130	0.0202
No	CAREFS04-SD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.026	MG_KG	U		5.6	26.	51.	0.0202
No	CAREFS04-SD04-1012	SVOC	2-Methylnaphthalene	91-57-6	0.044	MG_KG	U		9.8	44.	89.	0.0202
No	CAREFS04-SD05-1012	SVOC	2-Methylnaphthalene	91-57-6	0.055	MG_KG	U		12.	55.	110	0.0202
No	CAREFS04-SSD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.033	MG_KG	U		7.2	33.	66.	0.0202
No	CAREFS04-SSD01P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.025	MG_KG	U		5.5	25.	50.	0.0202
No	CAREFS04-SSD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.026	MG_KG	U		5.7	26.	52.	0.0202
No	CAREFS04-SSD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.026	MG_KG	U		5.8	26.	53.	0.0202
No	CAREFS04-SSD04-1012	SVOC	2-Methylnaphthalene	91-57-6	0.038	MG_KG	U		8.4	38.	76.	0.0202
No	CAREFS04-SSD05-1012	SVOC	2-Methylnaphthalene	91-57-6	0.033	MG_KG	U		7.2	33.	66.	0.0202
No	CAREFYP-SD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.12	MG_KG	U		0.099	0.12	0.16	0.0202
No	CAREFYP-SD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.11	MG_KG	U		0.088	0.11	0.14	0.0202
No	CAREFYP-SD02P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.11	MG_KG	U		0.092	0.11	0.14	0.0202
No	CAREFYP-SD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.11	MG_KG	U		0.092	0.11	0.14	0.0202
No	CAREFYP-SSD01-1012	SVOC	2-Methylnaphthalene	91-57-6	0.091	MG_KG	U		0.077	0.091	0.12	0.0202
No	CAREFYP-SSD02-1012	SVOC	2-Methylnaphthalene	91-57-6	0.10	MG_KG	U		0.086	0.10	0.14	0.0202
No	CAREFYP-SSD02P-1012	SVOC	2-Methylnaphthalene	91-57-6	0.098	MG_KG	U		0.083	0.098	0.13	0.0202
No	CAREFYP-SSD03-1012	SVOC	2-Methylnaphthalene	91-57-6	0.075	MG_KG	U		0.063	0.075	0.10	0.0202
No	CAREFS04-SD01-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.6	MG_KG	U		1200	1600	2100	0.67
No	CAREFS04-SD01P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.3	MG_KG	U		960	1300	1700	0.67
No	CAREFS04-SD02-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.6	MG_KG	U		1200	1600	2100	0.67
No	CAREFS04-SD04-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.1	MG_KG	U		830	1100	1500	0.67
No	CAREFS04-SD05-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.4	MG_KG	U		1000	1400	1800	0.67
No	CAREFS04-SSD01-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.82	MG_KG	U		620	820	1100	0.67
No	CAREFS04-SSD04-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.95	MG_KG	U		710	950	1200	0.67
No	CAREFS04-SSD05-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.82	MG_KG	U		620	820	1100	0.67
No	CAREFYP-SD01-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.94	MG_KG	U		0.76	0.94	1.6	0.67
No	CAREFYP-SD02-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.7	MG_KG	U		1.3	1.7	2.7	0.67
No	CAREFYP-SD02P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	0.88	MG_KG	U		0.70	0.88	1.4	0.67
No	CAREFYP-SD03-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.7	MG_KG	U		1.4	1.7	2.9	0.67
No	CAREFYP-SSD01-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.4	MG_KG	U		1.2	1.4	2.4	0.67
No	CAREFYP-SSD02-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.6	MG_KG	U		1.3	1.6	2.6	0.67
No	CAREFYP-SSD02P-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.5	MG_KG	U		1.2	1.5	2.5	0.67
No	CAREFYP-SSD03-1012	SVOC	3- and 4-Methylphenol	m&pCRESOL	1.2	MG_KG	U		0.95	1.2	2.0	0.67
No	CAREFS04-SD01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.6	MG_KG	U		740	1600	2100	0.68
No	CAREFS04-SD01P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.3	MG_KG	U		590	1300	1700	0.68
No	CAREFS04-SD02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.6	MG_KG	U		740	1600	2100	0.68
No	CAREFS04-SD04-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.1	MG_KG	U		510	1100	1500	0.68
No	CAREFS04-SD05-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	1.4	MG_KG	U		620	1400	1800	0.68
No	CAREFS04-SSD01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.82	MG_KG	U		380	820	1100	0.68
No	CAREFS04-SSD04-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.95	MG_KG	U		430	950	1200	0.68
No	CAREFS04-SSD05-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.82	MG_KG	U		380	820	1100	0.68
No	CAREFYP-SD02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.83	MG_KG	U		0.75	0.83	2.7	0.68
No	CAREFYP-SD03-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.87	MG_KG	U		0.79	0.87	2.9	0.68
No	CAREFYP-SSD02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.80	MG_KG	U		0.73	0.80	2.6	0.68
No	CAREFYP-SSD02P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.77	MG_KG	U		0.70	0.77	2.5	0.68
No	CAREFS04-SD01-1012	SVOC	Acenaphthene	83-32-9	0.075	MG_KG	U		11.	75.	150	0.0067
No	CAREFS04-SD01P-1012	SVOC	Acenaphthene	83-32-9	0.06	MG_KG	U		9.0	60.	120	0.0067
No	CAREFS04-SD02-1012	SVOC	Acenaphthene	83-32-9	0.064	MG_KG	U		9.7	64.	130	0.0067
No	CAREFS04-SD03-1012	SVOC	Acenaphthene	83-32-9	0.026	MG_KG	U		3.8	26.	51.	0.0067
No	CAREFS04-SD04-1012	SVOC	Acenaphthene	83-32-9	0.044	MG_KG	U		6.7	44.	89.	0.0067
No	CAREFS04-SD05-1012	SVOC	Acenaphthene	83-32-9	0.055	MG_KG	U		8.2	55.	110	0.0067
No	CAREFS04-SSD01-1012	SVOC	Acenaphthene	83-32-9	0.033	MG_KG	U		4.9	33.	66.	0.0067
No	CAREFS04-SSD01P-1012	SVOC	Acenaphthene	83-32-9	0.025	MG_KG	U		3.8	25.	50.	0.0067
No	CAREFS04-SSD02-1012	SVOC	Acenaphthene	83-32-9	0.026	MG_KG	U		3.9	26.	52.	0.0067
No	CAREFS04-SSD03-1012	SVOC	Acenaphthene	83-32-9	0.026	MG_KG	U		4.0	26.	53.	0.0067

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SSD04-1012	SVOC	Acenaphthene	83-32-9	0.038	MG_KG	U		5.7	38.	76.	0.0067
No	CAREFS04-SSD05-1012	SVOC	Acenaphthene	83-32-9	0.033	MG_KG	U		4.9	33.	66.	0.0067
No	CAREFYP-SD01-1012	SVOC	Acenaphthene	83-32-9	0.12	MG_KG	U		0.10	0.12	0.16	0.0067
No	CAREFYP-SD02-1012	SVOC	Acenaphthene	83-32-9	0.11	MG_KG	U		0.092	0.11	0.14	0.0067
No	CAREFYP-SD02P-1012	SVOC	Acenaphthene	83-32-9	0.11	MG_KG	U		0.097	0.11	0.14	0.0067
No	CAREFYP-SD03-1012	SVOC	Acenaphthene	83-32-9	0.11	MG_KG	U		0.096	0.11	0.14	0.0067
No	CAREFYP-SSD01-1012	SVOC	Acenaphthene	83-32-9	0.091	MG_KG	U		0.080	0.091	0.12	0.0067
No	CAREFYP-SSD02-1012	SVOC	Acenaphthene	83-32-9	0.10	MG_KG	U		0.091	0.10	0.14	0.0067
No	CAREFYP-SSD02P-1012	SVOC	Acenaphthene	83-32-9	0.098	MG_KG	U		0.087	0.098	0.13	0.0067
No	CAREFYP-SSD03-1012	SVOC	Acenaphthene	83-32-9	0.075	MG_KG	U		0.066	0.075	0.10	0.0067
No	CAREFS04-SD01-1012	SVOC	Acenaphthylene	208-96-8	0.075	MG_KG	U		9.0	75.	150	0.0059
No	CAREFS04-SD01P-1012	SVOC	Acenaphthylene	208-96-8	0.06	MG_KG	U		7.2	60.	120	0.0059
No	CAREFS04-SD02-1012	SVOC	Acenaphthylene	208-96-8	0.064	MG_KG	U		7.7	64.	130	0.0059
No	CAREFS04-SD03-1012	SVOC	Acenaphthylene	208-96-8	0.026	MG_KG	U		3.1	26.	51.	0.0059
No	CAREFS04-SD04-1012	SVOC	Acenaphthylene	208-96-8	0.044	MG_KG	U		5.3	44.	89.	0.0059
No	CAREFS04-SD05-1012	SVOC	Acenaphthylene	208-96-8	0.055	MG_KG	U		6.6	55.	110	0.0059
No	CAREFS04-SSD01-1012	SVOC	Acenaphthylene	208-96-8	0.033	MG_KG	U		4.0	33.	66.	0.0059
No	CAREFS04-SSD01P-1012	SVOC	Acenaphthylene	208-96-8	0.025	MG_KG	U		3.0	25.	50.	0.0059
No	CAREFS04-SSD02-1012	SVOC	Acenaphthylene	208-96-8	0.026	MG_KG	U		3.1	26.	52.	0.0059
No	CAREFS04-SSD03-1012	SVOC	Acenaphthylene	208-96-8	0.026	MG_KG	U		3.2	26.	53.	0.0059
No	CAREFS04-SSD04-1012	SVOC	Acenaphthylene	208-96-8	0.038	MG_KG	U		4.6	38.	76.	0.0059
No	CAREFS04-SSD05-1012	SVOC	Acenaphthylene	208-96-8	0.033	MG_KG	U		4.0	33.	66.	0.0059
No	CAREFYP-SD01-1012	SVOC	Acenaphthylene	208-96-8	0.12	MG_KG	U		0.090	0.12	0.16	0.0059
No	CAREFYP-SD02-1012	SVOC	Acenaphthylene	208-96-8	0.11	MG_KG	U		0.080	0.11	0.14	0.0059
No	CAREFYP-SD02P-1012	SVOC	Acenaphthylene	208-96-8	0.11	MG_KG	U		0.083	0.11	0.14	0.0059
No	CAREFYP-SD03-1012	SVOC	Acenaphthylene	208-96-8	0.11	MG_KG	U		0.083	0.11	0.14	0.0059
No	CAREFYP-SSD01-1012	SVOC	Acenaphthylene	208-96-8	0.091	MG_KG	U		0.069	0.091	0.12	0.0059
No	CAREFYP-SSD02-1012	SVOC	Acenaphthylene	208-96-8	0.10	MG_KG	U		0.078	0.10	0.14	0.0059
No	CAREFYP-SSD02P-1012	SVOC	Acenaphthylene	208-96-8	0.098	MG_KG	U		0.075	0.098	0.13	0.0059
No	CAREFYP-SSD03-1012	SVOC	Acenaphthylene	208-96-8	0.075	MG_KG	U		0.057	0.075	0.10	0.0059
No	CAREFS04-SD01-1012	SVOC	Anthracene	120-12-7	0.075	MG_KG	U		9.0	75.	150	0.0572
No	CAREFS04-SD01P-1012	SVOC	Anthracene	120-12-7	0.06	MG_KG	U		7.2	60.	120	0.0572
No	CAREFS04-SD02-1012	SVOC	Anthracene	120-12-7	0.064	MG_KG	U		7.7	64.	130	0.0572
No	CAREFYP-SD01-1012	SVOC	Anthracene	120-12-7	0.12	MG_KG	U		0.066	0.12	0.16	0.0572
No	CAREFYP-SD02P-1012	SVOC	Anthracene	120-12-7	0.11	MG_KG	U		0.061	0.11	0.14	0.0572
No	CAREFYP-SD03-1012	SVOC	Anthracene	120-12-7	0.11	MG_KG	U		0.061	0.11	0.14	0.0572
No	CAREFS04-SD01-1012	SVOC	Atrazine	1912-24-9	1.6	MG_KG	UJ	2S	590	1600	2100	0.035
No	CAREFS04-SD01P-1012	SVOC	Atrazine	1912-24-9	1.3	MG_KG	UJ	2S	470	1300	1700	0.035
No	CAREFS04-SD02-1012	SVOC	Atrazine	1912-24-9	1.6	MG_KG	UJ	2S	590	1600	2100	0.035
No	CAREFS04-SD03-1012	SVOC	Atrazine	1912-24-9	0.63	MG_KG	UJ	2S	230	630	840	0.035
No	CAREFS04-SD04-1012	SVOC	Atrazine	1912-24-9	1.1	MG_KG	UJ	2S	400	1100	1500	0.035
No	CAREFS04-SD05-1012	SVOC	Atrazine	1912-24-9	1.4	MG_KG	UJ	2S	500	1400	1800	0.035
No	CAREFS04-SSD01-1012	SVOC	Atrazine	1912-24-9	0.82	MG_KG	UJ	2S	300	820	1100	0.035
No	CAREFS04-SSD01P-1012	SVOC	Atrazine	1912-24-9	0.62	MG_KG	UJ	2S	230	620	830	0.035
No	CAREFS04-SSD02-1012	SVOC	Atrazine	1912-24-9	0.64	MG_KG	UJ	2S	240	640	850	0.035
No	CAREFS04-SSD03-1012	SVOC	Atrazine	1912-24-9	0.65	MG_KG	UJ	2S	240	650	870	0.035
No	CAREFS04-SSD04-1012	SVOC	Atrazine	1912-24-9	0.95	MG_KG	UJ	2S	350	950	1200	0.035
No	CAREFS04-SSD05-1012	SVOC	Atrazine	1912-24-9	0.82	MG_KG	UJ	2S	300	820	1100	0.035
No	CAREFYP-SD01-1012	SVOC	Atrazine	1912-24-9	0.47	MG_KG	U		0.35	0.47	1.6	0.035
No	CAREFYP-SD02-1012	SVOC	Atrazine	1912-24-9	0.83	MG_KG	U		0.61	0.83	2.7	0.035
No	CAREFYP-SD02P-1012	SVOC	Atrazine	1912-24-9	0.44	MG_KG	U		0.32	0.44	1.4	0.035
No	CAREFYP-SD03-1012	SVOC	Atrazine	1912-24-9	0.87	MG_KG	U		0.64	0.87	2.9	0.035
No	CAREFYP-SSD01-1012	SVOC	Atrazine	1912-24-9	0.72	MG_KG	U		0.53	0.72	2.4	0.035
No	CAREFYP-SSD02-1012	SVOC	Atrazine	1912-24-9	0.80	MG_KG	U		0.59	0.80	2.6	0.035
No	CAREFYP-SSD02P-1012	SVOC	Atrazine	1912-24-9	0.77	MG_KG	U		0.57	0.77	2.5	0.035
No	CAREFYP-SSD03-1012	SVOC	Atrazine	1912-24-9	0.60	MG_KG	U		0.44	0.60	2.0	0.035
No	CAREFS04-SSD05-1012	SVOC	Benzo(b)fluoranthene	205-99-2	0.033	MG_KG	U		7.9	33.	66.	0.0272
No	CAREFS04-SD01P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.3	MG_KG	U		500	1300	1700	0.18
No	CAREFS04-SD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.6	MG_KG	U		630	1600	2100	0.18
No	CAREFS04-SD05-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.4	MG_KG	U		540	1400	1800	0.18
No	CAREFS04-SSD01P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.62	MG_KG	U		240	620	830	0.18
No	CAREFS04-SSD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.64	MG_KG	U		250	640	850	0.18
No	CAREFS04-SSD04-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.95	MG_KG	U		370	950	1200	0.18
No	CAREFS04-SSD05-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.82	MG_KG	U		320	820	1100	0.18
No	CAREFYP-SD01-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.47	MG_KG	U		0.40	0.47	1.6	0.18
No	CAREFYP-SD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.83	MG_KG	U		0.70	0.83	2.7	0.18
No	CAREFYP-SD02P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.44	MG_KG	U		0.37	0.44	1.4	0.18
No	CAREFYP-SD03-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.87	MG_KG	U		0.74	0.87	2.9	0.18
No	CAREFYP-SSD01-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.72	MG_KG	U		0.61	0.72	2.4	0.18
No	CAREFYP-SSD02-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.80	MG_KG	U		0.68	0.80	2.6	0.18
No	CAREFYP-SSD02P-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.77	MG_KG	U		0.66	0.77	2.5	0.18
No	CAREFYP-SSD03-1012	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.60	MG_KG	U		0.51	0.60	2.0	0.18
No	CAREFS04-SD01-1012	SVOC	Carbazole	86-74-8	1.6	MG_KG	U		720	1600	2100	0.14
No	CAREFS04-SD01P-1012	SVOC	Carbazole	86-74-8	1.3	MG_KG	U		570	1300	1700	0.14
No	CAREFS04-SD02-1012	SVOC	Carbazole	86-74-8	1.6	MG_KG	U		720	1600	2100	0.14
No	CAREFS04-SD03-1012	SVOC	Carbazole	86-74-8	0.63	MG_KG	U		280	630	840	0.14
No	CAREFS04-SD04-1012	SVOC	Carbazole	86-74-8	1.1	MG_KG	U		490	1100	1500	0.14
No	CAREFS04-SD05-1012	SVOC	Carbazole	86-74-8	1.4	MG_KG	U		610	1400	1800	0.14
No	CAREFS04-SSD01-1012	SVOC	Carbazole	86-74-8	0.82	MG_KG	U		370	820	1100	0.14
No	CAREFS04-SSD01P-1012	SVOC	Carbazole	86-74-8	0.62	MG_KG	U		280	620	830	0.14
No	CAREFS04-SSD02-1012	SVOC	Carbazole	86-74-8	0.64	MG_KG	U		290	640	850	0.14
No	CAREFS04-SSD03-1012	SVOC	Carbazole	86-74-8	0.65	MG_KG	U		290	650	870	0.14
No	CAREFS04-SSD04-1012	SVOC	Carbazole	86-74-8	0.95	MG_KG	U		420	950	1200	0.14
No	CAREFS04-SSD05-1012	SVOC	Carbazole	86-74-8	0.82	MG_KG	U		360	820	1100	0.14
No	CAREFYP-SD01-1012	SVOC	Carbazole	86-74-8	0.47	MG_KG	U		0.32	0.47	1.6	0.14
No	CAREFYP-SD02-1012	SVOC	Carbazole	86-74-8	0.83	MG_KG	U		0.56	0.83	2.7	0.14

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SD02P-1012	SVOC	Carbazole	86-74-8	0.44	MG_KG	U		0.30	0.44	1.4	0.14
No	CAREFYP-SD03-1012	SVOC	Carbazole	86-74-8	0.87	MG_KG	U		0.59	0.87	2.9	0.14
No	CAREFYP-SSD01-1012	SVOC	Carbazole	86-74-8	0.72	MG_KG	U		0.49	0.72	2.4	0.14
No	CAREFYP-SSD02-1012	SVOC	Carbazole	86-74-8	0.80	MG_KG	U		0.55	0.80	2.6	0.14
No	CAREFYP-SSD02P-1012	SVOC	Carbazole	86-74-8	0.77	MG_KG	U		0.52	0.77	2.5	0.14
No	CAREFYP-SSD03-1012	SVOC	Carbazole	86-74-8	0.60	MG_KG	U		0.40	0.60	2.0	0.14
No	CAREFS04-SD01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.075	MG_KG	U		14.	75.	150	0.033
No	CAREFS04-SD01P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.06	MG_KG	U		11.	60.	120	0.033
No	CAREFS04-SD02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.064	MG_KG	U		12.	64.	130	0.033
No	CAREFS04-SD04-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.044	MG_KG	UL	MSL	8.0	44.	89.	0.033
No	CAREFS04-SD05-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.055	MG_KG	U		9.8	55.	110	0.033
No	CAREFS04-SSD01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.033	MG_KG	U		5.9	33.	66.	0.033
No	CAREFS04-SSD05-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.033	MG_KG	U		5.9	33.	66.	0.033
No	CAREFYP-SD01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.12	MG_KG	U		0.061	0.12	0.16	0.033
No	CAREFYP-SD02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.11	MG_KG	U		0.055	0.11	0.14	0.033
No	CAREFYP-SD02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.11	MG_KG	U		0.057	0.11	0.14	0.033
No	CAREFYP-SD03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.11	MG_KG	U		0.057	0.11	0.14	0.033
No	CAREFYP-SSD01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.091	MG_KG	U		0.048	0.091	0.12	0.033
No	CAREFYP-SSD02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.10	MG_KG	U		0.054	0.10	0.14	0.033
No	CAREFYP-SSD02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.098	MG_KG	U		0.051	0.098	0.13	0.033
No	CAREFYP-SSD03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.075	MG_KG	U		0.039	0.075	0.10	0.033
No	CAREFS04-SD01-1012	SVOC	Diethylphthalate	84-66-2	1.6	MG_KG	U		520	1600	2100	0.63
No	CAREFS04-SD01P-1012	SVOC	Diethylphthalate	84-66-2	1.3	MG_KG	U		410	1300	1700	0.63
No	CAREFS04-SD02-1012	SVOC	Diethylphthalate	84-66-2	1.6	MG_KG	U		520	1600	2100	0.63
No	CAREFS04-SD03-1012	SVOC	Diethylphthalate	84-66-2	0.63	MG_KG	U		200	630	840	0.63
No	CAREFS04-SD04-1012	SVOC	Diethylphthalate	84-66-2	1.1	MG_KG	U		360	1100	1500	0.63
No	CAREFS04-SD05-1012	SVOC	Diethylphthalate	84-66-2	1.4	MG_KG	U		440	1400	1800	0.63
No	CAREFS04-SSD01-1012	SVOC	Diethylphthalate	84-66-2	0.82	MG_KG	U		260	820	1100	0.63
No	CAREFS04-SSD02-1012	SVOC	Diethylphthalate	84-66-2	0.64	MG_KG	U		210	640	850	0.63
No	CAREFS04-SSD03-1012	SVOC	Diethylphthalate	84-66-2	0.65	MG_KG	U		210	650	870	0.63
No	CAREFS04-SSD04-1012	SVOC	Diethylphthalate	84-66-2	0.95	MG_KG	U		300	950	1200	0.63
No	CAREFS04-SSD05-1012	SVOC	Diethylphthalate	84-66-2	0.82	MG_KG	U		260	820	1100	0.63
No	CAREFYP-SD03-1012	SVOC	Diethylphthalate	84-66-2	0.87	MG_KG	U		0.65	0.87	2.9	0.63
No	CAREFS04-SD01-1012	SVOC	Di-n-butylphthalate	84-74-2	1.6	MG_KG	U		660	1600	2100	0.11
No	CAREFS04-SD01P-1012	SVOC	Di-n-butylphthalate	84-74-2	1.3	MG_KG	U		520	1300	1700	0.11
No	CAREFS04-SD02-1012	SVOC	Di-n-butylphthalate	84-74-2	1.6	MG_KG	U		650	1600	2100	0.11
No	CAREFS04-SD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.63	MG_KG	U		260	630	840	0.11
No	CAREFS04-SD04-1012	SVOC	Di-n-butylphthalate	84-74-2	1.1	MG_KG	UL	MSL	450	1100	1500	0.11
No	CAREFS04-SD05-1012	SVOC	Di-n-butylphthalate	84-74-2	1.4	MG_KG	U		550	1400	1800	0.11
No	CAREFS04-SSD01-1012	SVOC	Di-n-butylphthalate	84-74-2	0.82	MG_KG	U		330	820	1100	0.11
No	CAREFS04-SSD01P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.62	MG_KG	U		250	620	830	0.11
No	CAREFS04-SSD02-1012	SVOC	Di-n-butylphthalate	84-74-2	0.64	MG_KG	U		260	640	850	0.11
No	CAREFS04-SSD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.65	MG_KG	U		270	650	870	0.11
No	CAREFS04-SSD04-1012	SVOC	Di-n-butylphthalate	84-74-2	0.95	MG_KG	U		380	950	1200	0.11
No	CAREFS04-SSD05-1012	SVOC	Di-n-butylphthalate	84-74-2	0.82	MG_KG	U		330	820	1100	0.11
No	CAREFYP-SD01-1012	SVOC	Di-n-butylphthalate	84-74-2	0.47	MG_KG	U		0.37	0.47	1.6	0.11
No	CAREFYP-SD02-1012	SVOC	Di-n-butylphthalate	84-74-2	0.83	MG_KG	U		0.66	0.83	2.7	0.11
No	CAREFYP-SD02P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.44	MG_KG	U		0.35	0.44	1.4	0.11
No	CAREFYP-SD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.87	MG_KG	U		0.68	0.87	2.9	0.11
No	CAREFYP-SSD01-1012	SVOC	Di-n-butylphthalate	84-74-2	0.72	MG_KG	U		0.57	0.72	2.4	0.11
No	CAREFYP-SSD02-1012	SVOC	Di-n-butylphthalate	84-74-2	0.80	MG_KG	U		0.63	0.80	2.6	0.11
No	CAREFYP-SSD02P-1012	SVOC	Di-n-butylphthalate	84-74-2	0.77	MG_KG	U		0.61	0.77	2.5	0.11
No	CAREFYP-SSD03-1012	SVOC	Di-n-butylphthalate	84-74-2	0.60	MG_KG	U		0.47	0.60	2.0	0.11
No	CAREFYP-SD01-1012	SVOC	Fluorene	86-73-7	0.12	MG_KG	U		0.099	0.12	0.16	0.0774
No	CAREFYP-SD02-1012	SVOC	Fluorene	86-73-7	0.11	MG_KG	U		0.088	0.11	0.14	0.0774
No	CAREFYP-SD02P-1012	SVOC	Fluorene	86-73-7	0.11	MG_KG	U		0.092	0.11	0.14	0.0774
No	CAREFYP-SD03-1012	SVOC	Fluorene	86-73-7	0.11	MG_KG	U		0.092	0.11	0.14	0.0774
No	CAREFYP-SSD02-1012	SVOC	Fluorene	86-73-7	0.10	MG_KG	U		0.086	0.10	0.14	0.0774
No	CAREFYP-SSD02P-1012	SVOC	Fluorene	86-73-7	0.098	MG_KG	U		0.083	0.098	0.13	0.0774
No	CAREFS04-SD01-1012	SVOC	Hexachlorobenzene	118-74-1	1.6	MG_KG	U		530	1600	2100	0.02
No	CAREFS04-SD01P-1012	SVOC	Hexachlorobenzene	118-74-1	1.3	MG_KG	U		420	1300	1700	0.02
No	CAREFS04-SD02-1012	SVOC	Hexachlorobenzene	118-74-1	1.6	MG_KG	U		530	1600	2100	0.02
No	CAREFS04-SD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.63	MG_KG	U		210	630	840	0.02
No	CAREFS04-SD04-1012	SVOC	Hexachlorobenzene	118-74-1	1.1	MG_KG	U		360	1100	1500	0.02
No	CAREFS04-SD05-1012	SVOC	Hexachlorobenzene	118-74-1	1.4	MG_KG	U		450	1400	1800	0.02
No	CAREFS04-SSD01-1012	SVOC	Hexachlorobenzene	118-74-1	0.82	MG_KG	U		270	820	1100	0.02
No	CAREFS04-SSD01P-1012	SVOC	Hexachlorobenzene	118-74-1	0.62	MG_KG	U		200	620	830	0.02
No	CAREFS04-SSD02-1012	SVOC	Hexachlorobenzene	118-74-1	0.64	MG_KG	U		210	640	850	0.02
No	CAREFS04-SSD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.65	MG_KG	U		220	650	870	0.02
No	CAREFS04-SSD04-1012	SVOC	Hexachlorobenzene	118-74-1	0.95	MG_KG	U		310	950	1200	0.02
No	CAREFS04-SSD05-1012	SVOC	Hexachlorobenzene	118-74-1	0.82	MG_KG	U		270	820	1100	0.02
No	CAREFYP-SD01-1012	SVOC	Hexachlorobenzene	118-74-1	0.47	MG_KG	U		0.38	0.47	1.6	0.02
No	CAREFYP-SD02-1012	SVOC	Hexachlorobenzene	118-74-1	0.83	MG_KG	U		0.67	0.83	2.7	0.02
No	CAREFYP-SD02P-1012	SVOC	Hexachlorobenzene	118-74-1	0.44	MG_KG	U		0.36	0.44	1.4	0.02
No	CAREFYP-SD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.87	MG_KG	U		0.70	0.87	2.9	0.02
No	CAREFYP-SSD01-1012	SVOC	Hexachlorobenzene	118-74-1	0.72	MG_KG	U		0.58	0.72	2.4	0.02
No	CAREFYP-SSD02-1012	SVOC	Hexachlorobenzene	118-74-1	0.80	MG_KG	U		0.65	0.80	2.6	0.02
No	CAREFYP-SSD02P-1012	SVOC	Hexachlorobenzene	118-74-1	0.77	MG_KG	U		0.62	0.77	2.5	0.02
No	CAREFYP-SSD03-1012	SVOC	Hexachlorobenzene	118-74-1	0.60	MG_KG	U		0.48	0.60	2.0	0.02
No	CAREFS04-SD01-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.075	MG_KG	U		14.	75.	150	0.017
No	CAREFS04-SD01P-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.06	MG_KG	U		11.	60.	120	0.017
No	CAREFS04-SD02-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.064	MG_KG	U		12.	64.	130	0.017
No	CAREFS04-SD03-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.026	MG_KG	U		4.8	26.	51.	0.017
No	CAREFS04-SD04-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.044	MG_KG	U		8.4	44.	89.	0.017
No	CAREFS04-SD05-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.055	MG_KG	U		10.	55.	110	0.017
No	CAREFS04-SSD01-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.033	MG_KG	U		6.3	33.	66.	0.017

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SSD01P-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.025	MG_KG	U		4.8	25.	50.	0.017
No	CAREFS04-SSD02-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.026	MG_KG	U		4.9	26.	52.	0.017
No	CAREFS04-SSD03-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.026	MG_KG	U		5.0	26.	53.	0.017
No	CAREFS04-SSD05-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.033	MG_KG	U		6.2	33.	66.	0.017
No	CAREFYP-SD01-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.12	MG_KG	U		0.057	0.12	0.16	0.017
No	CAREFYP-SSD03-1012	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	0.075	MG_KG	U		0.036	0.075	0.10	0.017
No	CAREFS04-SD01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.6	MG_KG	U		540	1600	2100	0.69
No	CAREFS04-SD01P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.3	MG_KG	U		430	1300	1700	0.69
No	CAREFS04-SD02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.6	MG_KG	U		540	1600	2100	0.69
No	CAREFS04-SD04-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.1	MG_KG	U		370	1100	1500	0.69
No	CAREFS04-SD05-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	1.4	MG_KG	U		450	1400	1800	0.69
No	CAREFS04-SSD01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.82	MG_KG	U		270	820	1100	0.69
No	CAREFS04-SSD04-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.95	MG_KG	U		320	950	1200	0.69
No	CAREFS04-SSD05-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.82	MG_KG	U		270	820	1100	0.69
No	CAREFYP-SD02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.83	MG_KG	U		0.75	0.83	2.7	0.69
No	CAREFYP-SD03-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.87	MG_KG	U		0.78	0.87	2.9	0.69
No	CAREFYP-SSD02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.80	MG_KG	U		0.72	0.80	2.6	0.69
No	CAREFYP-SSD02P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.77	MG_KG	U		0.69	0.77	2.5	0.69
No	CAREFS04-SD01-1012	SVOC	Pentachlorophenol	87-86-5	4	MG_KG	U		1500	4000	5300	2.7
No	CAREFS04-SD01P-1012	SVOC	Pentachlorophenol	87-86-5	3.2	MG_KG	U		1200	3200	4200	2.7
No	CAREFS04-SD02-1012	SVOC	Pentachlorophenol	87-86-5	4	MG_KG	U		1500	4000	5300	2.7
No	CAREFS04-SD04-1012	SVOC	Pentachlorophenol	87-86-5	2.7	MG_KG	U		1000	2700	3600	2.7
No	CAREFS04-SD05-1012	SVOC	Pentachlorophenol	87-86-5	3.4	MG_KG	U		1300	3400	4500	2.7
No	CAREFS04-SD01-1012	SVOC	Phenol	108-95-2	1.6	MG_KG	U		1000	1600	2100	0.048
No	CAREFS04-SD01P-1012	SVOC	Phenol	108-95-2	1.3	MG_KG	U		800	1300	1700	0.048
No	CAREFS04-SD02-1012	SVOC	Phenol	108-95-2	1.6	MG_KG	U		1000	1600	2100	0.048
No	CAREFS04-SD03-1012	SVOC	Phenol	108-95-2	0.63	MG_KG	U		400	630	840	0.048
No	CAREFS04-SD04-1012	SVOC	Phenol	108-95-2	1.1	MG_KG	U		690	1100	1500	0.048
No	CAREFS04-SD05-1012	SVOC	Phenol	108-95-2	1.4	MG_KG	U		850	1400	1800	0.048
No	CAREFS04-SSD01-1012	SVOC	Phenol	108-95-2	0.82	MG_KG	U		510	820	1100	0.048
No	CAREFS04-SSD01P-1012	SVOC	Phenol	108-95-2	0.62	MG_KG	U		390	620	830	0.048
No	CAREFS04-SSD02-1012	SVOC	Phenol	108-95-2	0.64	MG_KG	U		400	640	850	0.048
No	CAREFS04-SSD03-1012	SVOC	Phenol	108-95-2	0.65	MG_KG	U		410	650	870	0.048
No	CAREFS04-SSD04-1012	SVOC	Phenol	108-95-2	0.95	MG_KG	U		600	950	1200	0.048
No	CAREFS04-SSD05-1012	SVOC	Phenol	108-95-2	0.82	MG_KG	U		510	820	1100	0.048
No	CAREFYP-SD01-1012	SVOC	Phenol	108-95-2	0.47	MG_KG	U		0.36	0.47	1.6	0.048
No	CAREFYP-SD02-1012	SVOC	Phenol	108-95-2	0.83	MG_KG	U		0.63	0.83	2.7	0.048
No	CAREFYP-SD02P-1012	SVOC	Phenol	108-95-2	0.44	MG_KG	U		0.33	0.44	1.4	0.048
No	CAREFYP-SD03-1012	SVOC	Phenol	108-95-2	0.87	MG_KG	U		0.66	0.87	2.9	0.048
No	CAREFYP-SSD01-1012	SVOC	Phenol	108-95-2	0.72	MG_KG	U		0.55	0.72	2.4	0.048
No	CAREFYP-SSD02-1012	SVOC	Phenol	108-95-2	0.80	MG_KG	U		0.61	0.80	2.6	0.048
No	CAREFYP-SSD02P-1012	SVOC	Phenol	108-95-2	0.77	MG_KG	U		0.59	0.77	2.5	0.048
No	CAREFYP-SSD03-1012	SVOC	Phenol	108-95-2	0.60	MG_KG	U		0.45	0.60	2.0	0.048
No	CAREFYP-SD02-1012	VOC	Carbon disulfide	75-15-0	0.015	MG_KG	U		0.0064	0.015	0.030	0.0045
No	CAREFYP-SD02P-1012	VOC	Carbon disulfide	75-15-0	0.022	MG_KG	U		0.0092	0.022	0.044	0.0045
No	CAREFYP-SD03-1012	VOC	Carbon disulfide	75-15-0	0.028	MG_KG	U		0.012	0.028	0.056	0.0045
No	CAREFYP-SSD01-1012	VOC	Carbon disulfide	75-15-0	0.018	MG_KG	U		0.0077	0.018	0.037	0.0045
No	CAREFYP-SSD02-1012	VOC	Carbon disulfide	75-15-0	0.028	MG_KG	U		0.012	0.028	0.055	0.0045
No	CAREFYP-SSD02P-1012	VOC	Carbon disulfide	75-15-0	0.025	MG_KG	U		0.011	0.025	0.051	0.0045
No	CAREFYP-SSD03-1012	VOC	Carbon disulfide	75-15-0	0.020	MG_KG	U		0.0085	0.020	0.041	0.0045
No	CAREFS04-SD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.023	MG_KG	UL	SSL	6.6	23.	46.	0.00027
No	CAREFS04-SD01P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.02	MG_KG	UL	SSL	5.6	20.	39.	0.00027
No	CAREFS04-SD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.019	MG_KG	UL	SSL	5.5	19.	38.	0.00027
No	CAREFS04-SD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.007	MG_KG	U		2.0	7.0	14.	0.00027
No	CAREFS04-SD04-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.014	MG_KG	UL	MSL	4.1	14.	28.	0.00027
No	CAREFS04-SD05-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.016	MG_KG	UL	SSL	4.5	16.	32.	0.00027
No	CAREFS04-SSD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.008	MG_KG	UL	SSL	2.3	8.0	16.	0.00028
No	CAREFS04-SSD01P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.009	MG_KG	UL	SSL	2.6	9.0	18.	0.00028
No	CAREFS04-SSD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0065	MG_KG	UL	SSL	1.9	6.5	13.	0.00028
No	CAREFS04-SSD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.008	MG_KG	U		2.3	8.0	16.	0.00028
No	CAREFS04-SSD04-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0085	MG_KG	UL	SSL	2.4	8.5	17.	0.00028
No	CAREFS04-SSD05-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.012	MG_KG	UL	SSL	3.4	12.	24.	0.00028
No	CAREFYP-SD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0069	MG_KG	U		0.0021	0.0069	0.014	0.00027
No	CAREFYP-SD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0030	MG_KG	U		0.0009	0.0030	0.0061	0.00027
No	CAREFYP-SD02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0044	MG_KG	U		0.0013	0.0044	0.0088	0.00027
No	CAREFYP-SD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0056	MG_KG	UL	MSL	0.0017	0.0056	0.011	0.00027
No	CAREFYP-SSD01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0037	MG_KG	U		0.0011	0.0037	0.0073	0.00028
No	CAREFYP-SSD02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0055	MG_KG	U		0.0017	0.0055	0.011	0.00028
No	CAREFYP-SSD02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0051	MG_KG	U		0.0015	0.0051	0.010	0.00028
No	CAREFYP-SSD03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.0041	MG_KG	UL	MSL	0.0012	0.0041	0.0081	0.00028
No	CAREFS04-SD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.023	MG_KG	UL	SSL	7.9	23.	46.	0.00027
No	CAREFS04-SD01P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.02	MG_KG	UL	SSL	6.7	20.	39.	0.00027
No	CAREFS04-SD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.019	MG_KG	UL	SSL	6.5	19.	38.	0.00027
No	CAREFS04-SD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.007	MG_KG	U		2.4	7.0	14.	0.00027
No	CAREFS04-SD04-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.014	MG_KG	UL	SSL	4.9	14.	28.	0.00027
No	CAREFS04-SD05-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.016	MG_KG	UL	SSL	5.4	16.	32.	0.00027
No	CAREFS04-SSD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.008	MG_KG	UL	SSL	2.8	8.0	16.	0.00028
No	CAREFS04-SSD01P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.009	MG_KG	UL	SSL	3.1	9.0	18.	0.00028
No	CAREFS04-SSD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0065	MG_KG	UL	SSL	2.2	6.5	13.	0.00028
No	CAREFS04-SSD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.008	MG_KG	U		2.8	8.0	16.	0.00028
No	CAREFS04-SSD04-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0085	MG_KG	UL	SSL	2.9	8.5	17.	0.00028
No	CAREFS04-SSD05-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.012	MG_KG	UL	SSL	4.0	12.	24.	0.00028
No	CAREFYP-SD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0069	MG_KG	U		0.0021	0.0069	0.014	0.00027
No	CAREFYP-SD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0030	MG_KG	U		0.0009	0.0030	0.0061	0.00027
No	CAREFYP-SD02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0044	MG_KG	U		0.0014	0.0044	0.0088	0.00027
No	CAREFYP-SD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0056	MG_KG	UL	MSL	0.0017	0.0056	0.011	0.00027

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SSD01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0037	MG_KG	U		0.0011	0.0037	0.0073	0.00028
No	CAREFYP-SSD02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0055	MG_KG	U		0.0017	0.0055	0.011	0.00028
No	CAREFYP-SSD02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0051	MG_KG	U		0.0016	0.0051	0.010	0.00028
No	CAREFYP-SSD03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.0041	MG_KG	UL	MSL	0.0013	0.0041	0.0081	0.00028
Yes	CAREFS04-SD01P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	270	UG_KG	UL	SSL	33.	270	530	36
Yes	CAREFS04-SD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	100	UG_KG	UL	SSL	13.	100	210	36
Yes	CAREFS04-SD04-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	250	UG_KG	UL	MSL	31.	250	500	36
Yes	CAREFS04-SD05-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	270	UG_KG	UL	SSL	33.	270	530	36
Yes	CAREFS04-SSD01-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	160	UG_KG	U		19.	160	310	36
Yes	CAREFS04-SSD01P-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	150	UG_KG	U		19.	150	300	36
Yes	CAREFS04-SSD02-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	120	UG_KG	U		15.	120	250	36
Yes	CAREFS04-SSD03-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	120	UG_KG	U		14.	120	230	36
Yes	CAREFS04-SSD04-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	200	UG_KG	UL	MSL	24.	200	400	36
Yes	CAREFS04-SSD05-1012	EXPLO	1,3-Dinitrobenzene	99-65-0	170	UG_KG	UL	SSL	21.	170	340	36
Yes	CAREFS04-SD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	100	UG_KG	UL	SSL	44.	100	210	70.6
Yes	CAREFS04-SSD01-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	160	UG_KG	U		66.	160	310	70.6
Yes	CAREFS04-SSD01P-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	150	UG_KG	U		63.	150	300	70.6
Yes	CAREFS04-SSD02-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	120	UG_KG	U		52.	120	250	70.6
Yes	CAREFS04-SSD03-1012	EXPLO	2-Amino-4,6-dinitrotoluene	35572-78-2	120	UG_KG	U		49.	120	230	70.6
Yes	CAREFS04-SD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	320	UG_KG	UL	BSL	110	320	650	124
Yes	CAREFS04-SD01P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	270	UG_KG	UL	BSL	90.	270	530	124
Yes	CAREFS04-SD02-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	290	UG_KG	UL	BSL	100	290	590	124
Yes	CAREFS04-SD04-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	250	UG_KG	UL	BSL	85.	250	500	124
Yes	CAREFS04-SD05-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	270	UG_KG	UL	BSL	90.	270	530	124
Yes	CAREFS04-SSD01-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	160	UG_KG	UL	BSL	53.	160	310	124
Yes	CAREFS04-SSD01P-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	150	UG_KG	UL	BSL	51.	150	300	124
Yes	CAREFS04-SSD04-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	200	UG_KG	UL	BSL	67.	200	400	124
Yes	CAREFS04-SSD05-1012	EXPLO	4-Amino-2,6-dinitrotoluene	19406-51-0	170	UG_KG	UL	BSL	58.	170	340	124
Yes	CAREFS04-SD03-1012	EXPLO	HMX	2691-41-0	100	UG_KG	UL	BSL	18.	100	210	25
Yes	CAREFS04-SSD02-1012	EXPLO	HMX	2691-41-0	120	UG_KG	UL	BSL	21.	120	250	25
Yes	CAREFS04-SSD03-1012	EXPLO	HMX	2691-41-0	120	UG_KG	UL	BSL	20.	120	230	25
Yes	CAREFS04-SD01-1012	EXPLO	RDX	121-82-4	320	UG_KG	UL	SSL	44.	320	650	68
Yes	CAREFS04-SD01P-1012	EXPLO	RDX	121-82-4	270	UG_KG	UL	SSL	36.	270	530	68
Yes	CAREFS04-SD02-1012	EXPLO	RDX	121-82-4	290	UG_KG	UL	SSL	40.	290	590	68
Yes	CAREFS04-SD03-1012	EXPLO	RDX	121-82-4	100	UG_KG	UL	SSL	14.	100	210	68
Yes	CAREFS04-SD04-1012	EXPLO	RDX	121-82-4	250	UG_KG	UL	SSL	34.	250	500	68
Yes	CAREFS04-SD05-1012	EXPLO	RDX	121-82-4	270	UG_KG	UL	SSL	36.	270	530	68
Yes	CAREFS04-SSD01-1012	EXPLO	RDX	121-82-4	160	UG_KG	U		21.	160	310	68
Yes	CAREFS04-SSD01P-1012	EXPLO	RDX	121-82-4	150	UG_KG	U		20.	150	300	68
Yes	CAREFS04-SSD02-1012	EXPLO	RDX	121-82-4	120	UG_KG	U		17.	120	250	68
Yes	CAREFS04-SSD03-1012	EXPLO	RDX	121-82-4	120	UG_KG	U		16.	120	230	68
Yes	CAREFS04-SSD04-1012	EXPLO	RDX	121-82-4	200	UG_KG	UL	SSL	27.	200	400	68
Yes	CAREFS04-SSD05-1012	EXPLO	RDX	121-82-4	170	UG_KG	UL	SSL	23.	170	340	68
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.073	MG_KG	U		0.051	0.073	0.15	0.0598
Yes	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.088	MG_KG	U		0.057	0.088	0.18	0.0598
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.073	MG_KG	U		0.048	0.073	0.15	0.0598
Yes	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.088	MG_KG	U		0.057	0.088	0.18	0.0598
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.073	MG_KG	U		0.048	0.073	0.15	0.0598
Yes	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.088	MG_KG	U		0.044	0.088	0.18	0.0598
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.073	MG_KG	U		0.037	0.073	0.15	0.0598
Yes	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.12	MG_KG	U		0.059	0.12	0.24	0.0598
Yes	CAREFYP-SD01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.19	MG_KG	UL	SSL	0.053	0.19	0.37	0.0598
Yes	CAREFYP-SD02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.16	MG_KG	U		0.047	0.16	0.33	0.0598
Yes	CAREFYP-SD02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.088	MG_KG	U		0.025	0.088	0.18	0.0598
Yes	CAREFYP-SD03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.17	MG_KG	U		0.049	0.17	0.35	0.0598
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.073	MG_KG	U		0.021	0.073	0.15	0.0598
Yes	CAREFYP-SSD02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.16	MG_KG	U		0.046	0.16	0.33	0.0598
Yes	CAREFYP-SSD02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.16	MG_KG	U		0.045	0.16	0.31	0.0598
Yes	CAREFYP-SSD03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.12	MG_KG	U		0.034	0.12	0.24	0.0598
Yes	CAREFYP-SSD01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.073	MG_KG	U		0.055	0.073	0.15	0.0598
Yes	CAREFYP-SD03-1012	PEST/PCB	Endosulfan I	959-98-8	0.017	MG_KG	UL	SSL	0.0068	0.017	0.029	0.0155
Yes	CAREFYP-SSD01-1012	PEST/PCB	Endosulfan I	959-98-8	0.037	MG_KG	UL	SSL	0.014	0.037	0.062	0.0155
Yes	CAREFYP-SSD02P-1012	PEST/PCB	Endosulfan I	959-98-8	0.039	MG_KG	UL	SSL	0.015	0.039	0.066	0.0155
Yes	CAREFYP-SSD03-1012	PEST/PCB	Endosulfan I	959-98-8	0.030	MG_KG	UL	SSL	0.012	0.030	0.050	0.0155
Yes	CAREFYP-SD01-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.046	MG_KG	UL	SSL	0.023	0.046	0.079	0.0289
Yes	CAREFYP-SD02-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.041	MG_KG	UL	SSL	0.020	0.041	0.070	0.0289
Yes	CAREFYP-SD02P-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.044	MG_KG	UL	SSL	0.021	0.044	0.075	0.0289
Yes	CAREFYP-SSD01-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.037	MG_KG	UL	SSL	0.018	0.037	0.062	0.0289
Yes	CAREFYP-SSD02-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.041	MG_KG	UL	SSL	0.020	0.041	0.069	0.0289
Yes	CAREFYP-SSD02P-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.039	MG_KG	UL	SSL	0.019	0.039	0.066	0.0289
Yes	CAREFYP-SSD03-1012	PEST/PCB	Endosulfan sulfate	1031-07-8	0.030	MG_KG	UL	SSL	0.014	0.030	0.050	0.0289
Yes	CAREFYP-SD02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.7	MG_KG	U		0.61	1.7	2.7	1.52
Yes	CAREFYP-SD03-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.7	MG_KG	U		0.64	1.7	2.9	1.52
Yes	CAREFYP-SSD02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	1.6	MG_KG	U		0.59	1.6	2.6	1.52
Yes	CAREFYP-SD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.83	MG_KG	U		0.59	0.83	2.7	0.626
Yes	CAREFYP-SD03-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.87	MG_KG	U		0.61	0.87	2.9	0.626
Yes	CAREFYP-SSD01-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.72	MG_KG	U		0.51	0.72	2.4	0.626
Yes	CAREFYP-SSD02-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.80	MG_KG	U		0.57	0.80	2.6	0.626
Yes	CAREFYP-SSD02P-1012	SVOC	2,4-Dichlorophenol	120-83-2	0.77	MG_KG	U		0.55	0.77	2.5	0.626
Yes	CAREFYP-SSD01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	0.72	MG_KG	U		0.66	0.72	2.4	0.68
Yes	CAREFYP-SSD01-1012	SVOC	Anthracene	120-12-7	0.091	MG_KG	U		0.051	0.091	0.12	0.0572
Yes	CAREFYP-SSD02P-1012	SVOC	Anthracene	120-12-7	0.098	MG_KG	U		0.055	0.098	0.13	0.0572
Yes	CAREFYP-SSD03-1012	SVOC	Anthracene	120-12-7	0.075	MG_KG	U		0.042	0.075	0.10	0.0572
Yes	CAREFYP-SD02-1012	SVOC	Diethylphthalate	84-66-2	0.83	MG_KG	U		0.62	0.83	2.7	0.63
Yes	CAREFYP-SSD01-1012	SVOC	Diethylphthalate	84-66-2	0.72	MG_KG	U		0.54	0.72	2.4	0.63
Yes	CAREFYP-SSD02-1012	SVOC	Diethylphthalate	84-66-2	0.80	MG_KG	U		0.60	0.80	2.6	0.63

TABLE 3-13
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAREFYP-SSD02P-1012	SVOC	Diethylphthalate	84-66-2	0.77	MG_KG	U		0.58	0.77	2.5	0.63
Yes	CAREFYP-SSD01-1012	SVOC	Fluorene	86-73-7	0.091	MG_KG	U		0.077	0.091	0.12	0.0774
Yes	CAREFYP-SSD01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	0.72	MG_KG	U		0.65	0.72	2.4	0.69

TABLE 3-14
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Reference Sediment

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SD01-1012	METAL	Antimony	7440-36-0	6.56	MG_KG	U		2.23	6.56	13.1	2
No	CAREFYP-SD03-1012	METAL	Antimony	7440-36-0	5.93	MG_KG	UL	MSL	2.01	5.93	11.9	2
No	CAREFYP-SSD02-1012	METAL	Antimony	7440-36-0	6.54	MG_KG	U		2.22	6.54	13.1	2
No	CAREFS04-SD01-1012	METAL	CYANIDE	57-12-5	2.7	MG_KG	U		1.5	2.7	3.4	0.1
No	CAREFS04-SD01P-1012	METAL	CYANIDE	57-12-5	1.8	MG_KG	U		0.98	1.8	2.2	0.1
No	CAREFS04-SD02-1012	METAL	CYANIDE	57-12-5	2.4	MG_KG	U		1.4	2.4	3.0	0.1
No	CAREFS04-SD03-1012	METAL	CYANIDE	57-12-5	0.92	MG_KG	U		0.51	0.92	1.2	0.1
No	CAREFS04-SD04-1012	METAL	CYANIDE	57-12-5	2.0	MG_KG	U		1.1	2.0	2.5	0.1
No	CAREFS04-SD05-1012	METAL	CYANIDE	57-12-5	2.1	MG_KG	U		1.2	2.1	2.6	0.1
No	CAREFS04-SSD01-1012	METAL	CYANIDE	57-12-5	1.2	MG_KG	U		0.67	1.2	1.5	0.1
No	CAREFS04-SSD01P-1012	METAL	CYANIDE	57-12-5	1.2	MG_KG	U		0.67	1.2	1.5	0.1
No	CAREFS04-SSD02-1012	METAL	CYANIDE	57-12-5	1.0	MG_KG	U		0.58	1.0	1.3	0.1
No	CAREFS04-SSD03-1012	METAL	CYANIDE	57-12-5	0.88	MG_KG	U		0.49	0.88	1.1	0.1
No	CAREFS04-SSD04-1012	METAL	CYANIDE	57-12-5	1.8	MG_KG	U		0.95	1.8	2.2	0.1
No	CAREFS04-SSD05-1012	METAL	CYANIDE	57-12-5	1.2	MG_KG	U		0.67	1.2	1.5	0.1
No	CAREFYP-SD01-1012	METAL	Cyanide	57-12-5	0.85	MG_KG	U		0.29	0.85	2.3	0.1
No	CAREFYP-SD02-1012	METAL	Cyanide	57-12-5	0.76	MG_KG	U		0.26	0.76	2.0	0.1
No	CAREFYP-SD02P-1012	METAL	Cyanide	57-12-5	0.79	MG_KG	U		0.27	0.79	2.1	0.1
No	CAREFYP-SD03-1012	METAL	Cyanide	57-12-5	0.79	MG_KG	U		0.27	0.79	2.1	0.1
No	CAREFYP-SSD01-1012	METAL	Cyanide	57-12-5	0.66	MG_KG	U		0.23	0.66	1.8	0.1
No	CAREFYP-SSD02-1012	METAL	Cyanide	57-12-5	0.74	MG_KG	U		0.26	0.74	2.0	0.1
No	CAREFYP-SSD02P-1012	METAL	Cyanide	57-12-5	0.71	MG_KG	U		0.24	0.71	1.9	0.1
No	CAREFYP-SSD03-1012	METAL	Cyanide	57-12-5	0.54	MG_KG	U		0.19	0.54	1.4	0.1
No	CAREFYP-SD01-1012	METAL	Thallium	7440-28-0	6.56	MG_KG	U		1.97	6.56	13.1	0.78
No	CAREFYP-SD02-1012	METAL	Thallium	7440-28-0	6.67	MG_KG	U		2.00	6.67	13.3	0.78
No	CAREFYP-SD02P-1012	METAL	Thallium	7440-28-0	5.22	MG_KG	U		1.57	5.22	10.4	0.78
No	CAREFYP-SD03-1012	METAL	Thallium	7440-28-0	5.93	MG_KG	U		1.78	5.93	11.9	0.78
No	CAREFYP-SSD02P-1012	METAL	Thallium	7440-28-0	5.04	MG_KG	U		1.51	5.04	10.1	0.78
Yes	CAREFYP-SD02P-1012	METAL	Antimony	7440-36-0	5.22	MG_KG	U		1.78	5.22	10.4	2
Yes	CAREFYP-SSD01-1012	METAL	Antimony	7440-36-0	5.30	MG_KG	U		1.80	5.30	10.6	2
Yes	CAREFYP-SSD02P-1012	METAL	Antimony	7440-36-0	5.04	MG_KG	U		1.71	5.04	10.1	2
Yes	CAREFYP-SSD03-1012	METAL	Antimony	7440-36-0	3.63	MG_KG	UL	MSL	1.24	3.63	7.27	2
Yes	CAREFS04-SD04-1012	METAL	Selenium	7782-49-2	2.2	MG_KG	U		0.54	2.2	3.2	2
Yes	CAREFYP-SSD03-1012	METAL	Selenium	7782-49-2	3.63	MG_KG	U		1.20	3.63	7.27	2
Yes	CAREFYP-SD01-1012	METAL	Silver	7440-22-4	1.64	MG_KG	U		0.380	1.64	3.28	1
Yes	CAREFYP-SD02-1012	METAL	Silver	7440-22-4	1.67	MG_KG	U		0.387	1.67	3.34	1
Yes	CAREFYP-SSD01-1012	METAL	Silver	7440-22-4	1.32	MG_KG	U		0.307	1.32	2.65	1
Yes	CAREFYP-SSD02-1012	METAL	Silver	7440-22-4	1.63	MG_KG	U		0.379	1.63	3.27	1
Yes	CAREFS04-SD01-1012	METAL	Thallium	7440-28-0	2.6	MG_KG	U		0.44	2.6	7.7	0.78
Yes	CAREFS04-SD01P-1012	METAL	Thallium	7440-28-0	1.6	MG_KG	U		0.28	1.6	4.8	0.78
Yes	CAREFS04-SD02-1012	METAL	Thallium	7440-28-0	2.3	MG_KG	U		0.39	2.3	6.8	0.78
Yes	CAREFS04-SSD01-1012	METAL	Thallium	7440-28-0	1.0	MG_KG	U		0.17	1.0	3.0	0.78
Yes	CAREFS04-SSD01P-1012	METAL	Thallium	7440-28-0	0.81	MG_KG	U		0.14	0.81	2.4	0.78
Yes	CAREFS04-SSD02-1012	METAL	Thallium	7440-28-0	0.92	MG_KG	U		0.16	0.92	2.8	0.78
Yes	CAREFS04-SSD03-1012	METAL	Thallium	7440-28-0	0.81	MG_KG	U		0.14	0.81	2.4	0.78
Yes	CAREFS04-SSD05-1012	METAL	Thallium	7440-28-0	1.1	MG_KG	U		0.19	1.1	3.3	0.78

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SW01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAREFYP-SW02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAREFYP-SW02P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAREFYP-SW03-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.023	0.050	0.10	0.011
No	CAREFYP-SW01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAREFYP-SW02-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAREFYP-SW02P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAREFYP-SW03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.023	0.050	0.10	0.013
No	CAREFS04-SW01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.048	UG_L	U		0.009	0.048	0.097	0.0005
No	CAREFS04-SW02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.009	0.050	0.10	0.0005
No	CAREFS04-SW02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.009	0.050	0.10	0.0005
No	CAREFS04-SW03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	UL	MSL	0.009	0.050	0.10	0.0005
No	CAREFS04-SW04-1012	PEST/PCB	4,4'-DDT	50-29-3	0.047	UG_L	U		0.008	0.047	0.094	0.0005
No	CAREFS04-SW05-1012	PEST/PCB	4,4'-DDT	50-29-3	0.048	UG_L	U		0.009	0.048	0.095	0.0005
No	CAREFYP-SW01-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAREFYP-SW02-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAREFYP-SW02P-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAREFYP-SW03-1012	PEST/PCB	4,4'-DDT	50-29-3	0.05	UG_L	U		0.024	0.050	0.10	0.0005
No	CAREFS04-SW01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.024	UG_L	U		0.007	0.024	0.048	0.0022
No	CAREFS04-SW02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.025	UG_L	U		0.008	0.025	0.050	0.0022
No	CAREFS04-SW02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.025	UG_L	U		0.008	0.025	0.050	0.0022
No	CAREFS04-SW03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.025	UG_L	UL	MSL	0.008	0.025	0.050	0.0022
No	CAREFS04-SW04-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.024	UG_L	U		0.007	0.024	0.047	0.0022
No	CAREFS04-SW05-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.024	UG_L	U		0.007	0.024	0.048	0.0022
No	CAREFYP-SW01-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAREFYP-SW02-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAREFYP-SW02P-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAREFYP-SW03-1012	PEST/PCB	alpha-Chlordane	5103-71-9	0.05	UG_L	U		0.027	0.050	0.10	0.0022
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.24	UG_L	UL	SSL	0.14	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.25	UG_L	U		0.15	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.25	UG_L	U		0.15	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.25	UG_L	UL	SSL	0.15	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.24	UG_L	U		0.14	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.24	UG_L	U		0.14	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1016	12674-11-2	0.5	UG_L	U		0.32	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.24	UG_L	UL	SSL	0.19	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.25	UG_L	U		0.2	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.25	UG_L	U		0.2	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.25	UG_L	UL	SSL	0.2	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.24	UG_L	U		0.19	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.24	UG_L	U		0.19	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1221	11104-28-2	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.24	UG_L	UL	SSL	0.086	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.25	UG_L	U		0.089	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.25	UG_L	U		0.09	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.25	UG_L	UL	SSL	0.089	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.24	UG_L	U		0.084	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.24	UG_L	U		0.085	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1232	11141-16-5	0.5	UG_L	U		0.45	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.24	UG_L	UL	SSL	0.17	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.25	UG_L	U		0.18	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.25	UG_L	U		0.18	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.25	UG_L	UL	SSL	0.18	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.24	UG_L	U		0.17	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.24	UG_L	U		0.17	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1242	53469-21-9	0.5	UG_L	U		0.49	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.24	UG_L	UL	SSL	0.19	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.25	UG_L	U		0.2	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.25	UG_L	U		0.2	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.25	UG_L	UL	SSL	0.2	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.24	UG_L	U		0.19	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.24	UG_L	U		0.19	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1248	12672-29-6	0.5	UG_L	U		0.24	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.24	UG_L	UL	SSL	0.08	0.24	0.48	0.000074

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.25	UG_L	U		0.082	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.25	UG_L	U		0.083	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.25	UG_L	UL	SSL	0.082	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.24	UG_L	U		0.077	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.24	UG_L	UL	SSL	0.078	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1254	11097-69-1	0.5	UG_L	U		0.46	0.50	1.0	0.000074
No	CAREFS04-SW01-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.24	UG_L	UL	SSL	0.16	0.24	0.48	0.000074
No	CAREFS04-SW02-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.25	UG_L	U		0.17	0.25	0.50	0.000074
No	CAREFS04-SW02P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.25	UG_L	U		0.17	0.25	0.50	0.000074
No	CAREFS04-SW03-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.25	UG_L	UL	SSL	0.17	0.25	0.50	0.000074
No	CAREFS04-SW04-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.24	UG_L	U		0.16	0.24	0.47	0.000074
No	CAREFS04-SW05-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.24	UG_L	U		0.16	0.24	0.48	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAREFYP-SW02-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAREFYP-SW02P-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAREFYP-SW03-1012	PEST/PCB	Aroclor-1260	11096-82-5	0.5	UG_L	U		0.48	0.50	1.0	0.000074
No	CAREFYP-SW01-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAREFYP-SW02-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAREFYP-SW02P-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAREFYP-SW03-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.031	0.050	0.10	0.015
No	CAREFYP-SW01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAREFYP-SW02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAREFYP-SW02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAREFYP-SW03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.05	UG_L	U		0.035	0.050	0.10	0.01
No	CAREFS04-SW01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.024	UG_L	U		0.006	0.024	0.048	0.0022
No	CAREFS04-SW02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.025	UG_L	U		0.006	0.025	0.050	0.0022
No	CAREFS04-SW02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.025	UG_L	U		0.006	0.025	0.050	0.0022
No	CAREFS04-SW03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.025	UG_L	UL	MSL	0.006	0.025	0.050	0.0022
No	CAREFS04-SW04-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.024	UG_L	U		0.006	0.024	0.047	0.0022
No	CAREFS04-SW05-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.024	UG_L	U		0.006	0.024	0.048	0.0022
No	CAREFYP-SW01-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAREFYP-SW02-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAREFYP-SW02P-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAREFYP-SW03-1012	PEST/PCB	gamma-Chlordane	5103-74-2	0.05	UG_L	U		0.038	0.050	0.10	0.0022
No	CAREFS04-SW01-1012	PEST/PCB	Heptachlor	76-44-8	0.024	UG_L	U		0.008	0.024	0.048	0.0019
No	CAREFS04-SW02-1012	PEST/PCB	Heptachlor	76-44-8	0.025	UG_L	U		0.008	0.025	0.050	0.0019
No	CAREFS04-SW02P-1012	PEST/PCB	Heptachlor	76-44-8	0.025	UG_L	U		0.008	0.025	0.050	0.0019
No	CAREFS04-SW03-1012	PEST/PCB	Heptachlor	76-44-8	0.025	UG_L	UL	MSL	0.008	0.025	0.050	0.0019
No	CAREFS04-SW04-1012	PEST/PCB	Heptachlor	76-44-8	0.024	UG_L	U		0.008	0.024	0.047	0.0019
No	CAREFS04-SW05-1012	PEST/PCB	Heptachlor	76-44-8	0.024	UG_L	U		0.008	0.024	0.048	0.0019
No	CAREFYP-SW01-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAREFYP-SW02-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAREFYP-SW02P-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAREFYP-SW03-1012	PEST/PCB	Heptachlor	76-44-8	0.05	UG_L	U		0.038	0.050	0.10	0.0019
No	CAREFS04-SW01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.024	UG_L	U		0.007	0.024	0.048	0.0019
No	CAREFS04-SW02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.025	UG_L	U		0.007	0.025	0.050	0.0019
No	CAREFS04-SW02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.025	UG_L	U		0.008	0.025	0.050	0.0019
No	CAREFS04-SW03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.025	UG_L	UL	MSL	0.007	0.025	0.050	0.0019
No	CAREFS04-SW04-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.024	UG_L	U		0.007	0.024	0.047	0.0019
No	CAREFS04-SW05-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.024	UG_L	U		0.007	0.024	0.048	0.0019
No	CAREFYP-SW01-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAREFYP-SW02-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAREFYP-SW02P-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAREFYP-SW03-1012	PEST/PCB	Heptachlor epoxide	1024-57-3	0.05	UG_L	U		0.027	0.050	0.10	0.0019
No	CAREFYP-SW01-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAREFYP-SW02-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAREFYP-SW02P-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAREFYP-SW03-1012	PEST/PCB	Methoxychlor	72-43-5	0.05	UG_L	U		0.024	0.050	0.10	0.019
No	CAREFS04-SW01-1012	PEST/PCB	Toxaphene	8001-35-2	0.48	UG_L	U		0.16	0.48	0.97	0.0002
No	CAREFS04-SW02-1012	PEST/PCB	Toxaphene	8001-35-2	0.5	UG_L	U		0.17	0.50	1.0	0.0002
No	CAREFS04-SW02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.5	UG_L	U		0.17	0.50	1.0	0.0002
No	CAREFS04-SW03-1012	PEST/PCB	Toxaphene	8001-35-2	0.5	UG_L	UL	MSL	0.17	0.50	1.0	0.0002
No	CAREFS04-SW04-1012	PEST/PCB	Toxaphene	8001-35-2	0.47	UG_L	U		0.16	0.47	0.94	0.0002
No	CAREFS04-SW05-1012	PEST/PCB	Toxaphene	8001-35-2	0.48	UG_L	U		0.16	0.48	0.95	0.0002
No	CAREFYP-SW01-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAREFYP-SW02-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAREFYP-SW02P-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAREFYP-SW03-1012	PEST/PCB	Toxaphene	8001-35-2	0.64	UG_L	U		0.32	0.64	1.3	0.0002
No	CAREFS04-SW01-1012	SVOC	1,1-Biphenyl	92-52-4	7.4	UG_L	U		2.6	7.4	9.8	0.83
No	CAREFS04-SW02-1012	SVOC	1,1-Biphenyl	92-52-4	7.5	UG_L	U		2.7	7.5	10.	0.83
No	CAREFS04-SW02P-1012	SVOC	1,1-Biphenyl	92-52-4	7.5	UG_L	U		2.7	7.5	10.	0.83
No	CAREFS04-SW03-1012	SVOC	1,1-Biphenyl	92-52-4	7.3	UG_L	U		2.6	7.3	9.7	0.83
No	CAREFS04-SW04-1012	SVOC	1,1-Biphenyl	92-52-4	7.4	UG_L	U		2.7	7.4	9.9	0.83
No	CAREFS04-SW05-1012	SVOC	1,1-Biphenyl	92-52-4	7.2	UG_L	U		2.6	7.2	9.6	0.83
No	CAREFYP-SW01-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAREFYP-SW02-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SW02P-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	U		7	9.0	10	0.83
No	CAREFYP-SW03-1012	SVOC	1,1-Biphenyl	92-52-4	9	UG_L	UL	MSL	7	9.0	10	0.83
No	CAREFS04-SW01-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.4	UG_L	U		1.8	7.4	9.8	1.2
No	CAREFS04-SW02-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.5	UG_L	U		1.8	7.5	10.	1.2
No	CAREFS04-SW02P-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.5	UG_L	U		1.8	7.5	10.	1.2
No	CAREFS04-SW03-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.3	UG_L	U		1.7	7.3	9.7	1.2
No	CAREFS04-SW04-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.4	UG_L	U		1.8	7.4	9.9	1.2
No	CAREFS04-SW05-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	7.2	UG_L	U		1.7	7.2	9.6	1.2
No	CAREFYP-SW01-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAREFYP-SW02-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAREFYP-SW02P-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAREFYP-SW03-1012	SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	6	UG_L	U		3.2	6.0	10	1.2
No	CAREFYP-SW01-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAREFYP-SW02-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAREFYP-SW02P-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAREFYP-SW03-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	6	UG_L	U		3.1	6.0	10	3.1
No	CAREFS04-SW01-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.4	UG_L	U		2.6	7.4	9.8	1.2
No	CAREFS04-SW02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.5	UG_L	U		2.7	7.5	10.	1.2
No	CAREFS04-SW02P-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.5	UG_L	U		2.7	7.5	10.	1.2
No	CAREFS04-SW03-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.3	UG_L	UL	MSL	2.6	7.3	9.7	1.2
No	CAREFS04-SW04-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.4	UG_L	U		2.7	7.4	9.9	1.2
No	CAREFS04-SW05-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	7.2	UG_L	U		2.6	7.2	9.6	1.2
No	CAREFYP-SW01-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAREFYP-SW02-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAREFYP-SW02P-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	U		4.7	6.0	10	1.2
No	CAREFYP-SW03-1012	SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	6	UG_L	UL	MSL	4.7	6.0	10	1.2
No	CAREFS04-SW01-1012	SVOC	2-Chloronaphthalene	91-58-7	7.4	UG_L	U		2.8	7.4	9.8	0.4
No	CAREFS04-SW02-1012	SVOC	2-Chloronaphthalene	91-58-7	7.5	UG_L	U		2.9	7.5	10.	0.4
No	CAREFS04-SW02P-1012	SVOC	2-Chloronaphthalene	91-58-7	7.5	UG_L	U		2.9	7.5	10.	0.4
No	CAREFS04-SW03-1012	SVOC	2-Chloronaphthalene	91-58-7	7.3	UG_L	U		2.8	7.3	9.7	0.4
No	CAREFS04-SW04-1012	SVOC	2-Chloronaphthalene	91-58-7	7.4	UG_L	U		2.9	7.4	9.9	0.4
No	CAREFS04-SW05-1012	SVOC	2-Chloronaphthalene	91-58-7	7.2	UG_L	U		2.8	7.2	9.6	0.4
No	CAREFYP-SW01-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAREFYP-SW02-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAREFYP-SW02P-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	U		3	3.0	10	0.4
No	CAREFYP-SW03-1012	SVOC	2-Chloronaphthalene	91-58-7	3	UG_L	UL	MSL	3	3.0	10	0.4
No	CAREFS04-SW01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.4	UG_L	U		1.1	7.4	9.8	1.1
No	CAREFS04-SW02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.5	UG_L	U		1.1	7.5	10.	1.1
No	CAREFS04-SW02P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.5	UG_L	U		1.1	7.5	10.	1.1
No	CAREFS04-SW03-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.3	UG_L	U		1.1	7.3	9.7	1.1
No	CAREFS04-SW04-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.4	UG_L	U		1.1	7.4	9.9	1.1
No	CAREFYP-SW01-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAREFYP-SW02-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAREFYP-SW02P-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAREFYP-SW03-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	6	UG_L	U		3.2	6.0	10	1.1
No	CAREFS04-SW01-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	18	UG_L	U		2	18.	24.	1.2
No	CAREFS04-SW02-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	19	UG_L	U		2	19.	25.	1.2
No	CAREFS04-SW02P-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	19	UG_L	U		2	19.	25.	1.2
No	CAREFS04-SW03-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	18	UG_L	UL	MSL	1.9	18.	24.	1.2
No	CAREFS04-SW04-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	19	UG_L	U		2	19.	25.	1.2
No	CAREFS04-SW05-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	18	UG_L	U		1.9	18.	24.	1.2
No	CAREFYP-SW01-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAREFYP-SW02-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAREFYP-SW02P-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAREFYP-SW03-1012	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	6	UG_L	U		6	6.0	10	1.2
No	CAREFS04-SW01-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.4	UG_L	U		1.9	7.4	9.8	1.5
No	CAREFS04-SW02-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.5	UG_L	U		1.9	7.5	10.	1.5
No	CAREFS04-SW02P-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.5	UG_L	U		1.9	7.5	10.	1.5
No	CAREFS04-SW03-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.3	UG_L	U		1.8	7.3	9.7	1.5
No	CAREFS04-SW04-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.4	UG_L	U		1.9	7.4	9.9	1.5
No	CAREFS04-SW05-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	7.2	UG_L	U		1.8	7.2	9.6	1.5
No	CAREFYP-SW01-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAREFYP-SW02-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAREFYP-SW02P-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAREFYP-SW03-1012	SVOC	4-Bromophenyl-phenylether	101-55-3	6	UG_L	U		3.3	6.0	10	1.5
No	CAREFS04-SW01-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.4	UG_L	U		3.5	7.4	9.8	0.3
No	CAREFS04-SW02-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.5	UG_L	U		3.6	7.5	10.	0.3
No	CAREFS04-SW02P-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.5	UG_L	U		3.6	7.5	10.	0.3
No	CAREFS04-SW03-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.3	UG_L	U		3.5	7.3	9.7	0.3
No	CAREFS04-SW04-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.4	UG_L	U		3.6	7.4	9.9	0.3
No	CAREFS04-SW05-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	7.2	UG_L	U		3.5	7.2	9.6	0.3
No	CAREFYP-SW01-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAREFYP-SW02-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAREFYP-SW02P-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAREFYP-SW03-1012	SVOC	4-Chloro-3-methylphenol	59-50-7	6	UG_L	U		2.6	6.0	10	0.3
No	CAREFS04-SW01-1012	SVOC	4-Nitrophenol	100-02-7	18	UG_L	U		1.8	18.	24.	1.2
No	CAREFS04-SW02-1012	SVOC	4-Nitrophenol	100-02-7	19	UG_L	U		1.8	19.	25.	1.2
No	CAREFS04-SW02P-1012	SVOC	4-Nitrophenol	100-02-7	19	UG_L	U		1.8	19.	25.	1.2
No	CAREFS04-SW03-1012	SVOC	4-Nitrophenol	100-02-7	18	UG_L	U		1.7	18.	24.	1.2

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SW04-1012	SVOC	4-Nitrophenol	100-02-7	19	UG_L	U		1.8	19.	25.	1.2
No	CAREFS04-SW05-1012	SVOC	4-Nitrophenol	100-02-7	18	UG_L	U		1.7	18.	24.	1.2
No	CAREFYP-SW01-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAREFYP-SW02-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAREFYP-SW02P-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAREFYP-SW03-1012	SVOC	4-Nitrophenol	100-02-7	3	UG_L	U		2.3	3.0	10	1.2
No	CAREFS04-SW01-1012	SVOC	Anthracene	120-12-7	0.095	UG_L	U		0.042	0.095	0.19	0.012
No	CAREFS04-SW02-1012	SVOC	Anthracene	120-12-7	0.1	UG_L	U		0.044	0.10	0.20	0.012
No	CAREFS04-SW02P-1012	SVOC	Anthracene	120-12-7	0.096	UG_L	U		0.042	0.096	0.19	0.012
No	CAREFS04-SW03-1012	SVOC	Anthracene	120-12-7	0.095	UG_L	U		0.042	0.095	0.19	0.012
No	CAREFS04-SW04-1012	SVOC	Anthracene	120-12-7	0.095	UG_L	U		0.042	0.095	0.19	0.012
No	CAREFS04-SW05-1012	SVOC	Anthracene	120-12-7	0.095	UG_L	U		0.042	0.095	0.19	0.012
No	CAREFYP-SW01-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	UL	SSL	0.044	0.080	0.10	0.012
No	CAREFYP-SW02-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAREFYP-SW02P-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAREFYP-SW03-1012	SVOC	Anthracene	120-12-7	0.08	UG_L	U		0.044	0.080	0.10	0.012
No	CAREFS04-SW01-1012	SVOC	Atrazine	1912-24-9	7.4	UG_L	UJ	2S	3.2	7.4	9.8	1.8
No	CAREFS04-SW02-1012	SVOC	Atrazine	1912-24-9	7.5	UG_L	UJ	2S	3.3	7.5	10.	1.8
No	CAREFS04-SW02P-1012	SVOC	Atrazine	1912-24-9	7.5	UG_L	UJ	2S	3.3	7.5	10.	1.8
No	CAREFS04-SW03-1012	SVOC	Atrazine	1912-24-9	7.3	UG_L	UJ	2S	3.2	7.3	9.7	1.8
No	CAREFS04-SW04-1012	SVOC	Atrazine	1912-24-9	7.4	UG_L	UJ	2S	3.3	7.4	9.9	1.8
No	CAREFS04-SW05-1012	SVOC	Atrazine	1912-24-9	7.2	UG_L	UJ	2S	3.2	7.2	9.6	1.8
No	CAREFYP-SW01-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAREFYP-SW02-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAREFYP-SW02P-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAREFYP-SW03-1012	SVOC	Atrazine	1912-24-9	3	UG_L	U		2.9	3.0	10	1.8
No	CAREFS04-SW01-1012	SVOC	Benzo(a)anthracene	56-55-3	0.095	UG_L	U		0.044	0.095	0.19	0.018
No	CAREFS04-SW02-1012	SVOC	Benzo(a)anthracene	56-55-3	0.1	UG_L	U		0.046	0.10	0.20	0.018
No	CAREFS04-SW02P-1012	SVOC	Benzo(a)anthracene	56-55-3	0.096	UG_L	U		0.044	0.096	0.19	0.018
No	CAREFS04-SW03-1012	SVOC	Benzo(a)anthracene	56-55-3	0.095	UG_L	UL	MSL	0.044	0.095	0.19	0.018
No	CAREFS04-SW04-1012	SVOC	Benzo(a)anthracene	56-55-3	0.095	UG_L	U		0.044	0.095	0.19	0.018
No	CAREFS04-SW05-1012	SVOC	Benzo(a)anthracene	56-55-3	0.095	UG_L	U		0.044	0.095	0.19	0.018
No	CAREFYP-SW01-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	UL	SSL	0.049	0.080	0.10	0.018
No	CAREFYP-SW02-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAREFYP-SW02P-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAREFYP-SW03-1012	SVOC	Benzo(a)anthracene	56-55-3	0.08	UG_L	U		0.049	0.080	0.10	0.018
No	CAREFS04-SW01-1012	SVOC	Benzo(a)pyrene	50-32-8	0.095	UG_L	U		0.063	0.095	0.19	0.014
No	CAREFS04-SW02-1012	SVOC	Benzo(a)pyrene	50-32-8	0.1	UG_L	U		0.067	0.10	0.20	0.014
No	CAREFS04-SW02P-1012	SVOC	Benzo(a)pyrene	50-32-8	0.096	UG_L	U		0.063	0.096	0.19	0.014
No	CAREFS04-SW03-1012	SVOC	Benzo(a)pyrene	50-32-8	0.095	UG_L	UL	MSL	0.063	0.095	0.19	0.014
No	CAREFS04-SW04-1012	SVOC	Benzo(a)pyrene	50-32-8	0.095	UG_L	U		0.063	0.095	0.19	0.014
No	CAREFS04-SW05-1012	SVOC	Benzo(a)pyrene	50-32-8	0.095	UG_L	U		0.063	0.095	0.19	0.014
No	CAREFYP-SW01-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	UL	SSL	0.058	0.080	0.10	0.014
No	CAREFYP-SW02-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAREFYP-SW02P-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAREFYP-SW03-1012	SVOC	Benzo(a)pyrene	50-32-8	0.08	UG_L	U		0.058	0.080	0.10	0.014
No	CAREFS04-SW01-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.4	UG_L	U		2	7.4	9.8	0.12
No	CAREFS04-SW02-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.5	UG_L	U		2	7.5	10.	0.12
No	CAREFS04-SW02P-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.5	UG_L	U		2	7.5	10.	0.12
No	CAREFS04-SW03-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.3	UG_L	U		1.9	7.3	9.7	0.12
No	CAREFS04-SW04-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.4	UG_L	U		2	7.4	9.9	0.12
No	CAREFS04-SW05-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	7.2	UG_L	U		1.9	7.2	9.6	0.12
No	CAREFYP-SW01-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAREFYP-SW02-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAREFYP-SW02P-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAREFYP-SW03-1012	SVOC	bis(2-Chloroethyl)ether	111-44-4	6	UG_L	U		3.2	6.0	10	0.12
No	CAREFS04-SW01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.095	UG_L	U		0.067	0.095	0.19	0.029
No	CAREFS04-SW02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.1	UG_L	U		0.071	0.10	0.20	0.029
No	CAREFS04-SW02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.096	UG_L	U		0.067	0.096	0.19	0.029
No	CAREFS04-SW03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.095	UG_L	UL	MSL	0.067	0.095	0.19	0.029
No	CAREFS04-SW04-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.095	UG_L	U		0.067	0.095	0.19	0.029
No	CAREFS04-SW05-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.095	UG_L	U		0.067	0.095	0.19	0.029
No	CAREFYP-SW01-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	UL	SSL	0.069	0.080	0.10	0.029
No	CAREFYP-SW02-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAREFYP-SW02P-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAREFYP-SW03-1012	SVOC	Dibenz(a,h)anthracene	53-70-3	0.08	UG_L	U		0.069	0.080	0.10	0.029
No	CAREFS04-SW01-1012	SVOC	Fluoranthene	206-44-0	0.095	UG_L	U		0.07	0.095	0.19	0.04
No	CAREFS04-SW02-1012	SVOC	Fluoranthene	206-44-0	0.1	UG_L	U		0.074	0.10	0.20	0.04
No	CAREFS04-SW02P-1012	SVOC	Fluoranthene	206-44-0	0.096	UG_L	U		0.07	0.096	0.19	0.04
No	CAREFS04-SW03-1012	SVOC	Fluoranthene	206-44-0	0.095	UG_L	UL	MSL	0.07	0.095	0.19	0.04
No	CAREFS04-SW04-1012	SVOC	Fluoranthene	206-44-0	0.095	UG_L	U		0.07	0.095	0.19	0.04
No	CAREFS04-SW05-1012	SVOC	Fluoranthene	206-44-0	0.095	UG_L	U		0.07	0.095	0.19	0.04
No	CAREFYP-SW01-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	UL	SSL	0.054	0.080	0.10	0.04
No	CAREFYP-SW02-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAREFYP-SW02P-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAREFYP-SW03-1012	SVOC	Fluoranthene	206-44-0	0.08	UG_L	U		0.054	0.080	0.10	0.04
No	CAREFS04-SW01-1012	SVOC	Hexachlorobenzene	118-74-1	7.4	UG_L	U		2	7.4	9.8	0.0003
No	CAREFS04-SW02-1012	SVOC	Hexachlorobenzene	118-74-1	7.5	UG_L	U		2.1	7.5	10.	0.0003
No	CAREFS04-SW02P-1012	SVOC	Hexachlorobenzene	118-74-1	7.5	UG_L	U		2.1	7.5	10.	0.0003

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFS04-SW03-1012	SVOC	Hexachlorobenzene	118-74-1	7.3	UG_L	U		2	7.3	9.7	0.0003
No	CAREFS04-SW04-1012	SVOC	Hexachlorobenzene	118-74-1	7.4	UG_L	U		2.1	7.4	9.9	0.0003
No	CAREFS04-SW05-1012	SVOC	Hexachlorobenzene	118-74-1	7.2	UG_L	U		2	7.2	9.6	0.0003
No	CAREFYP-SW01-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAREFYP-SW02-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAREFYP-SW02P-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAREFYP-SW03-1012	SVOC	Hexachlorobenzene	118-74-1	3	UG_L	U		3	3.0	10	0.0003
No	CAREFS04-SW01-1012	SVOC	Hexachlorobutadiene	87-68-3	7.4	UG_L	U		1.8	7.4	9.8	1.3
No	CAREFS04-SW02-1012	SVOC	Hexachlorobutadiene	87-68-3	7.5	UG_L	U		1.8	7.5	10.	1.3
No	CAREFS04-SW02P-1012	SVOC	Hexachlorobutadiene	87-68-3	7.5	UG_L	U		1.8	7.5	10.	1.3
No	CAREFS04-SW03-1012	SVOC	Hexachlorobutadiene	87-68-3	7.3	UG_L	U		1.7	7.3	9.7	1.3
No	CAREFS04-SW04-1012	SVOC	Hexachlorobutadiene	87-68-3	7.4	UG_L	U		1.8	7.4	9.9	1.3
No	CAREFS04-SW05-1012	SVOC	Hexachlorobutadiene	87-68-3	7.2	UG_L	U		1.7	7.2	9.6	1.3
No	CAREFYP-SW01-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAREFYP-SW02-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAREFYP-SW02P-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAREFYP-SW03-1012	SVOC	Hexachlorobutadiene	87-68-3	6	UG_L	U		3.6	6.0	10	1.3
No	CAREFS04-SW01-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.4	UG_L	UJ	2S	1.2	7.4	9.8	1.04
No	CAREFS04-SW02-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.5	UG_L	UJ	2S	1.2	7.5	10.	1.04
No	CAREFS04-SW02P-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.5	UG_L	UJ	2S	1.2	7.5	10.	1.04
No	CAREFS04-SW03-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.3	UG_L	UJ	2S	1.2	7.3	9.7	1.04
No	CAREFS04-SW04-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.4	UG_L	UJ	2S	1.2	7.4	9.9	1.04
No	CAREFS04-SW05-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	7.2	UG_L	UJ	2S	1.2	7.2	9.6	1.04
No	CAREFYP-SW01-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAREFYP-SW02-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAREFYP-SW02P-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAREFYP-SW03-1012	SVOC	Hexachlorocyclopentadiene	77-47-4	6	UG_L	U		3.8	6.0	10	1.04
No	CAREFS04-SW01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.4	UG_L	U		1.9	7.4	9.8	0.093
No	CAREFS04-SW02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.5	UG_L	U		1.9	7.5	10.	0.093
No	CAREFS04-SW02P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.5	UG_L	U		1.9	7.5	10.	0.093
No	CAREFS04-SW03-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.3	UG_L	U		1.8	7.3	9.7	0.093
No	CAREFS04-SW04-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.4	UG_L	U		1.9	7.4	9.9	0.093
No	CAREFS04-SW05-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	7.2	UG_L	U		1.8	7.2	9.6	0.093
No	CAREFYP-SW01-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAREFYP-SW02-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAREFYP-SW02P-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAREFYP-SW03-1012	SVOC	n-Nitroso-di-n-propylamine	621-64-7	6	UG_L	U		3.4	6.0	10	0.093
No	CAREFS04-SW01-1012	SVOC	Pentachlorophenol	87-86-5	18	UG_L	U		2.2	18.	24.	0.35
No	CAREFS04-SW02-1012	SVOC	Pentachlorophenol	87-86-5	19	UG_L	U		2.3	19.	25.	0.35
No	CAREFS04-SW02P-1012	SVOC	Pentachlorophenol	87-86-5	19	UG_L	U		2.3	19.	25.	0.35
No	CAREFS04-SW03-1012	SVOC	Pentachlorophenol	87-86-5	18	UG_L	UL	MSL	2.2	18.	24.	0.35
No	CAREFS04-SW04-1012	SVOC	Pentachlorophenol	87-86-5	19	UG_L	U		2.3	19.	25.	0.35
No	CAREFS04-SW05-1012	SVOC	Pentachlorophenol	87-86-5	18	UG_L	U		2.2	18.	24.	0.35
No	CAREFYP-SW01-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAREFYP-SW02-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAREFYP-SW02P-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAREFYP-SW03-1012	SVOC	Pentachlorophenol	87-86-5	9	UG_L	U		6.3	9.0	10	0.35
No	CAREFS04-SW01-1012	SVOC	Pyrene	129-00-0	0.095	UG_L	U		0.056	0.095	0.19	0.025
No	CAREFS04-SW02-1012	SVOC	Pyrene	129-00-0	0.1	UG_L	U		0.06	0.10	0.20	0.025
No	CAREFS04-SW02P-1012	SVOC	Pyrene	129-00-0	0.096	UG_L	U		0.057	0.096	0.19	0.025
No	CAREFS04-SW03-1012	SVOC	Pyrene	129-00-0	0.095	UG_L	UL	MSL	0.056	0.095	0.19	0.025
No	CAREFS04-SW04-1012	SVOC	Pyrene	129-00-0	0.095	UG_L	U		0.056	0.095	0.19	0.025
No	CAREFS04-SW05-1012	SVOC	Pyrene	129-00-0	0.095	UG_L	U		0.056	0.095	0.19	0.025
No	CAREFYP-SW01-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	UL	SSL	0.053	0.080	0.10	0.025
No	CAREFYP-SW02-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAREFYP-SW02P-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAREFYP-SW03-1012	SVOC	Pyrene	129-00-0	0.08	UG_L	U		0.053	0.080	0.10	0.025
No	CAREFYP-SW01-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAREFYP-SW02-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAREFYP-SW02P-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAREFYP-SW03-1012	VOC	1,1,2-Trichloroethane	79-00-5	1	UG_L	U		0.76	1.0	2.0	0.41
No	CAREFS04-SW01-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFS04-SW02-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFS04-SW02P-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFS04-SW03-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFS04-SW04-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFS04-SW05-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	1	UG_L	U		0.5	1.0	2.0	0.0032
No	CAREFYP-SW01-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAREFYP-SW02-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAREFYP-SW02P-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAREFYP-SW03-1012	VOC	1,2-Dibromo-3-chloropropane	96-12-8	5	UG_L	U		0.96	5.0	10	0.0032
No	CAREFS04-SW01-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFS04-SW02-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFS04-SW02P-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFS04-SW03-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFS04-SW04-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFS04-SW05-1012	VOC	1,2-Dibromoethane	106-93-4	0.5	UG_L	U		0.22	0.50	1.0	0.065
No	CAREFYP-SW01-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAREFYP-SW02-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SW02P-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAREFYP-SW03-1012	VOC	1,2-Dibromoethane	106-93-4	1	UG_L	U		0.78	1.0	2.0	0.065
No	CAREFYP-SW01-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAREFYP-SW02-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAREFYP-SW02P-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAREFYP-SW03-1012	VOC	1,2-Dichlorobenzene	95-50-1	1	UG_L	U		0.73	1.0	2.0	0.7
No	CAREFYP-SW01-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAREFYP-SW02-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAREFYP-SW02P-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAREFYP-SW03-1012	VOC	Carbon disulfide	75-15-0	5	UG_L	U		2.6	5.0	10	0.92
No	CAREFS04-SW01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFS04-SW02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFS04-SW02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFS04-SW03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFS04-SW04-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFS04-SW05-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	0.5	UG_L	U		0.19	0.50	1.0	0.055
No	CAREFYP-SW01-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAREFYP-SW02-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAREFYP-SW02P-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAREFYP-SW03-1012	VOC	cis-1,3-Dichloropropene	10061-01-5	1	UG_L	U		0.59	1.0	2.0	0.055
No	CAREFS04-SW01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFS04-SW02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFS04-SW02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFS04-SW03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFS04-SW04-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFS04-SW05-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	0.5	UG_L	U		0.2	0.50	1.0	0.055
No	CAREFYP-SW01-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAREFYP-SW02-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAREFYP-SW02P-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAREFYP-SW03-1012	VOC	trans-1,3-Dichloropropene	10061-02-6	1	UG_L	U		0.73	1.0	2.0	0.055
No	CAREFS04-SW01-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFS04-SW02-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFS04-SW02P-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFS04-SW03-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFS04-SW04-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFS04-SW05-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.25	1.0	2.0	0.15
No	CAREFYP-SW01-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAREFYP-SW02-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAREFYP-SW02P-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
No	CAREFYP-SW03-1012	VOC	Vinyl chloride	75-01-4	1	UG_L	U		0.71	1.0	2.0	0.15
Yes	CAREFS04-SW01-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	UL	SSL	0.67	2.0	4.0	1.5
Yes	CAREFS04-SW02-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	UL	SSL	0.67	2.0	4.0	1.5
Yes	CAREFS04-SW02P-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	UL	SSL	0.67	2.0	4.0	1.5
Yes	CAREFS04-SW03-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	U		0.67	2.0	4.0	1.5
Yes	CAREFS04-SW04-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	UL	SSL	0.67	2.0	4.0	1.5
Yes	CAREFS04-SW05-1012	EXPLO	Nitroglycerin	55-63-0	2	UG_L	UL	SSL	0.67	2.0	4.0	1.5
Yes	CAREFS04-SW01-1012	PEST/PCB	4,4'-DDD	72-54-8	0.048	UG_L	U		0.009	0.048	0.097	0.011
Yes	CAREFS04-SW02-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.009	0.050	0.10	0.011
Yes	CAREFS04-SW02P-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.009	0.050	0.10	0.011
Yes	CAREFS04-SW03-1012	PEST/PCB	4,4'-DDD	72-54-8	0.05	UG_L	U		0.009	0.050	0.10	0.011
Yes	CAREFS04-SW04-1012	PEST/PCB	4,4'-DDD	72-54-8	0.047	UG_L	U		0.009	0.047	0.094	0.011
Yes	CAREFS04-SW05-1012	PEST/PCB	4,4'-DDD	72-54-8	0.048	UG_L	U		0.009	0.048	0.095	0.011
Yes	CAREFS04-SW01-1012	PEST/PCB	4,4'-DDE	72-55-9	0.048	UG_L	U		0.005	0.048	0.097	0.013
Yes	CAREFS04-SW02-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.005	0.050	0.10	0.013
Yes	CAREFS04-SW02P-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.005	0.050	0.10	0.013
Yes	CAREFS04-SW03-1012	PEST/PCB	4,4'-DDE	72-55-9	0.05	UG_L	U		0.005	0.050	0.10	0.013
Yes	CAREFS04-SW04-1012	PEST/PCB	4,4'-DDE	72-55-9	0.047	UG_L	U		0.005	0.047	0.094	0.013
Yes	CAREFS04-SW05-1012	PEST/PCB	4,4'-DDE	72-55-9	0.048	UG_L	U		0.005	0.048	0.095	0.013
Yes	CAREFYP-SW01-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAREFYP-SW02-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAREFYP-SW02P-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAREFYP-SW03-1012	PEST/PCB	Aldrin	309-00-2	0.05	UG_L	U		0.033	0.050	0.10	0.04
Yes	CAREFS04-SW01-1012	PEST/PCB	Dieldrin	60-57-1	0.048	UG_L	U		0.006	0.048	0.097	0.015
Yes	CAREFS04-SW02-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.007	0.050	0.10	0.015
Yes	CAREFS04-SW02P-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	U		0.007	0.050	0.10	0.015
Yes	CAREFS04-SW03-1012	PEST/PCB	Dieldrin	60-57-1	0.05	UG_L	UL	MSL	0.007	0.050	0.10	0.015
Yes	CAREFS04-SW04-1012	PEST/PCB	Dieldrin	60-57-1	0.047	UG_L	U		0.006	0.047	0.094	0.015
Yes	CAREFS04-SW05-1012	PEST/PCB	Dieldrin	60-57-1	0.048	UG_L	U		0.006	0.048	0.095	0.015
Yes	CAREFS04-SW01-1012	PEST/PCB	Endrin	72-20-8	0.048	UG_L	U		0.008	0.048	0.097	0.036
Yes	CAREFS04-SW02-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.008	0.050	0.10	0.036
Yes	CAREFS04-SW02P-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.009	0.050	0.10	0.036
Yes	CAREFS04-SW03-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	UL	MSL	0.008	0.050	0.10	0.036
Yes	CAREFS04-SW04-1012	PEST/PCB	Endrin	72-20-8	0.047	UG_L	U		0.008	0.047	0.094	0.036
Yes	CAREFS04-SW05-1012	PEST/PCB	Endrin	72-20-8	0.048	UG_L	U		0.008	0.048	0.095	0.036
Yes	CAREFYP-SW01-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAREFYP-SW02-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAREFYP-SW02P-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAREFYP-SW03-1012	PEST/PCB	Endrin	72-20-8	0.05	UG_L	U		0.026	0.050	0.10	0.036
Yes	CAREFS04-SW01-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.024	UG_L	U		0.007	0.024	0.048	0.01

TABLE 3-15
Nondetect Results Reported at Value Greater than the Comparison Criteria
Organics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAREFS04-SW02-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.025	UG_L	U		0.007	0.025	0.050	0.01
Yes	CAREFS04-SW02P-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.025	UG_L	U		0.007	0.025	0.050	0.01
Yes	CAREFS04-SW03-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.025	UG_L	U		0.007	0.025	0.050	0.01
Yes	CAREFS04-SW04-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.024	UG_L	U		0.007	0.024	0.047	0.01
Yes	CAREFS04-SW05-1012	PEST/PCB	gamma-BHC (Lindane)	58-89-9	0.024	UG_L	U		0.007	0.024	0.048	0.01
Yes	CAREFS04-SW01-1012	PEST/PCB	Methoxychlor	72-43-5	0.24	UG_L	U		0.008	0.24	0.48	0.019
Yes	CAREFS04-SW02-1012	PEST/PCB	Methoxychlor	72-43-5	0.25	UG_L	U		0.008	0.25	0.50	0.019
Yes	CAREFS04-SW02P-1012	PEST/PCB	Methoxychlor	72-43-5	0.25	UG_L	U		0.009	0.25	0.50	0.019
Yes	CAREFS04-SW03-1012	PEST/PCB	Methoxychlor	72-43-5	0.25	UG_L	U		0.008	0.25	0.50	0.019
Yes	CAREFS04-SW04-1012	PEST/PCB	Methoxychlor	72-43-5	0.24	UG_L	U		0.008	0.24	0.47	0.019
Yes	CAREFS04-SW05-1012	PEST/PCB	Methoxychlor	72-43-5	0.24	UG_L	U		0.008	0.24	0.48	0.019
Yes	CAREFS04-SW01-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.4	UG_L	UJ	2S	2	7.4	9.8	3.1
Yes	CAREFS04-SW02-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.5	UG_L	UJ	2S	2.1	7.5	10.	3.1
Yes	CAREFS04-SW02P-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.5	UG_L	UJ	2S	2.1	7.5	10.	3.1
Yes	CAREFS04-SW03-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.3	UG_L	UJ	2S	2	7.3	9.7	3.1
Yes	CAREFS04-SW04-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.4	UG_L	UJ	2S	2.1	7.4	9.9	3.1
Yes	CAREFS04-SW05-1012	SVOC	2,2'-Oxybis(1-chloropropane)	108-60-1	7.2	UG_L	UJ	2S	2	7.2	9.6	3.1
Yes	CAREFS04-SW01-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.4	UG_L	U		2.6	7.4	9.8	4.9
Yes	CAREFS04-SW02-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.5	UG_L	U		2.7	7.5	10.	4.9
Yes	CAREFS04-SW02P-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.5	UG_L	U		2.7	7.5	10.	4.9
Yes	CAREFS04-SW03-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.3	UG_L	UL	MSL	2.6	7.3	9.7	4.9
Yes	CAREFS04-SW04-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.4	UG_L	U		2.7	7.4	9.9	4.9
Yes	CAREFS04-SW05-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	7.2	UG_L	U		2.6	7.2	9.6	4.9
Yes	CAREFYP-SW01-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAREFYP-SW02-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAREFYP-SW02P-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	U		3.7	6.0	10	4.9
Yes	CAREFYP-SW03-1012	SVOC	2,4,6-Trichlorophenol	88-06-2	6	UG_L	UL	MSL	3.7	6.0	10	4.9
Yes	CAREFS04-SW02-1012	SVOC	2,4-Dinitrophenol	51-28-5	19	UG_L	U		1	19.	25.	19
Yes	CAREFS04-SW02P-1012	SVOC	2,4-Dinitrophenol	51-28-5	19	UG_L	U		1	19.	25.	19
Yes	CAREFS04-SW04-1012	SVOC	2,4-Dinitrophenol	51-28-5	19	UG_L	U		0.99	19.	25.	19
Yes	CAREFS04-SW05-1012	SVOC	3,3'-Dichlorobenzidine	91-94-1	7.2	UG_L	U		1	7.2	9.6	1.1
Yes	CAREFS04-SW01-1012	SVOC	4-Chloroaniline	106-47-8	7.4	UG_L	U		1.9	7.4	9.8	3.2
Yes	CAREFS04-SW02-1012	SVOC	4-Chloroaniline	106-47-8	7.5	UG_L	U		1.9	7.5	10.	3.2
Yes	CAREFS04-SW02P-1012	SVOC	4-Chloroaniline	106-47-8	7.5	UG_L	U		1.9	7.5	10.	3.2
Yes	CAREFS04-SW03-1012	SVOC	4-Chloroaniline	106-47-8	7.3	UG_L	U		1.8	7.3	9.7	3.2
Yes	CAREFS04-SW04-1012	SVOC	4-Chloroaniline	106-47-8	7.4	UG_L	U		1.9	7.4	9.9	3.2
Yes	CAREFS04-SW05-1012	SVOC	4-Chloroaniline	106-47-8	7.2	UG_L	U		1.8	7.2	9.6	3.2
Yes	CAREFYP-SW01-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAREFYP-SW02-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAREFYP-SW02P-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAREFYP-SW03-1012	SVOC	4-Chloroaniline	106-47-8	6	UG_L	U		2.7	6.0	10	3.2
Yes	CAREFS04-SW01-1012	SVOC	Dibenzofuran	132-64-9	7.4	UG_L	U		1.6	7.4	9.8	3.7
Yes	CAREFS04-SW02-1012	SVOC	Dibenzofuran	132-64-9	7.5	UG_L	U		1.6	7.5	10.	3.7
Yes	CAREFS04-SW02P-1012	SVOC	Dibenzofuran	132-64-9	7.5	UG_L	U		1.6	7.5	10.	3.7
Yes	CAREFS04-SW03-1012	SVOC	Dibenzofuran	132-64-9	7.3	UG_L	U		1.6	7.3	9.7	3.7
Yes	CAREFS04-SW04-1012	SVOC	Dibenzofuran	132-64-9	7.4	UG_L	U		1.6	7.4	9.9	3.7
Yes	CAREFS04-SW05-1012	SVOC	Dibenzofuran	132-64-9	7.2	UG_L	U		1.5	7.2	9.6	3.7
Yes	CAREFS04-SW01-1012	SVOC	Hexachloroethane	67-72-1	7.4	UG_L	U		2.2	7.4	9.8	5.1
Yes	CAREFS04-SW02-1012	SVOC	Hexachloroethane	67-72-1	7.5	UG_L	U		2.3	7.5	10.	5.1
Yes	CAREFS04-SW02P-1012	SVOC	Hexachloroethane	67-72-1	7.5	UG_L	U		2.3	7.5	10.	5.1
Yes	CAREFS04-SW03-1012	SVOC	Hexachloroethane	67-72-1	7.3	UG_L	U		2.2	7.3	9.7	5.1
Yes	CAREFS04-SW04-1012	SVOC	Hexachloroethane	67-72-1	7.4	UG_L	U		2.3	7.4	9.9	5.1
Yes	CAREFS04-SW05-1012	SVOC	Hexachloroethane	67-72-1	7.2	UG_L	U		2.2	7.2	9.6	5.1
Yes	CAREFS04-SW01-1012	SVOC	Phenol	108-95-2	7.4	UG_L	U		1.8	7.4	9.8	4
Yes	CAREFS04-SW02-1012	SVOC	Phenol	108-95-2	7.5	UG_L	U		1.8	7.5	10.	4
Yes	CAREFS04-SW02P-1012	SVOC	Phenol	108-95-2	7.5	UG_L	U		1.8	7.5	10.	4
Yes	CAREFS04-SW03-1012	SVOC	Phenol	108-95-2	7.3	UG_L	U		1.7	7.3	9.7	4
Yes	CAREFS04-SW04-1012	SVOC	Phenol	108-95-2	7.4	UG_L	U		1.8	7.4	9.9	4
Yes	CAREFS04-SW05-1012	SVOC	Phenol	108-95-2	7.2	UG_L	U		1.7	7.2	9.6	4
Yes	CAREFYP-SW01-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAREFYP-SW02-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAREFYP-SW02P-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAREFYP-SW03-1012	VOC	1,1,2,2-Tetrachloroethane	79-34-5	1	UG_L	U		0.54	1.0	2.0	0.66
Yes	CAREFS04-SW01-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41
Yes	CAREFS04-SW02-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41
Yes	CAREFS04-SW02P-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41
Yes	CAREFS04-SW03-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41
Yes	CAREFS04-SW04-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41
Yes	CAREFS04-SW05-1012	VOC	1,1,2-Trichloroethane	79-00-5	0.5	UG_L	U		0.33	0.50	1.0	0.41

TABLE 3-16
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
No	CAREFYP-SW02-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAREFYP-SW02P-1012	FMETAL	Chromium	7440-47-3	3	UG_L	U		0.45	3.00	6.00	0.31
No	CAREFS04-SW01-1012	FMETAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW02-1012	FMETAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW02P-1012	FMETAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW05-1012	FMETAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW02-1012	METAL	Chromium	7440-47-3	4	UG_L	U		0.36	4.0	10	0.31
No	CAREFS04-SW01-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW02-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW02P-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW03-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW04-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW05-1012	METAL	CYANIDE	57-12-5	8	UG_L	U		4	8.0	10.	1.4
No	CAREFS04-SW02-1012	METAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	1
No	CAREFS04-SW02P-1012	METAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	1
No	CAREFS04-SW03-1012	METAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	1
No	CAREFS04-SW04-1012	METAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	1
No	CAREFS04-SW05-1012	METAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	1
No	CAREFS04-SW01-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW02-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW02P-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW03-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW04-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
No	CAREFS04-SW05-1012	METAL	Thallium	7440-28-0	5	UG_L	U		1.07	5.0	15	0.16
Yes	CAREFYP-SW01-1012	FMETAL	Aluminum	7429-90-5	250	UG_L	U		68	250	500	87
Yes	CAREFYP-SW02P-1012	FMETAL	Aluminum	7429-90-5	250	UG_L	U		68	250	500	87
Yes	CAREFS04-SW01-1012	FMETAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.399376466
Yes	CAREFS04-SW02-1012	FMETAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.399376466
Yes	CAREFS04-SW03-1012	FMETAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.399376466
Yes	CAREFS04-SW04-1012	FMETAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.399376466
Yes	CAREFS04-SW05-1012	FMETAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.399376466
Yes	CAREFYP-SW01-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAREFYP-SW02-1012	FMETAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.399376466
Yes	CAREFS04-SW01-1012	FMETAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	4.61
Yes	CAREFS04-SW02-1012	FMETAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	4.61
Yes	CAREFS04-SW03-1012	FMETAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	4.61
Yes	CAREFS04-SW04-1012	FMETAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	4.61
Yes	CAREFS04-SW05-1012	FMETAL	Selenium	7782-49-2	7	UG_L	U		2.36	7.0	10	4.61
Yes	CAREFS04-SW01-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW02-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW02P-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW03-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW04-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW05-1012	FMETAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFYP-SW01-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFYP-SW02-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFYP-SW02P-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFYP-SW03-1012	FMETAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFS04-SW01-1012	METAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.453944019
Yes	CAREFS04-SW02-1012	METAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.453944019
Yes	CAREFS04-SW02P-1012	METAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.453944019
Yes	CAREFS04-SW03-1012	METAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.453944019
Yes	CAREFS04-SW04-1012	METAL	Cadmium	7440-43-9	3	UG_L	U		0.05	3.0	5.0	0.453944019
Yes	CAREFYP-SW01-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAREFYP-SW02-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAREFYP-SW02P-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAREFYP-SW03-1012	METAL	Cadmium	7440-43-9	4	UG_L	U		0.11	4.00	8.00	0.453944019
Yes	CAREFS04-SW01-1012	METAL	Mercury	7439-97-6	0.1	UG_L	U		0.01	0.10	0.20	0.026
Yes	CAREFS04-SW04-1012	METAL	Mercury	7439-97-6	0.1	UG_L	U		0.01	0.10	0.20	0.026
Yes	CAREFYP-SW01-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAREFYP-SW02-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAREFYP-SW02P-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAREFYP-SW03-1012	METAL	Mercury	7439-97-6	0.069	UG_L	U		0.023	0.0690	0.200	0.026
Yes	CAREFYP-SW01-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAREFYP-SW02-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAREFYP-SW02P-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAREFYP-SW03-1012	METAL	Selenium	7782-49-2	2.6	UG_L	U		0.65	2.60	5.20	1
Yes	CAREFS04-SW01-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW02-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW02P-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW03-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW04-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFS04-SW05-1012	METAL	Silver	7440-22-4	4	UG_L	U		0.27	4.0	10	0.36
Yes	CAREFYP-SW01-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFYP-SW02-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16

TABLE 3-16
Nondetect Results Reported at Value Greater than the Comparison Criteria
Inorganics in Reference Surface Water

DL meets Action Limit?	Sample Name	Analysis Group	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
Yes	CAREFYP-SW02P-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16
Yes	CAREFYP-SW03-1012	METAL	Thallium	7440-28-0	0.23	UG_L	U		0.058	0.230	0.460	0.16

SECTION 4

Data Quality Evaluation

In this section data qualifiers and the reason for their use are presented by site, media, and analytical grouping. Qualifiers and the reason codes are defined in **Section 2**.

Each subsection by site, media, and analytical grouping includes a summary table of qualifications. The table shows the qualifiers and the reason for their use in order of decreasing frequency, and each qualifier is identified as being either available as reported by the laboratory, available as qualified by the validator, or not available. The impact on Precision, Accuracy, Representativeness, Completeness and Comparability (PARCC) is identified. Statistics are also included: a count and percentage of the number of instances of each type of qualification is shown. Note that the statistics in these tables consider only parent and field duplicate results; data for quality control samples such as MS/MSD and blanks are not counted. The last row of the table shows the statistics totals.

A discussion is included if data that was deemed unusable or if there are other quality issues that should be considered during data use. In many cases the data is 100% usable and the need for qualification was sporadic and unremarkable; therefore the table is presented with no discussion, which implies that the data is of excellent quality.

4.1 Site 4

Samples were collected from Cheatham Annex Site 4 in the months of October and November 2013, with groundwater collected in December 2013. Analysis was performed by Katahdin Analytical Services, with select analyses by other labs: TestAmerica-Burlington, TestAmerica-Savannah, TestAmerica-Knoxville, or ALS Environmental-Rochester (formerly Columbia Analytical Services-Rochester).

4.1.1 Site 4 Groundwater

Organics Data

VOCs and PAHs were analyzed by the methods specified in the Site 4 SAP (SW-846 8260B and SW-846 8270D-SIM, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	402	85.71%	X		none
UL	BSL	35	7.46%		X	none
UJ	2S	9	1.92%		X	none
UJ	CCL	9	1.92%		X	none
B	MBL	5	1.07%		X	none
J	[NONE]	5	1.07%	X		none
UL	MSL	3	0.64%		X	none
J	2S	1	0.21%		X	none
		469	100.00%	86.78%	13.22%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-2**, and include data for 8 VOCs: 1,2,4-trichlorobenzene, 1,2-dichloropropane, 1,4-dichlorobenzene, benzene, bromomethane, carbon tetrachloride, cis-1,3-dichloropropene, and trans-1,3-dichloropropene. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Inorganics Data

Total and dissolved metals were analyzed by the methods specified in the Site 4 SAP (SW-846 6010B and 7470A). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	111	34.47%	X		none
J	[NONE]	78	24.22%	X		none
[NONE]	[NONE]	77	23.91%	X		none
B	MBL	22	6.83%		X	none
B	CCBL	17	5.28%		X	none
J	OT	8	2.48%		X	none
B	EBL	6	1.86%		X	none
UJ	CCL	2	0.62%		X	none
K	MSH	1	0.31%		X	none
		322	100.00%	82.61%	17.39%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-3**, and include data for total and dissolved thallium in all samples, as well as dissolved arsenic in a field duplicate (GW05P). These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Screening Data

Natural attenuation indicator parameters (NAIPs) (alkalinity, sulfate, sulfide, nitrite, nitrate, methane, ethane, and ethene) were analyzed by the methods specified in the Site 4 SAP, with the exception of nitrite and nitrite which were analyzed by USEPA 353.2. The variation in method for nitrate and nitrite was due to lab instrumentation issues which prevented in-hold analysis by the method specified in the SAP (USEPA 300.0); the difference in method has no negative effect on the quality of the data. The data review process issued the qualifiers shown in the following table. The NAIP data is 100% complete and available for use as screening data.

Qualifier	Reason Code	Count	Percent	Available as Reported	Impact on PARCC
U	[NONE]	25	52.08%	X	none
[NONE]	[NONE]	15	31.25%	X	none
J	[NONE]	8	16.67%	X	none
		48	100.00%	100.00%	

100.00% not R-flagged and available for use

4.1.2 Site 4 Surface Soil and Subsurface Soil

Organics Data

PAHs and PCBs were analyzed by the methods specified in the Site 4 SAP (SW-846 8270D-SIM and SW-846 8082, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	131	45.49%	X		none
[NONE]	[NONE]	67	23.26%	X		none
J	[NONE]	59	20.49%	X		none

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
J	CCL	8	2.78%		X	none
UL	SSL	7	2.43%		X	none
J	CCH	6	2.08%		X	none
B	MBL	5	1.74%		X	none
K	MSH	5	1.74%		X	none
		288	100.00%	89.24%	10.76%	

100.00% not R-flagged and available for use

Inorganics Data

Metals including mercury and hexavalent chromium were analyzed by the methods specified in the Site 4 SAP (SW-846 6010B, 7471 and 7199, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	168	58.74%	X		none
U	[NONE]	29	10.14%	X		none
J	[NONE]	27	9.44%	X		none
B	CCBL	21	7.34%		X	none
L	MSL	13	4.55%		X	none
B	MBL	8	2.80%		X	none
J	MDP	7	2.45%		X	none
K	MSH	6	2.10%		X	none
J	FD	4	1.40%		X	none
UL	MSL	3	1.05%		X	none
		286	100.00%	78.32%	21.68%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-4**, and include data for Selenium in SS11, and Thallium in SB06, SB07, SS10 and SS11. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Select results for SB07 and SS13 were detected below the PAL, but were qualified as biased low (L-qualified). These results are shown in **Table 4-1**. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Screening Data

Grain-size, total organic carbon, and pH were measured in almost all surface soil samples by the methods specified in the Site 4 SAP (ASTM D422, Lloyd Kahn, and SW-846 9045C, respectively). A total of 178 distinct data points were generated and no qualifiers were issued during the data review process. The screening dataset is 100% complete and available for use as screening data.

4.1.3 Site 4 Sediment

Organics Data

PCBs and PAHs were analyzed in surface sediment by the methods specified in the Site 4 SAP (SW-846 8082A and 8270D-SIM, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	150	41.67%	X		none
U	[NONE]	88	24.44%	X		none
J	[NONE]	73	20.28%	X		none
UL	SSL	15	4.17%		X	none
L	SSL	8	2.22%		X	none
K	BSH	7	1.94%		X	none
J	CCH	7	1.94%		X	none
L	MSL	5	1.39%		X	none
L	BSL	5	1.39%		X	none
J	CCL	2	0.56%		X	none
		360	100.00%	86.39%	13.61%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-5**, and include data for 2-methylnaphthalene and acenaphthalene in select samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Additionally, benzo(g,h,i)perylene and fluoranthene were detected below the PAL in select samples, but were qualified as biased low (L-qualified). These results are shown in **Table 4-2**. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Inorganics Data

Metals including mercury were analyzed in surface sediment by the methods specified in the Site 4 SAP (SW-846 6010B and 7471, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	238	68.99%	X		none
J	[NONE]	51	14.78%	X		none
U	[NONE]	27	7.83%	X		none
B	EBL	21	6.09%		X	none
K	MSH	4	1.16%		X	none
L	MSL	2	0.58%		X	none
B	MBL	2	0.58%		X	none
		345	100.00%	91.59%	8.41%	

100.00% not R-flagged and available for use

Antimony was detected below the PAL in SD11, but was qualified as biased low (L-qualified). This result is shown in **Table 4-3**. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Screening Data

Grainsize, pH, TOC, and Acid Volatile Sulfide with Simultaneously Extractable Metals (AVS/SEM) were analyzed in surface sediment by the methods specified in the Site 4 SAP (ASTM D422, SW-846 9045C, Lloyd Kahn, and EPA 821_R-91-100, respectively). Additionally, select sediment samples which were sent for ecological toxicity testing also had ammonia and total sulfide measured by USEPA 350.1 and SW-846 9034, respectively. The data review process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Impact on PARCC
[NONE]	[NONE]	394	91.20%	X	none
U	[NONE]	27	6.25%	X	none
J	[NONE]	11	2.55%	X	none
		432	100.00%	100.00%	

100.00% not R-flagged and available for use

4.1.4 Site 4 Tissue

Organics Data

PCBs, including PCB congeners and homologues were analyzed in tissue by the methods specified in the Site 4 SAP (SW-846 8082A and EPA 1668C, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	128	41.56%	X		none
J	EMPC	94	30.52%		X	none
X	EMPC	48	15.58%		X	none
J	[NONE]	14	4.55%	X		none
U	[NONE]	12	3.90%	X		none
UL	SSL	5	1.62%		X	none
K	MSH	3	0.97%		X	none
L	SSL	2	0.65%		X	none
J	CCH	1	0.32%		X	none
B	MBL	1	0.32%		X	none
		308	100.00%	50.00%	50.00%	

100.00% not R-flagged and available for use

Nearly a third of the results for PCB congeners are qualified as estimated maximum possible concentrations (EMPCs)with an X qualifier, and over half of the PCB homologue results are qualified as EMPCs with a J qualifier. Results are reported as EMPCs when one of the identification criteria is not met, which means that something was detected, but it is not certain that the detection was of the PCB congener of interest. This indicates a potential positive bias for the qualified data, due to matrix effects. For this RI report, X-qualified data has been treated as detections. However, all data is usable as qualified, and since no data was rejected the dataset is complete and of good quality.

Additionally, Aroclor-1254 and Aroclor-1260 were detected in CAS04-TS13-O-1012 at concentrations that are qualified L for having a low bias. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Inorganics Data

Metals including mercury were analyzed in tissue by the methods specified in the Site 4 SAP (SW-846 6010B and 7471, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	136	42.24%	X		none
U	[NONE]	79	24.53%	X		none

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
J	[NONE]	77	23.91%	X		none
B	MBL	15	4.66%		X	none
B	CCBL	14	4.35%		X	none
K	MSH	1	0.31%		X	none
		322	100.00%	90.68%	9.32%	

100.00% not R-flagged and available for use

Screening Data

Percent lipids and percent moisture was measured in all tissue by the methods specified in the Site 4 UFP-SAP SW-846 8290 and ASTM D2216, respectively. A total of 26 distinct data points were generated and no qualifiers were issued during the data review process. The screening dataset is 100% complete and available for use as screening data.

4.2 Youth Pond

Samples were collected from Cheatham Annex Youth Pond on several days in October and November 2013 and sent to several laboratories for analysis. All media besides tissue were sent to Environmental Conservation Laboratories with select analyses being performed by GEL Laboratories, ALS Environmental-Rochester, or Kemron. Tissue samples were analyzed at Katahdin and TestAmerica-Knoxville, similarly to the Site 4 tissue samples.

4.2.1 Youth Pond Surface Features

Youth Pond surface features include data for all surface soil locations as well as surface sediment locations CAYP-SD14 and CAYP-SD15. These two sediment locations are considered surface features because they are not located within the pond.

Organics Data

VOCs, SVOCs, Pesticides, PCBs, and Explosives were analyzed in surface features by the methods specified in the Youth Pond SAP (SW-846 methods 8260B, 8270D and 8270D-SIM, 8081B, 8082A, and 8330B, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	757	53.57%	X		none
UL	SSL	489	34.61%		X	none
[NONE]	[NONE]	76	5.38%	X		none
J	[NONE]	32	2.26%	X		none
UL	MSL	25	1.77%		X	none
UJ	CCL	23	1.63%		X	none
UL	BSL	6	0.42%		X	none
L	SSL	2	0.14%		X	none
J	CCL	1	0.07%		X	none
UJ	MDP	1	0.07%		X	none
J	2C	1	0.07%		X	none
		1,413	100.00%	61.22%	38.78%	

100.00% not R-flagged and available for use

Nearly every sample had qualifications due to low surrogate recovery for all or select SVOCs, Pesticides, or PCBs. Low surrogate recovery is the reason for almost 35% of the qualifications to the organics data for Youth Pond surface features. This indicates a potential low bias for the qualified data, due to matrix effects and/or laboratory performance. However, all data is usable as qualified, and since no data was rejected the dataset is complete and of good quality.

It is noteworthy that bis(2-ethylhexyl)phthalate and Aroclor-1260 were detected below the PAL in SS05, but were qualified as biased low (L-qualified). Results are shown in **Table 4-4**. The true concentrations may be higher, perhaps above the PAL, which should be taken into consideration when evaluating exceedances.

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-7**, and include data for select Pesticides and SVOCs in surface feature samples, as well as select explosives and VOCs in SD14 and SD15. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Inorganics Data

Metals including mercury, cyanide, and hexavalent chromium were analyzed in surface features by the methods specified in the Youth Pond SAP (SW-846 6010C and 7471B, 9014 and 7199, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	148	67.27%	X		none
U	[NONE]	46	20.91%	X		none
J	[NONE]	19	8.64%	X		none
K	MSH	4	1.82%		X	none
B	EBL	2	0.91%		X	none
UL	MSL	1	0.45%		X	none
		220	100.00%	96.82%	3.18%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-8**, and include data for Thallium in surface soil samples SS01 through SS06, and Selenium in samples SS01 through SS04 and SS06. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Screening Data

Grain-size, pH, and TOC were analyzed in surface features by the methods specified in the Youth Pond SAP (ASTM D422, SW-846 9045, and Walkley-Black). Additionally, surface sediment samples were analyzed for AVS/SEM by EPA 821_R-91-100, as noted in the SAP. The data review process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Impact on PARCC
[NONE]	[NONE]	159	94.64%	X	none
U	[NONE]	7	4.17%	X	none
B	[NONE]	2	1.19%	X	none
		168	100.00%	100.00%	

100.00% not R-flagged and available for use

4.2.2 Youth Pond Sediment

Youth Pond sediment includes surface and subsurface sediment samples except for the sediments collected at locations CAYP-SD14 and CAYP-SD15. Those two sediment locations are excluded from the sediment discussion because they are not located within the pond.

Organics Data

VOCs, SVOCs, Pesticides, PCBs, and Explosives were analyzed in sediment by the methods specified in the Youth Pond SAP (SW-846 methods 8260B, 8270D and 8270D-SIM, 8081B, 8082A, and 8330B, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC
U	[NONE]	3,034	66.64%	X			none
UL	SSL	1,139	25.02%		X		none
[NONE]	[NONE]	114	2.50%	X			none
J	[NONE]	66	1.45%	X			none
UJ	CCL	61	1.34%		X		none
UL	MSL	44	0.97%		X		none
L	SSL	38	0.83%		X		none
R	SSL	28	0.61%			X	Accuracy, Completeness
UL	BSL	13	0.29%		X		none
K	MSH	4	0.09%		X		none
J	FD	4	0.09%		X		none
K	BSH	3	0.07%		X		none
L	MSL	2	0.04%		X		none
J	MDP	1	0.02%		X		none
J	CCL	1	0.02%		X		none
J	2C	1	0.02%		X		none
		4,553	100.00%	70.59%	28.79%	0.61%	

99.39% not R-flagged and available for use

Data was R-qualified for low surrogate recovery (SSL) of PCBs in one sample (CAYP-SD10-1012) and of Pesticides in another sample (CAYP-SD09-1012). Additionally, nearly every sample had UL or L qualifications for Pesticides or PCBs and some samples also had select SVOCs qualified, such that 25% of the organics data for Youth Pond sediment are qualified due to low surrogate recoveries. Except for the R-qualified results, all data are available as reported by the lab or as qualified by the validator. The R-qualified results are not available as detections or nondetections, however, Pesticides and PCB data for the other 14 surface sediment (28 surface or subsurface sediment) samples is available for decision-making, therefore the impact on data completeness is not very significant. All in all, the data for organics in Youth Pond sediment is of good quality and exceeds the typical completeness goal of 95%.

With regard to low-biased data it is noteworthy that acetone and several PAHs were detected below the PAL, but were qualified as biased low (L-qualified). Results are shown in **Table 4-5**. The true concentrations may be higher, perhaps above the PAL, which should be taken into consideration when evaluating exceedances.

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in Table 3-9, and include data for several SVOCs, pesticides, PCBs, explosives and 3 VOCs in several samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Inorganics Data

Metals including mercury and cyanide were analyzed in sediment by the methods specified in the Youth Pond SAP (SW-846 6010C and 7471B, and 9014, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	476	68.39%	X		none
U	[NONE]	122	17.53%	X		none
J	[NONE]	85	12.21%	X		none
J	LR	6	0.86%		X	none
B	EBL	3	0.43%		X	none
K	MSH	2	0.29%		X	none
J	FD	2	0.29%		X	none
		696	100.00%	98.13%	1.87%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-10**, and include data for Cyanide and Thallium in many samples, and Antimony and Selenium in SD02P and SSD12. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Screening Data

Grain-size, pH, TOC, and AVS/SEM were analyzed in sediment by the methods specified in the Youth Pond SAP (ASTM D422, SW-846 9045, Walkley-Black, and EPA 821_R-91-100, respectively). The data review process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Impact on PARCC
[NONE]	[NONE]	616	87.75%	X	none
U	[NONE]	76	10.83%	X	none
B	[NONE]	10	1.42%	X	none
		702	100.00%	100.00%	

100.00% not R-flagged and available for use

4.2.3 Youth Pond Surface Water

Organics Data

VOCs, SVOCs, Pesticides, PCBs, and Explosives were analyzed in surface water by the methods specified in the Youth Pond SAP (SW-846 methods 8260B, 8270D and 8270D-SIM, 8081B, 8082A, and 8330B, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	1,054	95.91%	X		none
UL	SSL	34	3.09%		X	none
UJ	CCL	10	0.91%		X	none
UL	MSL	1	0.09%		X	none
		1,099	100.00%	95.91%	4.09%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-11**, and include data for 8 VOC analytes, 25 SVOC analytes, 11 Pesticides analytes, and all PCBs. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Inorganics Data

Total and dissolved metals including mercury, as well as total cyanide, were analyzed by the methods specified in the Youth Pond SAP (SW-846 6020A, 7470A, and 9014, respectively). The validation process issued the qualifiers show in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	165	50.15%	X		none
[NONE]	[NONE]	84	25.53%	X		none
J	[NONE]	75	22.80%	X		none
J	CCH	4	1.22%		X	none
L	MSL	1	0.30%		X	none
		329	100.00%	98.48%	1.52%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-12**, and include data for total and dissolved chromium in all Youth Pond surface water samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Additionally, zinc was detected below the PAL in SW02, but was qualified as biased low (L-qualified). This result is shown in **Table 4-6**. The true concentration may be higher, perhaps above the PAL, which should be taken into consideration when evaluating exceedances.

Screening Data

Hardness was measured in surface water samples by the method specified in the Youth Pond SAP (SM 2340C). A total of 6 distinct data points were generated and no qualifiers were issued during the data review process. The screening dataset is 100% complete and available for use as screening data.

4.2.4 Youth Pond Tissue

Organics Data

PCBs, including PCB congeners and homologues were analyzed in tissue by the methods specified in the Site 4 SAP (SW-846 8082A and EPA 1668C, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
J	EMPC	63	31.03%		X	none
[NONE]	[NONE]	49	24.14%	X		none
X	EMPC	34	16.75%		X	none
U	[NONE]	28	13.79%	X		none
J	[NONE]	13	6.40%	X		none
UL	SSL	6	2.96%		X	none
K	MSH	5	2.46%		X	none
B	MBL	4	1.97%		X	none

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
L	SSL	1	0.49%		X	none
		203	100.00%	44.33%	55.67%	

100.00% not R-flagged and available for use

Nearly a third of the results for PCB congeners are qualified as estimated maximum possible concentrations (EMPCs)with an X qualifier, and quarter of the PCB homologue results are qualified as EMPCs with a J qualifier. Results are reported as EMPCs when one of the identification criteria is not met, which means that something was detected, but it not certain that the detection was of the PCB congener of interest. This indicates a potential positive bias for the qualified data, due to matrix effects. For this RI report, X-qualified data has been treated as detections. However, all data is usable as qualified, and since no data was rejected the dataset is complete and of good quality.

Additionally, Aroclor-1260 was detected in CAYP-TS08-O-1012 at a concentration that that is qualified L for having a low bias. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Inorganics Data

Metals including mercury were analyzed in tissue by the methods specified in the Youth Pond SAP (SW-846 6020 and 7471A, respectively). The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	79	38.16%	X		none
U	[NONE]	51	24.64%	X		none
J	[NONE]	33	15.94%	X		none
B	MBL	25	12.08%		X	none
B	CCBL	16	7.73%		X	none
J	MDP	1	0.48%		X	none
L	MSL	1	0.48%		X	none
K	MSH	1	0.48%		X	none
		207	100.00%	78.74%	21.26%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-12**, and include data for total and dissolved chromium in all Youth Pond surface water samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Screening Data

Percent solids and percent lipids were measured in almost all tissue samples by the methods specified in the Youth Pond SAP (ASTM D2216 and SW-846 8290). A total of 18 distinct data points were generated and no qualifiers were issued during the data review process. The screening dataset is 100% complete and available for use as screening data.

4.3 Reference Data

Samples were collected from Cheatham Pond on several days in December, 2013 and sent to various laboratories for analysis based on which project they were originally associated with, either the Site 4 or the Youth Pond RI

(which have since been merged into a single RI). However, since similar methods were followed and analyses met the requirements of the DoD and the SAPs, this difference is negligible. One practical difference may be different reporting limits for nondetected samples.

All tissue samples were sent to Katahdin Analytical Services with PCB Congener analysis performed by TestAmerica-Knoxville. All non-tissue media associated with Site 4 were also sent to Katahdin Analytical Services with select analyses performed by TestAmerica-West Sacramento, TestAmerica-Savannah, or TestAmerica-Burlington, according to the laboratory accreditations. All non-tissue media associated with Youth Pond were sent to ENCO Laboratories with select analyses performed by ALS Environmental-Rochester, Empirical Laboratories, GEL Laboratories, and Kemron.

Reference samples were intended as reference for at least three separate investigations at Cheatham Annex: Site 4, Youth Pond, and Penniman Lake, consequently the samples were analyzed for all of the constituents investigated at any of these sites in Fall 2013.

4.3.1 Reference Surface and Subsurface Sediment

Organics Data

VOCs, SVOCs, Pesticides, PCBs, and Explosives were analyzed in surface and subsurface sediment by SW-846 methods 8260, 8270D and 8270D-SIM, 8081, 8082, and 8330, respectively. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC
U	[NONE]	1,923	59.72%	X			N/A
UL	SSL	757	23.51%		X		N/A
UL	MSL	132	4.10%		X		N/A
J	[NONE]	73	2.27%	X			N/A
[NONE]	[NONE]	69	2.14%	X			N/A
UJ	ISL	63	1.96%		X		N/A
UL	BSL	47	1.46%		X		N/A
UJ	ICB	34	1.06%		X		N/A
UJ	2S	34	1.06%		X		N/A
L	SSL	26	0.81%		X		N/A
J	ICB	10	0.31%		X		N/A
J	2S	10	0.31%		X		N/A
R	MSL	9	0.28%			X	Completeness, Accuracy
J	2C	8	0.25%		X		N/A
L	MSL	7	0.22%		X		N/A
B	MBL	5	0.16%		X		N/A
UJ	MDP	4	0.12%		X		N/A
K	SSH	3	0.09%		X		N/A
J	FD	2	0.06%		X		N/A
UJ	CCL	2	0.06%		X		N/A

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Not Available	Impact on PARCC
J	ISL	1	0.03%		X		N/A
L	BSL	1	0.03%		X		N/A
		3,220	100.00%	64.13%	35.59%	0.28%	

99.72% not R-flagged and available for use

About a third of the data is approximated for reasons other than the detection being less than the quantitation limit; the majority of that approximated data showed potential low bias due to matrix effects (SSL or MSL). In some cases, the matrix effects were so pronounced that the data was rejected; this was the case for nine SVOC, Pesticide, or Explosives results from a handful of samples. Rejected data accounted for 0.28% of the results, however, because the rejected values did not follow a particular pattern and are such a small percentage, the negative effect on completeness and accuracy is not very significant. All in all, the data for organics in Reference sediment is of good quality and meets the generic completeness goal of 95%. (Data is compared to a generic completeness goal since none was identified in the Site 4 or Youth Pond SAPs.)

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-13**, and include data for half of the explosives analytes, nearly all Pesticide and PCB analytes, several SVOCs analytes, and 3 VOC analytes in several sediment samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Several low-biased detections were not rejected and are therefore useable. For the data listed in **Table 4-7**, the low-biased results were detected below the PAL; however, because true concentrations may be higher, there is uncertainty about whether the detections exceeded the PAL.

Inorganics Data

Metals and cyanide were analyzed in surface and subsurface sediment by SW-846 methods 6010, 7471, and 9012 or 9014, respectively. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	283	58.96%	X		N/A
J	[NONE]	56	11.67%	X		N/A
U	[NONE]	50	10.42%	X		N/A
J	FD	24	5.00%		X	N/A
B	EBL	22	4.58%		X	N/A
B	CCBL	22	4.58%		X	N/A
J	LR	9	1.88%		X	N/A
L	MSL	4	0.83%		X	N/A
K	MSH	3	0.63%		X	N/A
UL	MSL	2	0.42%		X	N/A
UJ	OT	2	0.42%		X	N/A
B	MBL	2	0.42%		X	N/A
J	SD	1	0.21%		X	N/A
		480	100.00%	81.04%	18.96%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-14**, and include data for Cyanide in nearly all reference sediment samples, as well as antimony and thallium in a few samples. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Additionally, antimony and manganese were detected below the PAL in SD04 and SSD04, but were qualified as biased low (L-qualified). Results are shown in **Table 4-8**. The true concentrations may be higher, perhaps above the PAL, which should be taken into consideration when evaluating exceedances.

Screening Data

Grain-size, total organic carbon, pH, and acid-volatile sulfide and simultaneously extractable metals, were measured in surface and subsurface sediment by the following methods: ASTM D422, Lloyd Kahn or Walkley Black, USEPA SW-846 9045, and USEPA 821_R-91-100. Additionally, select sediment samples which were sent for ecological toxicity testing also had ammonia and total sulfide measured by USEPA 350.1 and SW-846 9034, respectively. The data review process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	411	88.20%	X		N/A
J	[NONE]	27	5.79%	X		N/A
U	[NONE]	26	5.58%	X		N/A
H	[NONE]	2	0.43%		X	N/A
		466	100.00%	99.57%	0.43%	

100.00% not R-flagged and available for use

4.3.2 Reference Surface Water

Organics Data

VOCs, SVOCs, Pesticides, PCBs, and Explosives were analyzed in surface water by SW-846 methods 8260B, 8270D and 8270D-SIM, 8081, 8082, and 8330, respectively. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	1,360	84.47%	X		N/A
UL	SSL	168	10.43%		X	N/A
UL	MSL	48	2.98%		X	N/A
UJ	2S	18	1.12%		X	N/A
B	EBL	6	0.37%		X	N/A
UJ	ICB	6	0.37%		X	N/A
B	MBL	2	0.12%		X	N/A
UL	BSL	1	0.06%		X	N/A
J	[NONE]	1	0.06%	X		N/A
		1,610	100.00%	84.53%	15.47%	

100.00% not R-flagged and available for use

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in **Table 3-15**, and include data for 8 VOC analytes, 23 SVOC analytes, 11 pesticide analytes, and all PCB analytes in the samples specified in the table. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Inorganics Data

Total and dissolved metals and cyanide were analyzed in surface water by SW-846 methods 6010 or 6020, 7470, and 9012 or 9014, respectively. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	172	36.60%	X		N/A
[NONE]	[NONE]	107	22.77%	X		N/A
J	[NONE]	95	20.21%	X		N/A
B	EBL	65	13.83%		X	N/A
B	MBL	12	2.55%		X	N/A
J	OT	8	1.70%		X	N/A
K	MSH	5	1.06%		X	N/A
J	FD	4	0.85%		X	N/A
J	CCH	2	0.43%		X	N/A
		470	100.00%	79.57%	20.43%	

100.00% not R-flagged and available for use

About 15% of the laboratory detections were attributed to contamination from the lab or equipment blank. For the samples associated with Youth Pond, (analyzed by ENCO laboratories), relatively large detections of nutrient metals were attributed to contamination, which is unusual, however does not affect the availability of the results. The inorganics dataset is 100% complete and of good quality.

All data is of sufficient quality to evaluate whether action limits were met, with the exception of data for which the DL was greater than the comparison criteria. Affected nondetect data are listed in Table 3-16, and include data for total and dissolved Chromium and Thallium for the samples noted in the table, as well as cyanide and total selenium. These results are available for use as nondetects, but their use may add uncertainty to the conclusions drawn.

Screening Data

Hardness was measured in surface water by method SM 2340C or USEPA 130.2. The data review process issued the qualifiers shown in the following table. A total of 8 distinct data points were generated. Hardness data is 100% complete and available for use as screening data.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
[NONE]	[NONE]	7	87.50%	X		N/A
Q	[NONE]	1	12.50%		X	N/A
		8	100.00%	87.50%	12.50%	

100.00% not R-flagged and available for use

4.3.3 Reference Tissue

Tissue samples were sent to Katahdin Analytical Services. At the lab samples were homogenized either whole-body (samples with “WB” in the sample ID) or separated into fillet and offal (bones, innards, head, skin) samples which were homogenized and analyzed as two separate samples. Aliquots of homogenized sample were sent to TestAmerica-Knoxville for PCB congener and homologue analysis.

Organics Data

PCBs (Aroclors) and PCB congeners and homologues were analyzed in tissue by SW-846 8082 and USEPA 1668C, respectively. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
J	EMPC	81	34.03%		X	N/A
[NONE]	[NONE]	46	19.33%	X		N/A
X	EMPC	41	17.23%		X	N/A
U	[NONE]	35	14.71%	X		N/A
J	[NONE]	16	6.72%	X		N/A
UL	SSL	13	5.46%		X	N/A
J	ISH	3	1.26%		X	N/A
L	SSL	2	0.84%		X	N/A
K	MSH	1	0.42%		X	N/A
		238	100.00%	36.55%	62.18%	

100.00% not R-flagged and available for use

About a half of the data is reported as estimated maximum possible concentrations (EMPCs) because the analysis was not able to positively identify the constituents according to all of the method requirements. Results qualified for EMPC are tentatively identified and are available for use as qualified. The organics dataset is 100% complete and of excellent quality.

Additionally, Aroclor-1260 was detected in CAREFS04-TS07-O-1012 and CAREFS04-TS08-O-1012 at concentrations that were qualified L for having a low bias. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Inorganics Data

Metals were analyzed in tissue by SW-846 methods 6010 or 6020, and 7471. The validation process issued the qualifiers shown in the following table.

Qualifier	Reason Code	Count	Percent	Available as Reported	Available as Qualified	Impact on PARCC
U	[NONE]	80	34.78%	X		N/A
[NONE]	[NONE]	77	33.48%	X		N/A
J	[NONE]	40	17.39%	X		N/A
B	MBL	24	10.43%		X	N/A
B	CCBL	4	1.74%		X	N/A
L	MSL	4	1.74%		X	N/A
J	MDP	1	0.43%		X	N/A
		230	100.00%	85.65%	14.35%	

100.00% not R-flagged and available for use

Additionally, Iron, Magnesium, Mercury and Sodium were detected in CAREFS04-TS04-WB-1012 at a concentrations that were qualified L for having a low bias. True concentrations may be higher, and the possibility that concentrations exceed the PAL should be taken into consideration when using the data.

Screening Data

Percent lipids and percent moisture was measured in all tissue by the method specified in SW-846 8290 and ASTM D2216, respectively. A total of 20 distinct data points were generated and no qualifiers were issued during the data review process. The screening dataset is 100% complete and available for use as screening data.

Table 4-1
Detections Below the PAL with Low Bias
Inorganics in Site 4 Surface and Subsurface Soil

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAS04-SB07-1012	6010B	Manganese	7439-96-5	35.6	MG_KG	L	MSL	0.30	0.75	0.94	176
CAS04-SB07-1012	7471A	Mercury	7439-97-6	0.04	MG_KG	L	MSL	0.005	0.016	0.031	0.1
CAS04-SS13-1012	6010B	Antimony	7440-36-0	0.47	MG_KG	L	MSL	0.28	2.0	3.2	3.1
CAS04-SS13-1012	6010B	Beryllium	7440-41-7	0.34	MG_KG	L	MSL	0.006	0.040	0.40	0.587
CAS04-SS13-1012	7471A	Mercury	7439-97-6	0.06	MG_KG	L	MSL	0.006	0.020	0.039	0.111
CAS04-SS13-1012	6010B	Silver	7440-22-4	1.3	MG_KG	L	MSL	0.11	1.6	4.0	39
CAS04-SS13-1012	6010B	Vanadium	7440-62-2	20.4	MG_KG	L	MSL	0.15	1.6	4.0	27.9

Table 4-2
Detections Below the PAL with Low Bias
Organics in Site 4 Sediment

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAS04-SD13-1012	8270D_SIM	Benzo(g,h,i)perylene	191-24-2	27.	UG_KG	L	BSL	2.6	13.	26.	170
CAS04-SD14-1012	8270D_SIM	Benzo(g,h,i)perylene	191-24-2	130	UG_KG	L	BSL	3.5	18.	35.	170
CAS04-SD15-1012	8270D_SIM	Fluoranthene	206-44-0	0.24	UG_KG	L	BSL	0.0025	0.014	0.028	423
CAS04-SD16-1012	8270D_SIM	Fluoranthene	206-44-0	130	UG_KG	L	BSL	2.1	12.	24.	423
CAS04-SD17-1012	8270D_SIM	Fluoranthene	206-44-0	270	UG_KG	L	BSL	2.9	16.	32.	423

Table 4-3
Detections Below the PAL with Low Bias
Inorganics in Site 4 Sediment

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAS04-SD11-1012	6010B	Antimony	7440-36-0	1.1	MG_KG	L	MSL	0.10	0.68	1.1	2

Table 4-4
Detections Below the PAL with Low Bias
Organics in Youth Pond Surface Features

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAYP-SS05-1012	8082A	Aroclor-1260	11096-82-5	0.026	MG_KG	L	SSL	0.013	0.024	0.048	0.22
CAYP-SS05-1012	8270D	bis(2-Ethylhexyl)phthalate	117-81-7	3.5	MG_KG	L	SSL	0.20	0.24	0.79	30

Table 4-5
Detections Below the PAL with Low Bias
Organics in Youth Pond Sediment

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAYP-SSD05-1112	8270D_SIM	Benzo(a)anthracene	56-55-3	0.047	MG_KG	L	SSL	0.024	0.064	0.085	0.108
CAYP-SSD07-1012	8270D_SIM	Benzo(a)anthracene	56-55-3	0.082	MG_KG	L	SSL	0.027	0.073	0.097	0.108
CAYP-SSD05-1112	8270D_SIM	Benzo(a)pyrene	50-32-8	0.033	MG_KG	L	SSL	0.019	0.064	0.085	0.15
CAYP-SSD07-1012	8270D_SIM	Benzo(a)pyrene	50-32-8	0.067	MG_KG	L	SSL	0.022	0.073	0.097	0.15
CAYP-SSD07-1012	8270D_SIM	Benzo(g,h,i)perylene	191-24-2	0.053	MG_KG	L	SSL	0.035	0.073	0.097	0.17
CAYP-SSD07-1012	8270D_SIM	Benzo(k)fluoranthene	207-08-9	0.048	MG_KG	L	SSL	0.035	0.073	0.097	0.24
CAYP-SSD05-1112	8270D_SIM	Chrysene	218-01-9	0.032	MG_KG	L	SSL	0.031	0.064	0.085	0.166
CAYP-SSD07-1012	8270D_SIM	Chrysene	218-01-9	0.082	MG_KG	L	SSL	0.035	0.073	0.097	0.166
CAYP-SSD01-1012	8270D_SIM	Fluoranthene	206-44-0	0.14	MG_KG	L	MSL	0.017	0.032	0.043	0.423
CAYP-SSD05-1112	8270D_SIM	Fluoranthene	206-44-0	0.062	MG_KG	L	SSL	0.033	0.064	0.085	0.423
CAYP-SSD07-1012	8270D_SIM	Fluoranthene	206-44-0	0.16	MG_KG	L	SSL	0.038	0.073	0.097	0.423
CAYP-SSD07-1012	8270D_SIM	Phenanthrene	85-01-8	0.070	MG_KG	L	SSL	0.053	0.073	0.097	0.204
CAYP-SSD05-1112	8270D_SIM	Pyrene	129-00-0	0.055	MG_KG	L	SSL	0.031	0.064	0.085	0.195
CAYP-SSD07-1012	8270D_SIM	Pyrene	129-00-0	0.14	MG_KG	L	SSL	0.035	0.073	0.097	0.195
CAYP-SD01-1012	8260B	Acetone	67-64-1	0.073	MG_KG	L	MSL	0.0025	0.019	0.037	61000
CAYP-SD05-1112	8270D_SIM	Benzo(a)pyrene	50-32-8	0.14	MG_KG	L	SSL	0.028	0.096	0.13	0.15
CAYP-SD10-1012	8270D_SIM	Benzo(a)pyrene	50-32-8	0.084	MG_KG	L	SSL	0.034	0.11	0.15	0.15
CAYP-SD05-1112	8270D_SIM	Benzo(g,h,i)perylene	191-24-2	0.089	MG_KG	L	SSL	0.046	0.096	0.13	0.17
CAYP-SD05-1112	8270D_SIM	Benzo(k)fluoranthene	207-08-9	0.091	MG_KG	L	SSL	0.046	0.096	0.13	0.24
CAYP-SD10-1012	8270D_SIM	Chrysene	218-01-9	0.088	MG_KG	L	SSL	0.055	0.11	0.15	0.166
CAYP-SD05-1112	8270D_SIM	Fluoranthene	206-44-0	0.30	MG_KG	L	SSL	0.050	0.096	0.13	0.423
CAYP-SD10-1012	8270D_SIM	Fluoranthene	206-44-0	0.20	MG_KG	L	SSL	0.059	0.11	0.15	0.423
CAYP-SD05-1112	8270D_SIM	Phenanthrene	85-01-8	0.15	MG_KG	L	SSL	0.069	0.096	0.13	0.204
CAYP-SD10-1012	8270D_SIM	Pyrene	129-00-0	0.15	MG_KG	L	SSL	0.055	0.11	0.15	0.195

Table 4-6
Detections Below the PAL with Low Bias
Inorganics in Youth Pond Surface Water

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAYP-SW02-1012	6020A	Zinc	7440-66-6	12.9	UG_L	L	MSL	1.60	6.00	12.0	216.5

Table 4-7
Detections Below the PAL with Low Bias
Organics in Reference Sediment

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAREFYP-SSD03-1012	8260B	2-Butanone	78-93-3	0.20	MG_KG	L	MSL	0.0073	0.010	0.020	1.44477
CAREFS04-SSD01-1012	8081A	4,4'-DDD	72-54-8	0.66	UG_KG	L	SSL	0.65	5.4	11.	4.88
CAREFS04-SSD04-1012	8081A	4,4'-DDD	72-54-8	1.4	UG_KG	L	MSL	0.78	6.4	13.	4.88
CAREFS04-SSD05-1012	8081A	4,4'-DDD	72-54-8	1.2	UG_KG	L	SSL	0.70	5.8	12.	4.88
CAREFS04-SSD04-1012	8270D_SIM	Benzo(a)pyrene	50-32-8	15.	UG_KG	L	BSL	12.	38.	76.	150
CAREFS04-SSD04-1012	8270D_SIM	Benzo(g,h,i)perylene	191-24-2	12.	UG_KG	L	MSL	7.6	38.	76.	170
CAREFS04-SSD02-1012	8260B	Carbon disulfide	75-15-0	4.4	UG_KG	L	SSL	2.0	6.5	13.	4.54835
CAREFS04-SSD04-1012	8260B	Carbon disulfide	75-15-0	4.5	UG_KG	L	SSL	2.6	8.5	17.	4.54835
CAREFS04-SSD04-1012	8270D_SIM	Dibenz(a,h)anthracene	53-70-3	8.6	UG_KG	L	MSL	6.9	38.	76.	33
CAREFS04-SD03-1012	8081A	4,4'-DDD	72-54-8	1.5	UG_KG	L	SSL	0.42	3.4	6.9	4.88
CAREFS04-SD05-1012	8081A	4,4'-DDD	72-54-8	3.0	UG_KG	L	SSL	1.1	9.1	18.	4.88
CAREFS04-SD04-1012	8270D_SIM	Benzo(a)anthracene	56-55-3	9.9	UG_KG	L	MSL	8.4	44.	89.	108
CAREFS04-SD04-1012	8270D_SIM	Benzo(b)fluoranthene	205-99-2	20.	UG_KG	L	MSL	11.	44.	89.	27.2

Table 4-8
Detections Below the PAL with Low Bias
Inorganics in Reference Sediment

Sample Name	Analytical Method	Analyte Name	CAS Number	Analytical Result	Units	Validator Qualifier	Qualifier Reason Code	DL	LOD	LOQ	Minimum PAL or Background
CAREFS04-SSD04-1012	6010B	Antimony	7440-36-0	0.32	MG_KG	L	MSL	0.17	1.2	2.0	2
CAREFS04-SSD04-1012	6010B	Manganese	7439-96-5	310	MG_KG	L	MSL	0.39	0.98	1.2	460
CAREFS04-SD04-1012	6010B	Antimony	7440-36-0	1.7	MG_KG	L	MSL	0.22	1.6	2.5	2
CAREFS04-SD04-1012	6010B	Manganese	7439-96-5	254	MG_KG	L	MSL	0.51	1.3	1.6	460

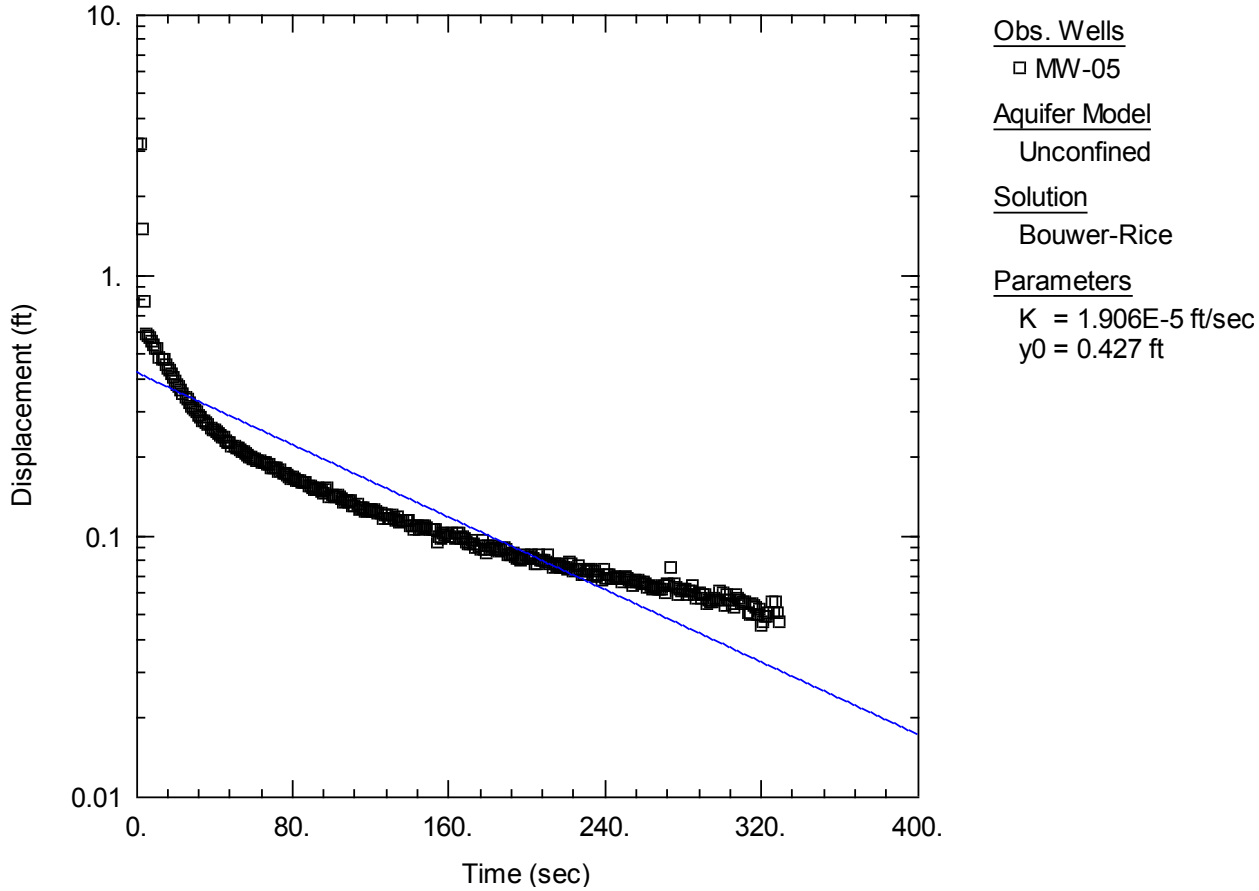
SECTION 5

Conclusions

The data user may express confidence in the fact that the data for Cheatham Annex Site 4, Youth Pond, and Reference is comparable to others of acceptable data quality because approved SOPs were used for sample collection and handling, common sample matrices were evaluated (except for tissue), and EPA methods were utilized.

With the exception of data that has been rejected due to quality exceedances, precision, accuracy, representativeness, and completeness were demonstrated to be acceptable and the data user may be confident that this data set is comparable to others of high data quality. For any single site, media, and analytical group, the lowest dataset completeness was found for Youth Pond Sediment samples in Organics, however even that dataset was 99.39% complete. As a whole, the Site 4, Youth Pond, and Reference dataset is 99.81% complete, with any rejected data being fairly randomly dispersed such that the 0.19% of data that is unavailable has negligible impact on the quality of the dataset. This far exceeds the typical 95% completeness goal.

Appendix H
Slug Test Plots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0.01
Displacement (ft)
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80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Bouwer-Rice
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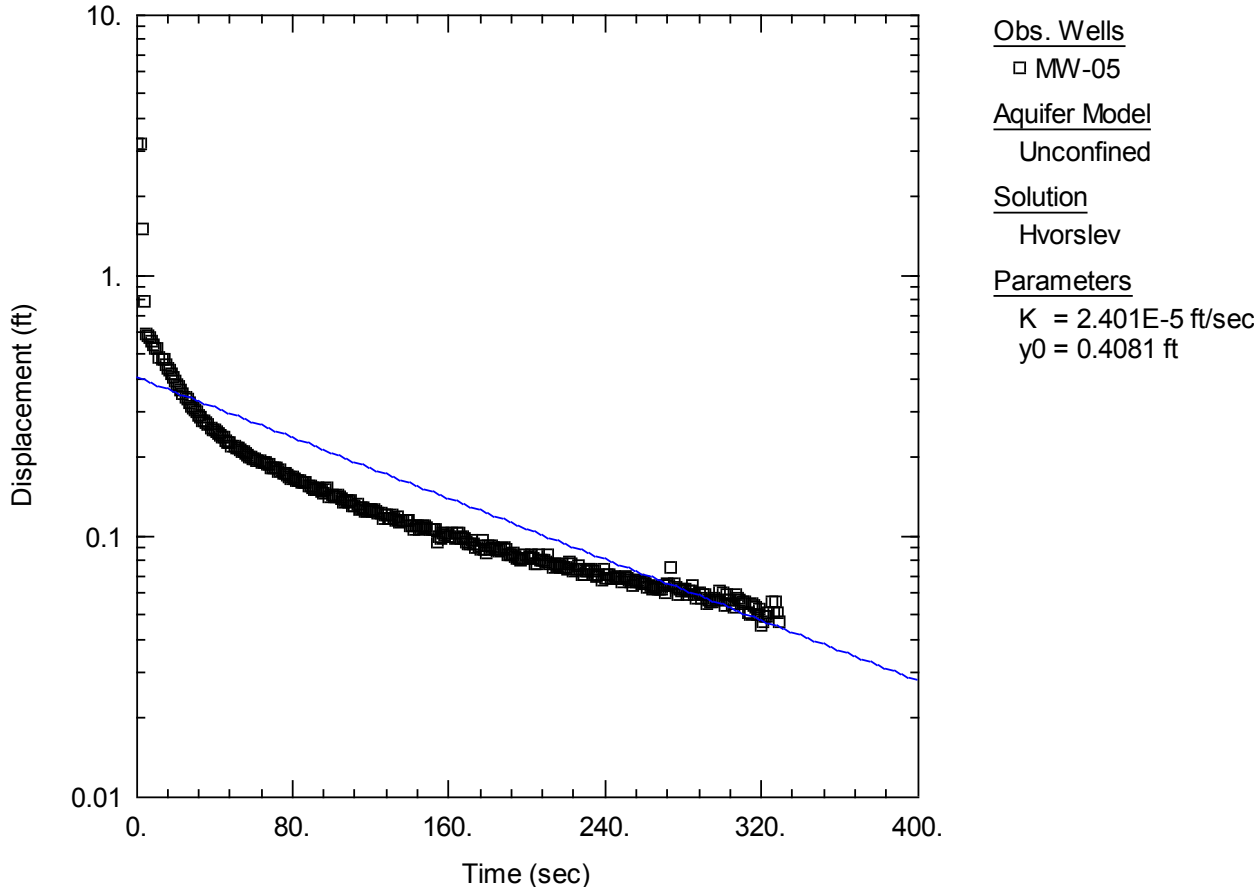
y0 = 0.427 ft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0.1
0.01
Displacement (ft)
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80.
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240.
320.
400.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Hvorslev
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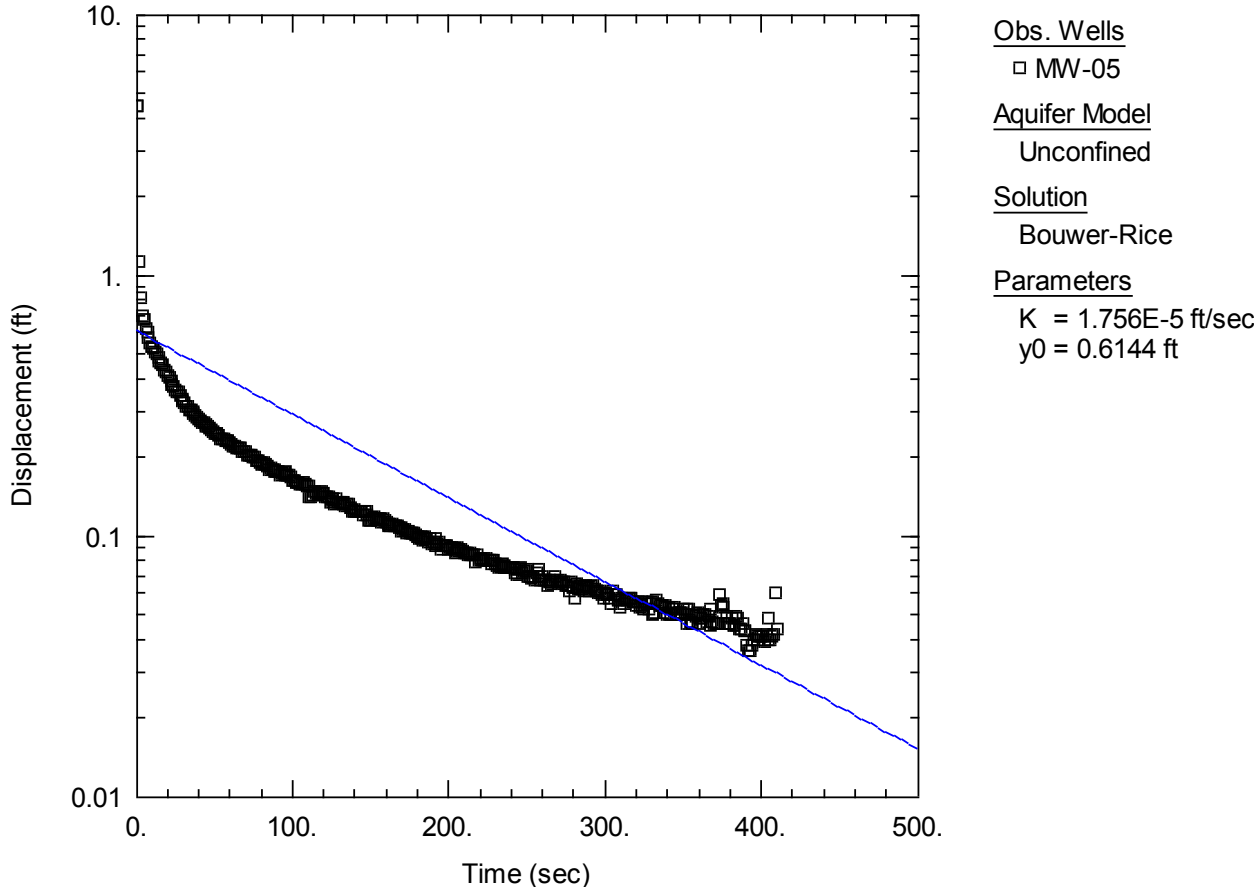
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100.
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Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Bouwer-Rice
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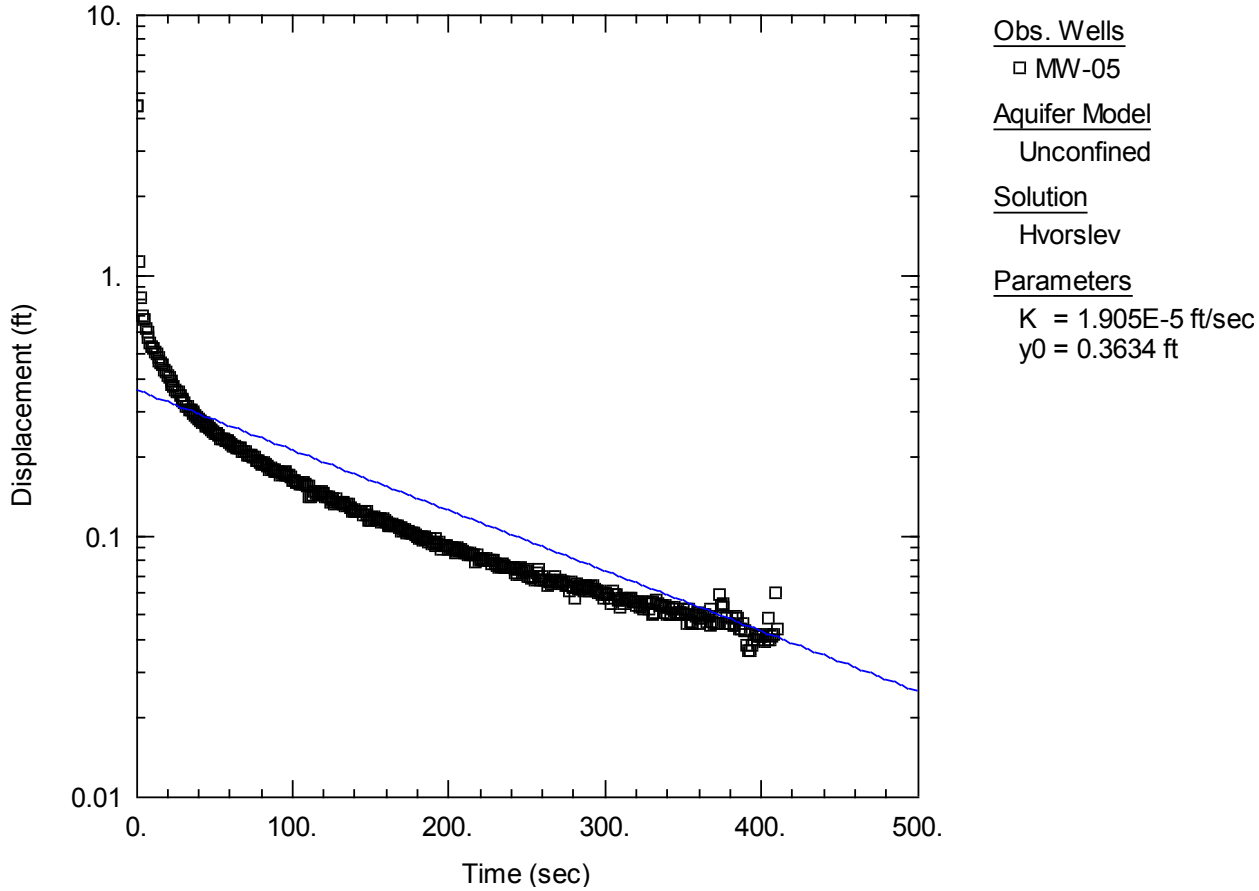
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Displacement (ft)
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100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Hvorslev
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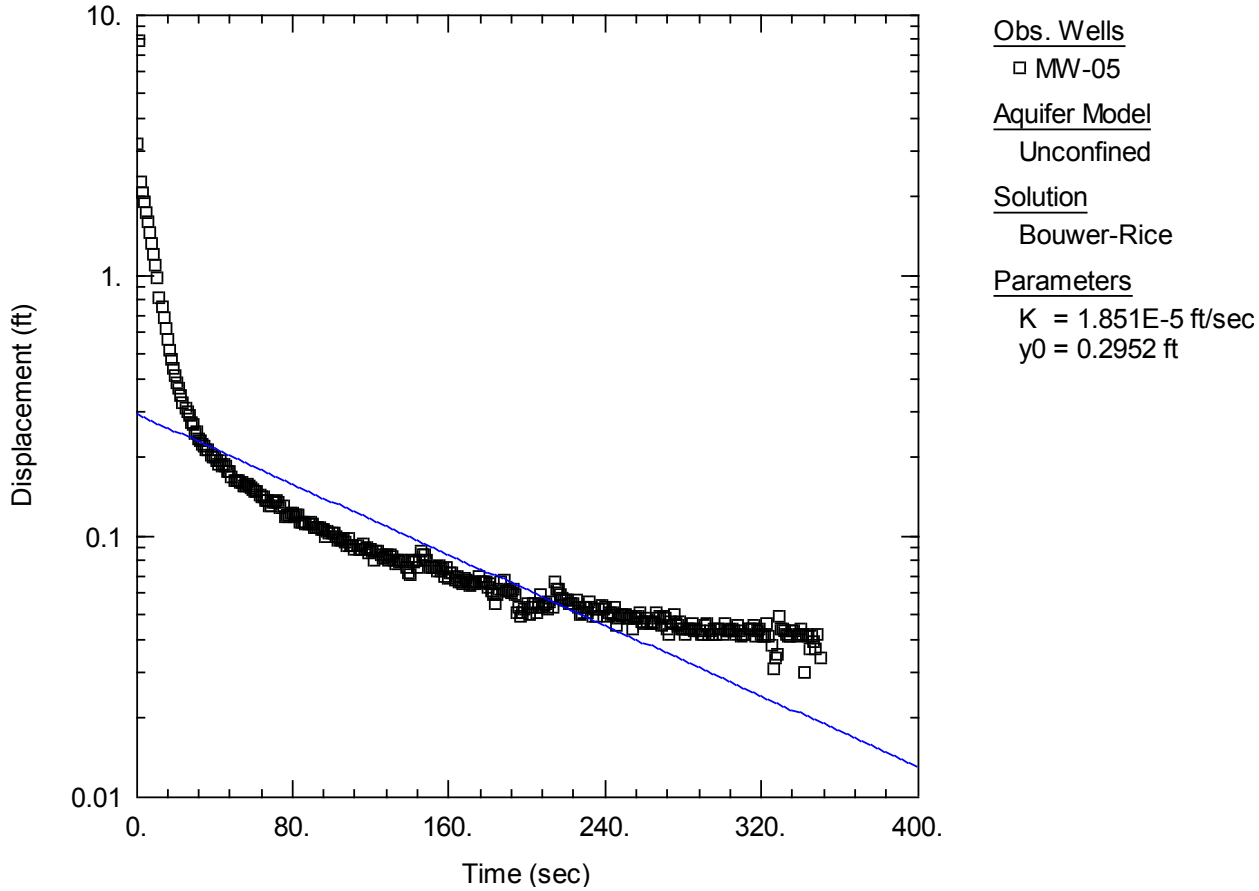
y0 = 0.3634 ft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Displacement (ft)
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80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Bouwer-Rice
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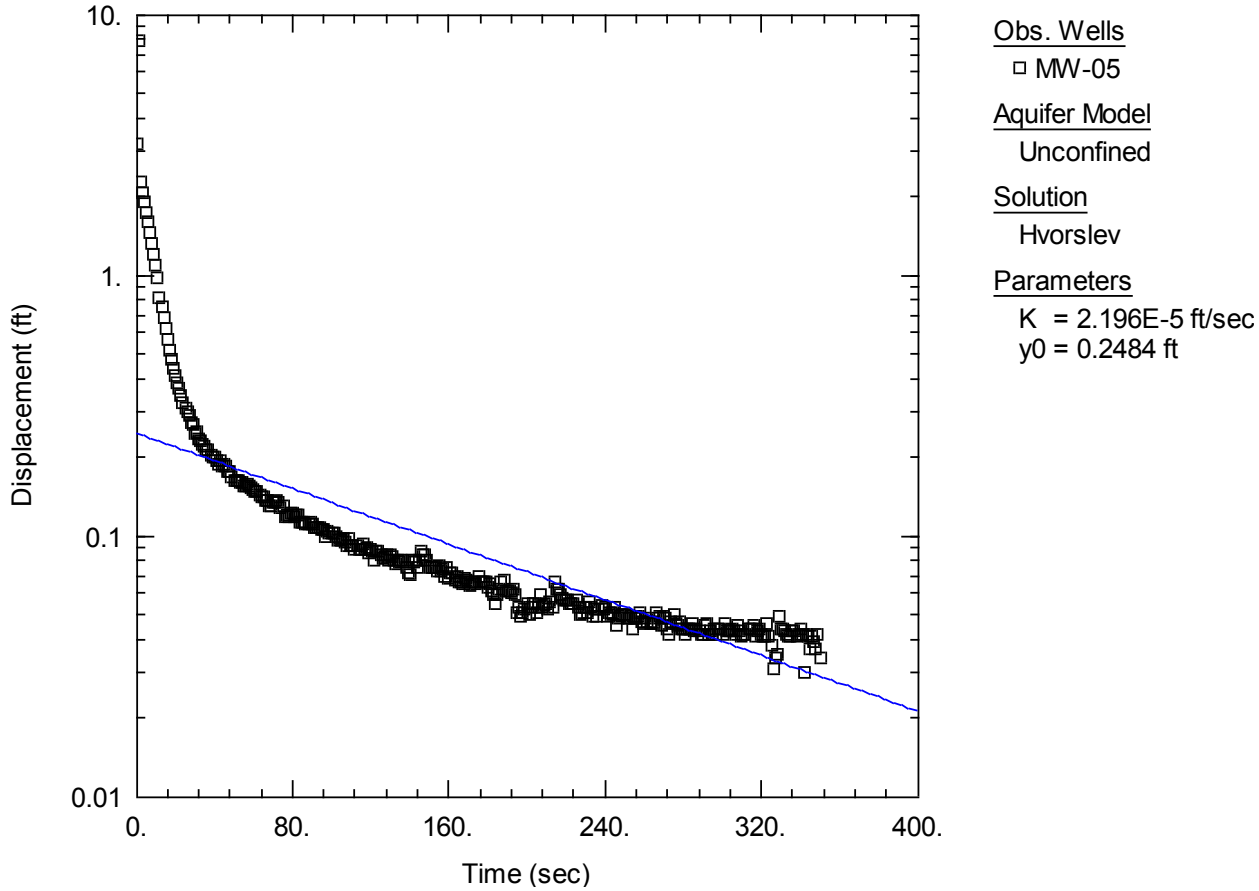
y0 = 0.2952 ft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0.1
0.01
Displacement (ft)
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80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
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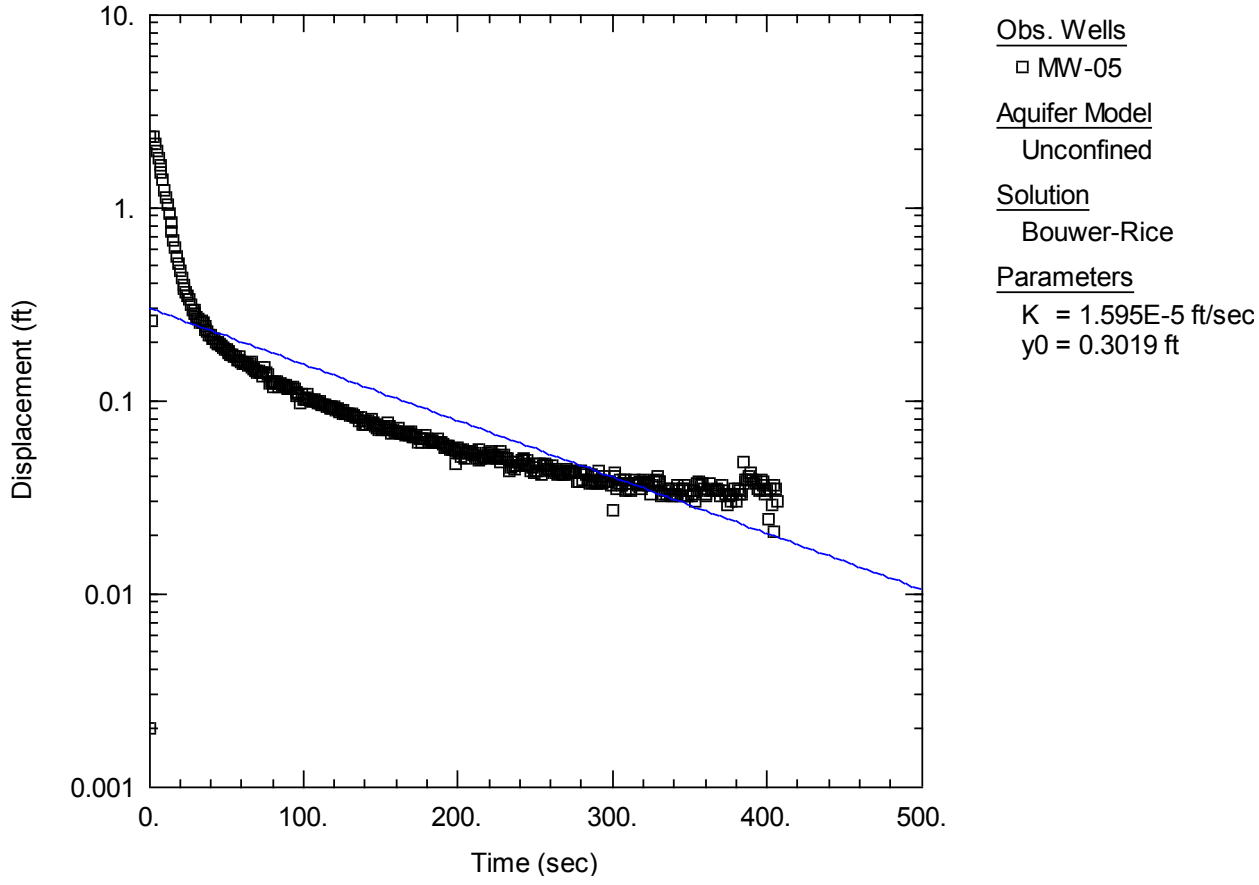
y0 = 0.2484 ft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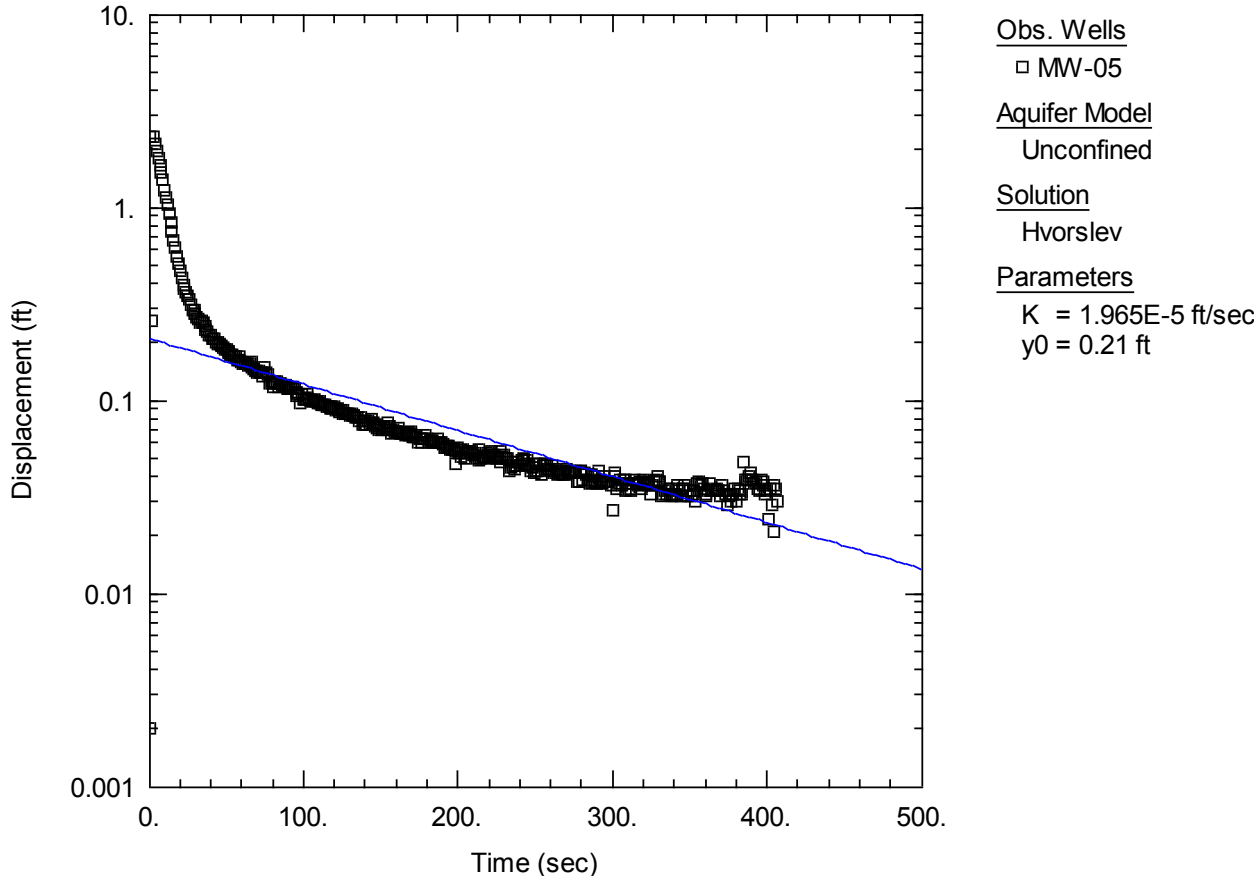
0.01
0.001
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.595E-5 ft/sec
y0 = 0.3019 ft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0.01
0.001
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
MW-05
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
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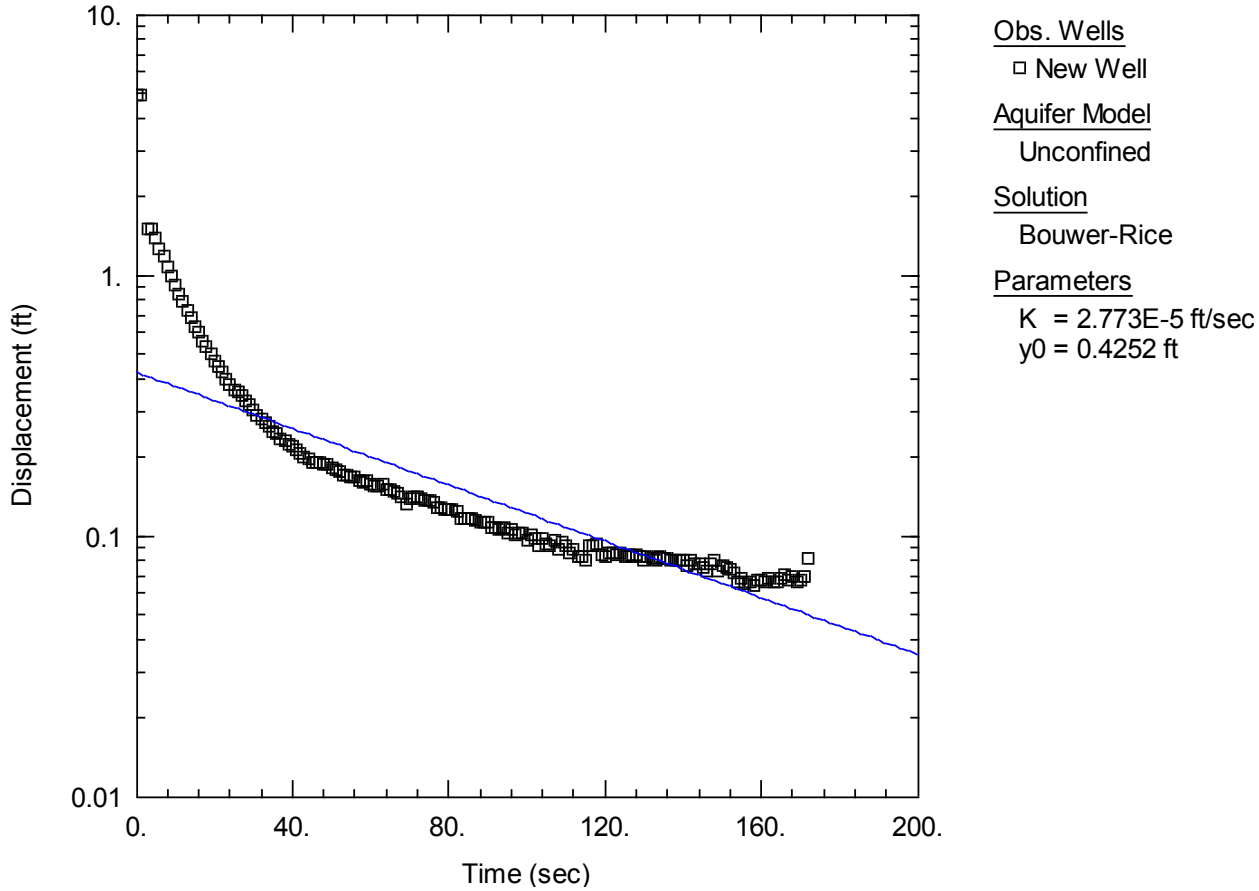
y0 = 0.21 ft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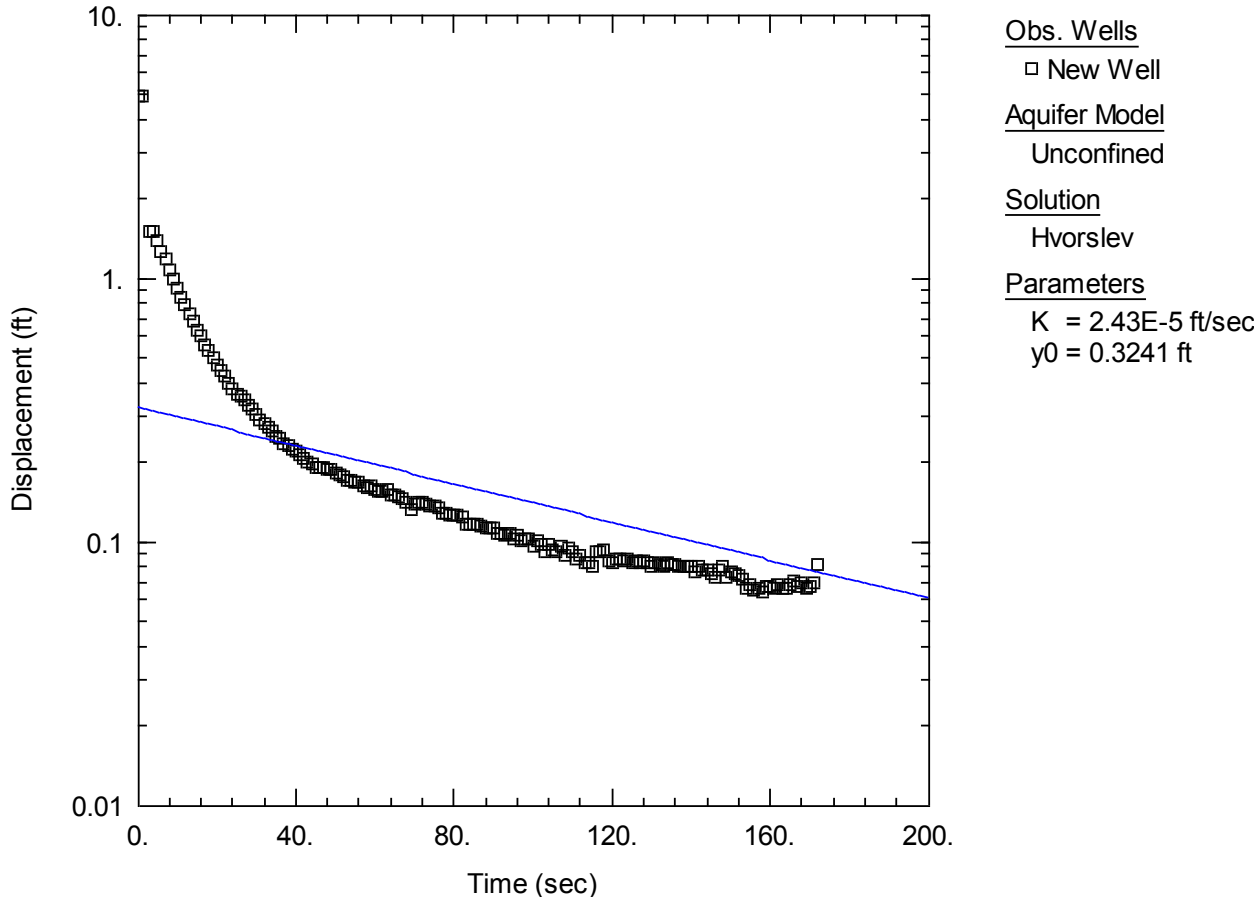
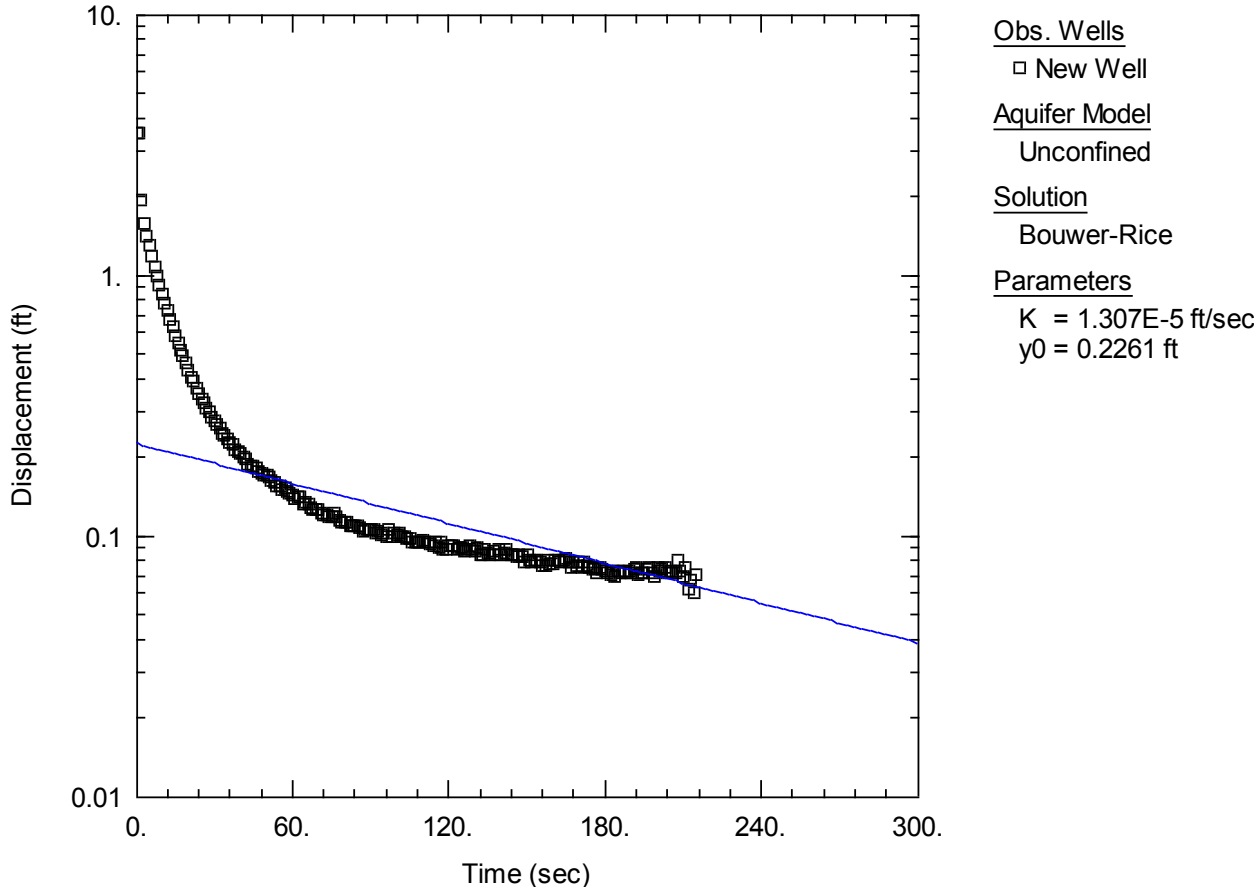
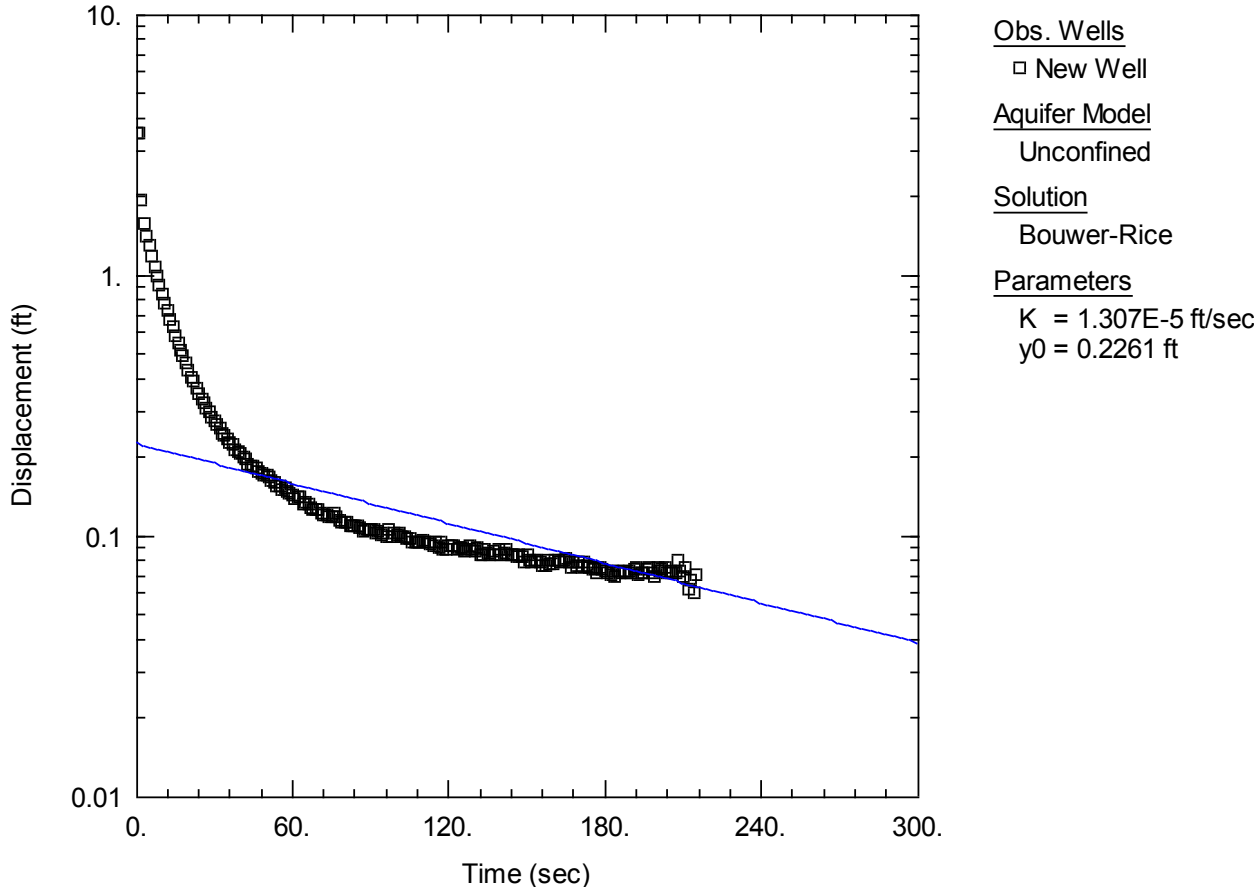
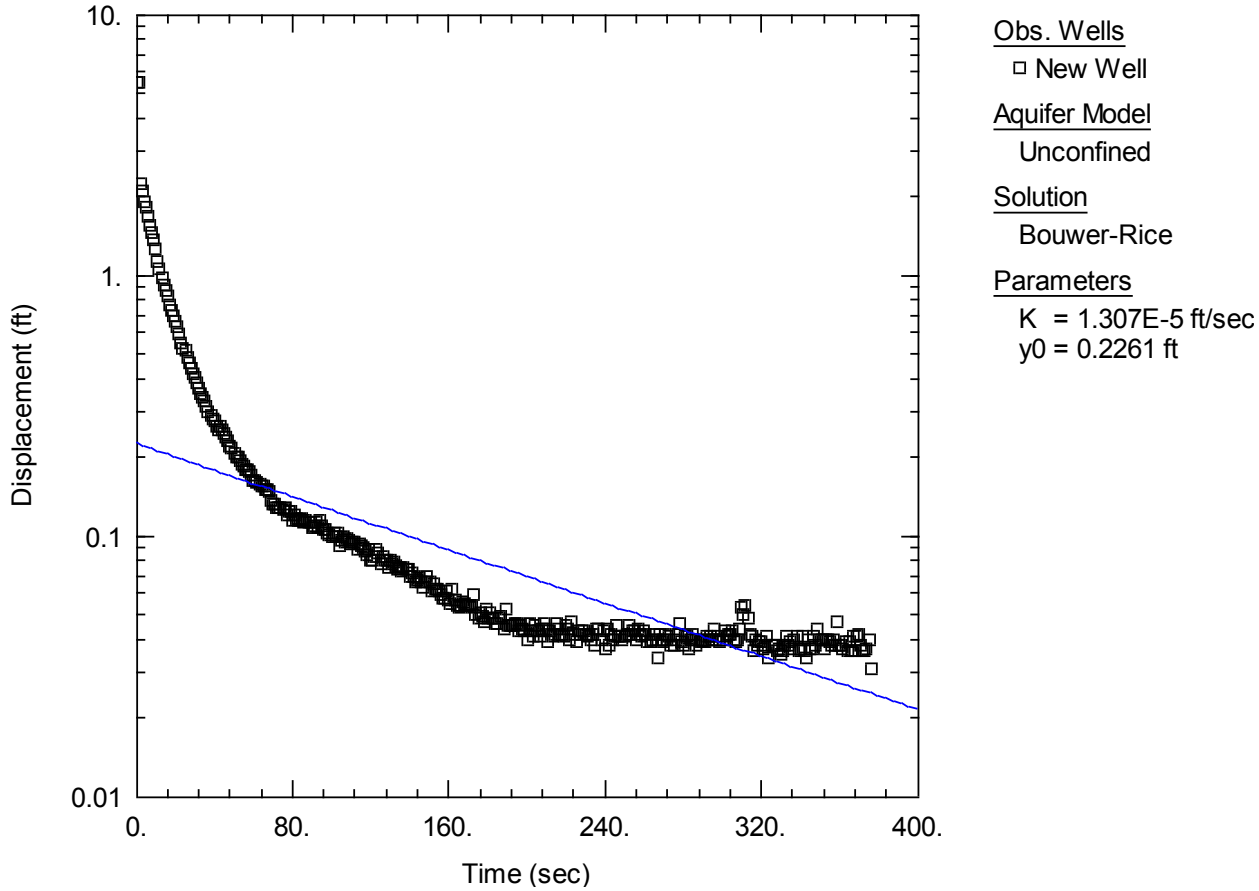
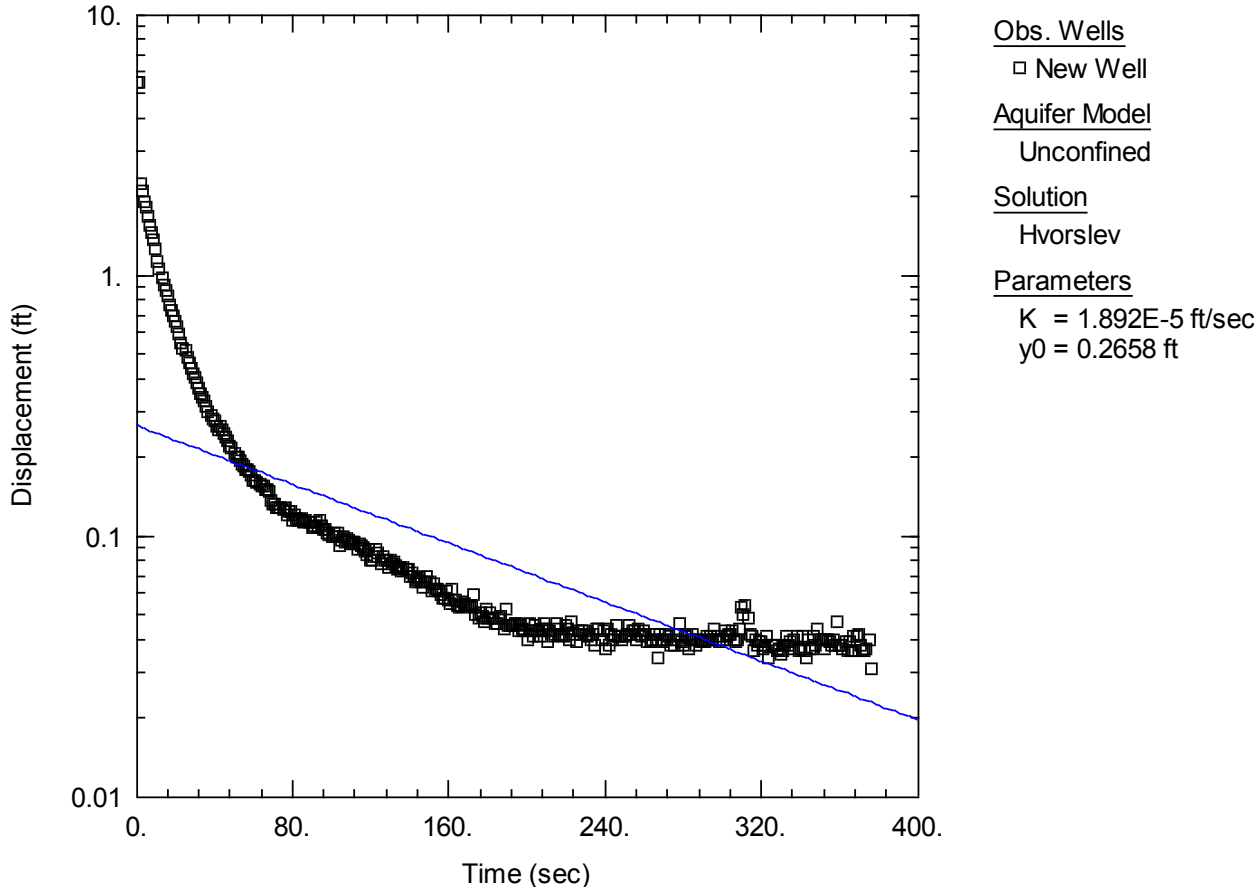
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 2.773E-5 ft/sec
y0 = 0.4252 ft

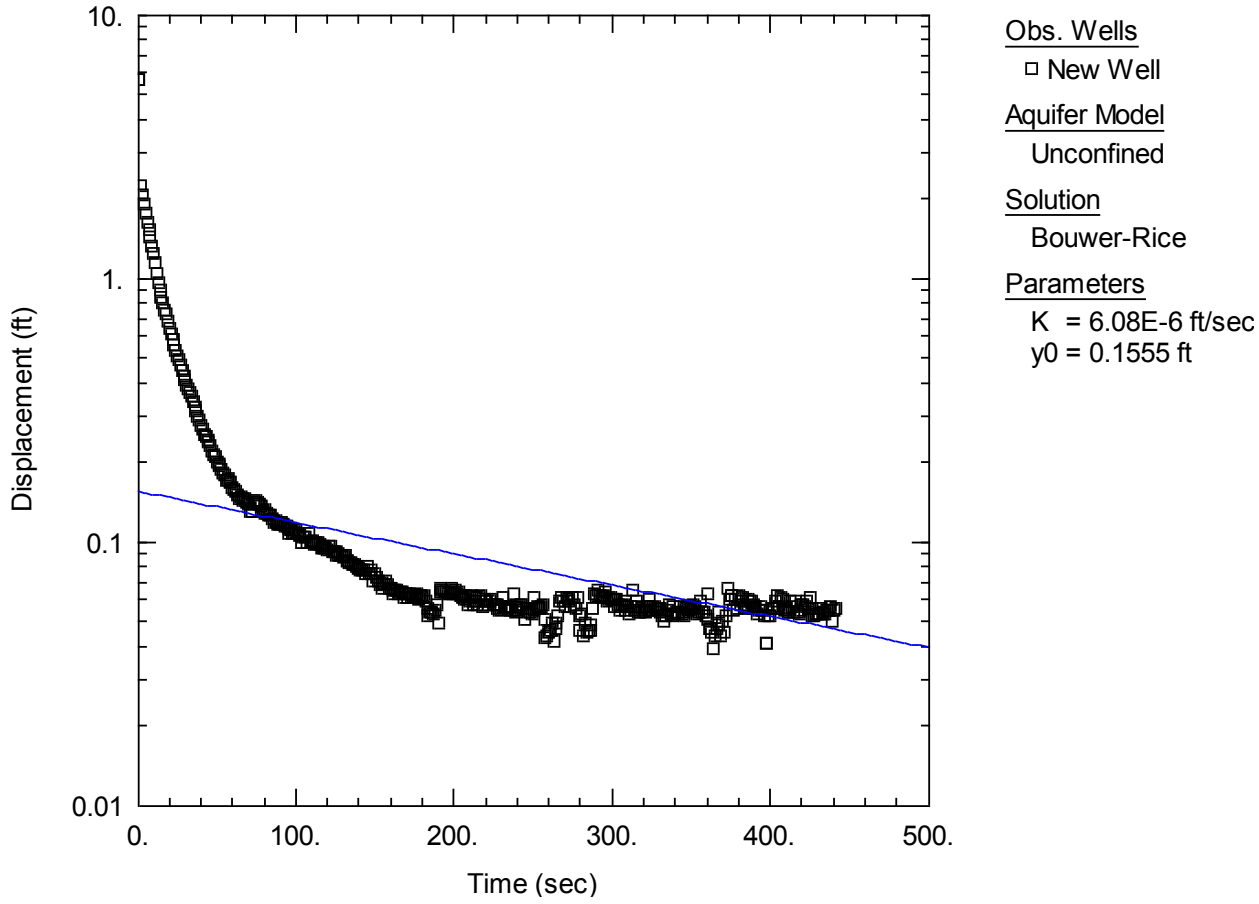

10.
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 2.43E-5 ft/sec
y0 = 0.3241 ft

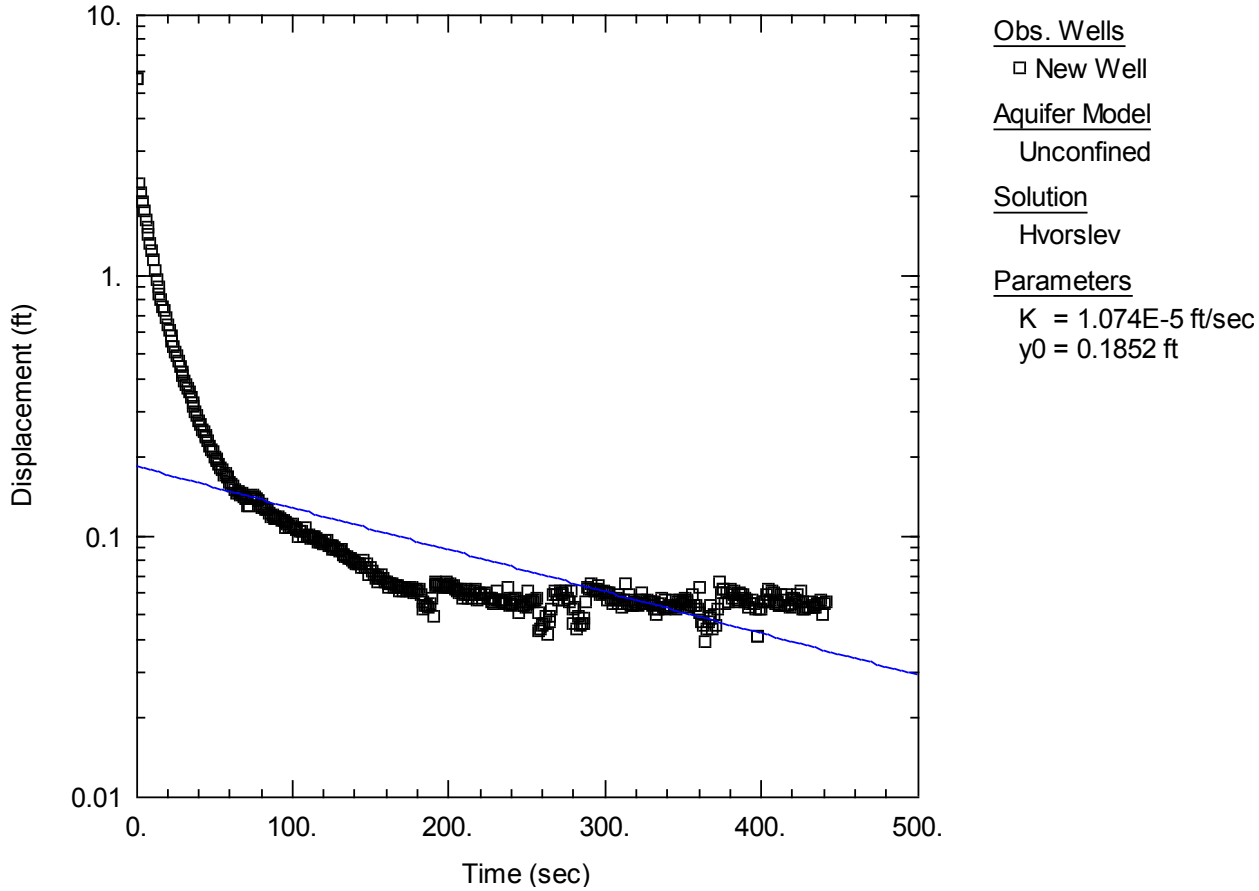

10.
1.
0.1
0.01
Displacement (ft)
0.
60.
120.
180.
240.
300.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.307E-5 ft/sec
y0 = 0.2261 ft

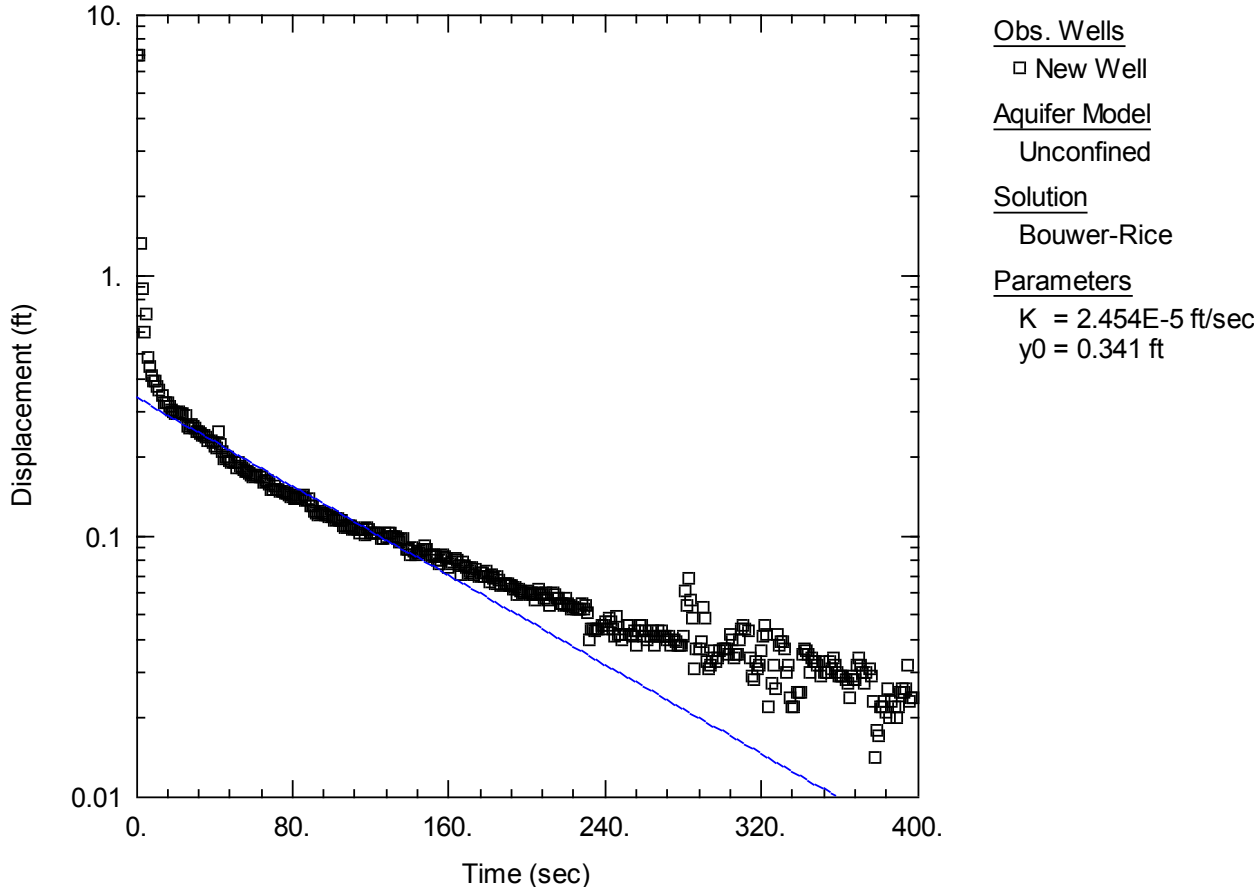

10.
1.
0.1
0.01
Displacement (ft)
0.
60.
120.
180.
240.
300.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.307E-5 ft/sec
y0 = 0.2261 ft

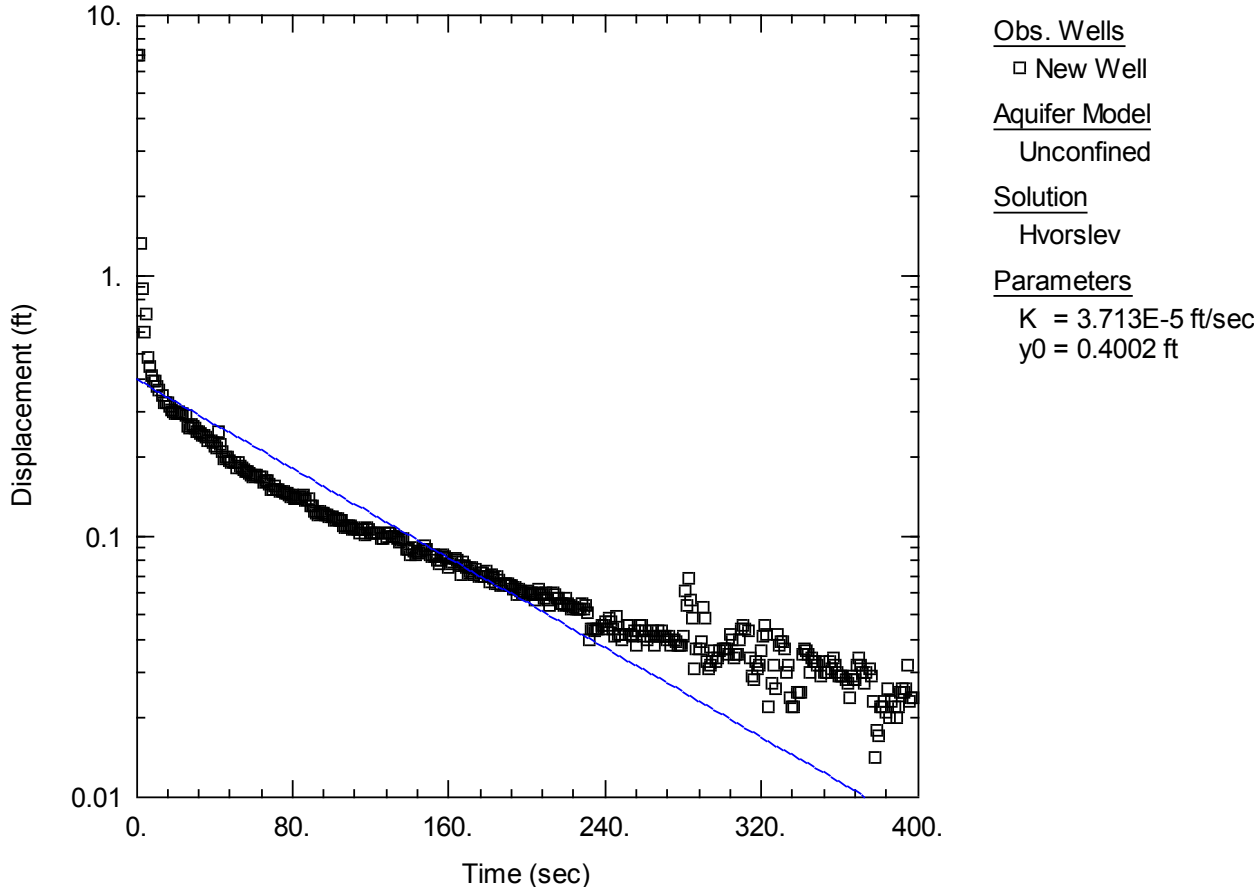

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.307E-5 ft/sec
y0 = 0.2261 ft

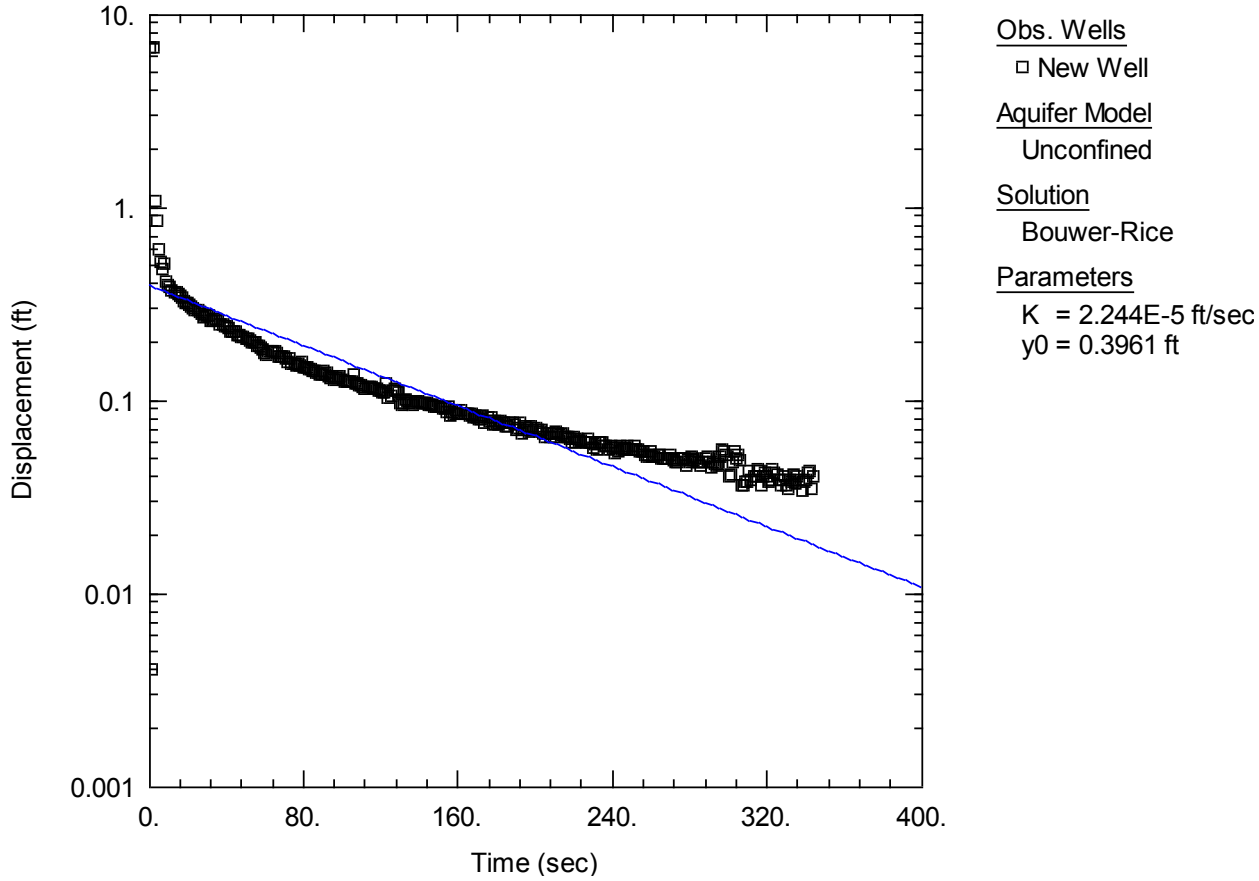

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.892E-5 ft/sec
y0 = 0.2658 ft

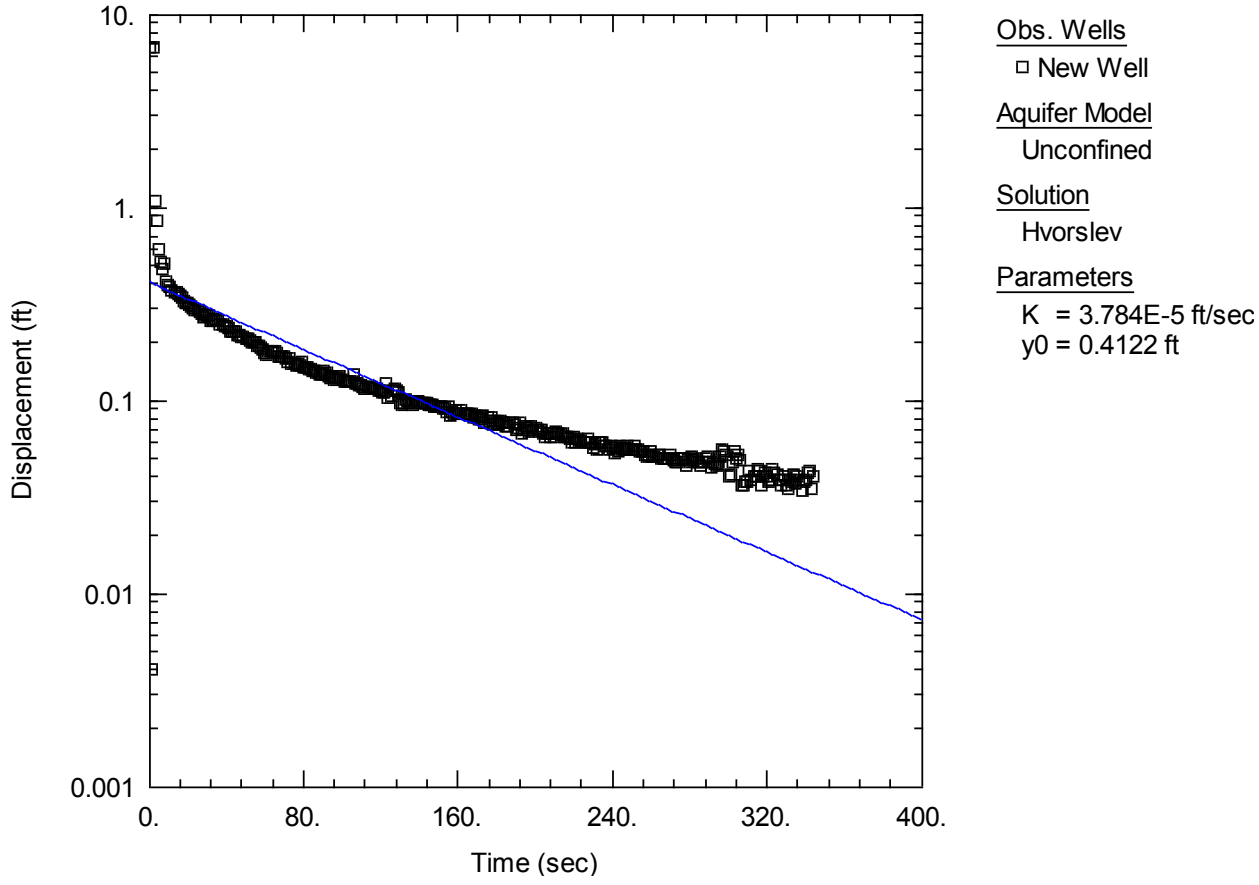

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 6.08E-6 ft/sec
y0 = 0.1555 ft

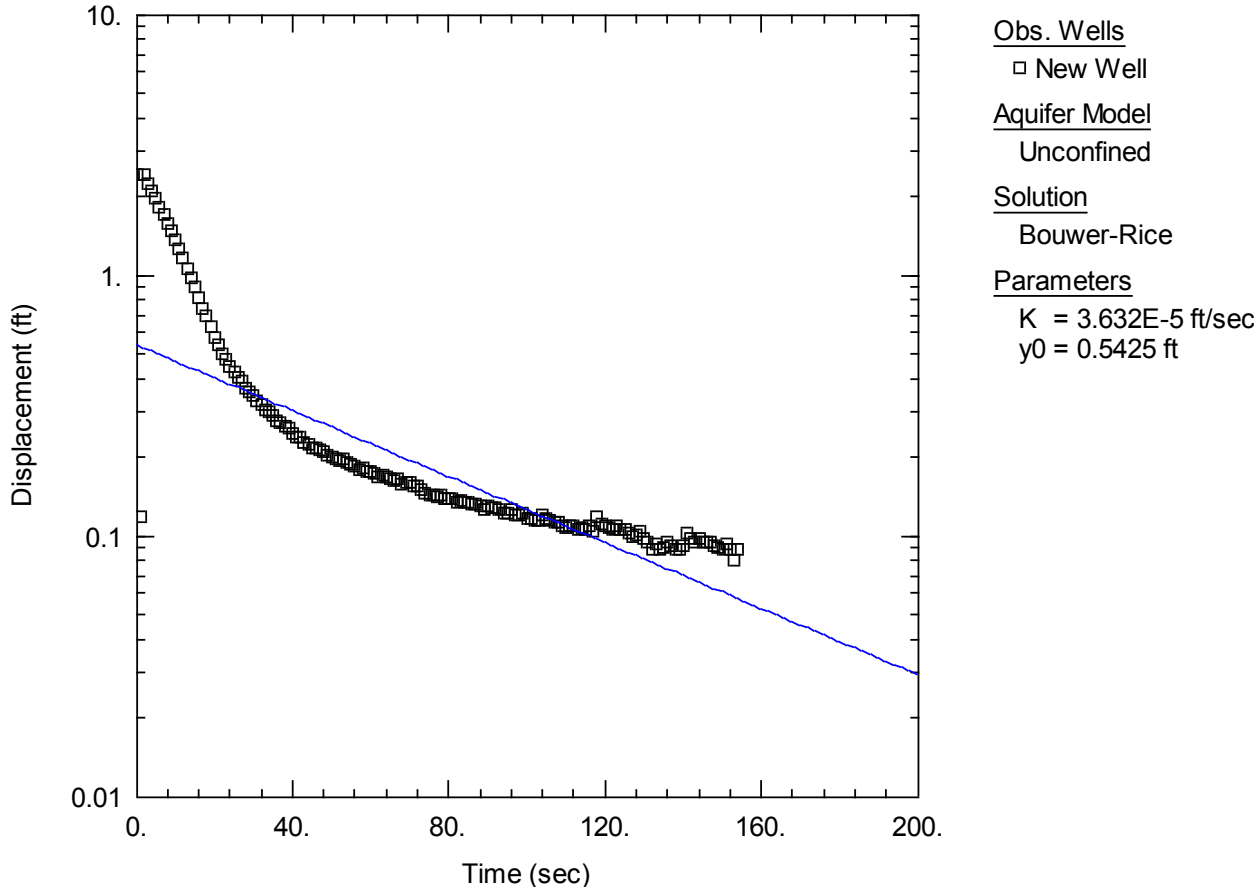

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.074E-5 ft/sec
y0 = 0.1852 ft

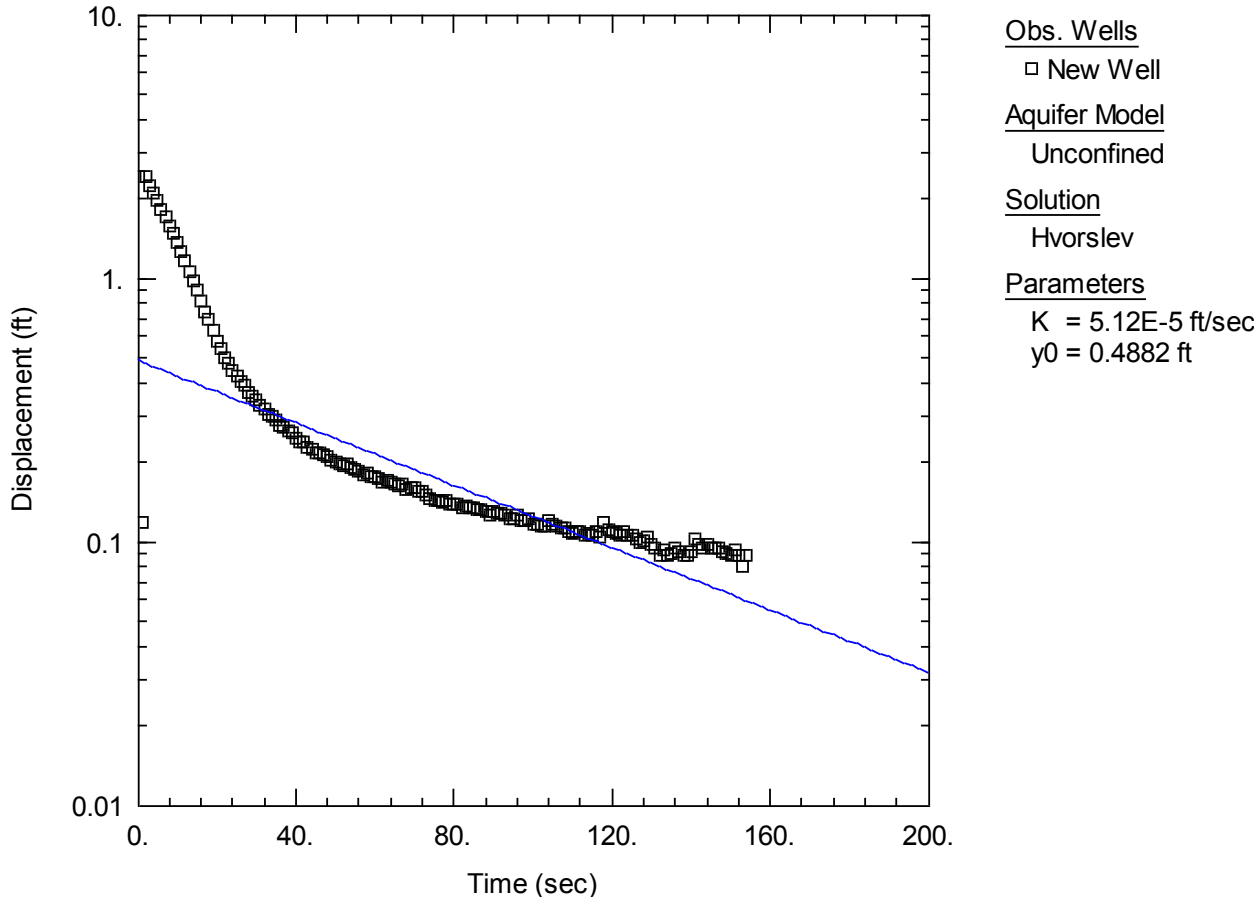

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 2.454E-5 ft/sec
y0 = 0.341 ft

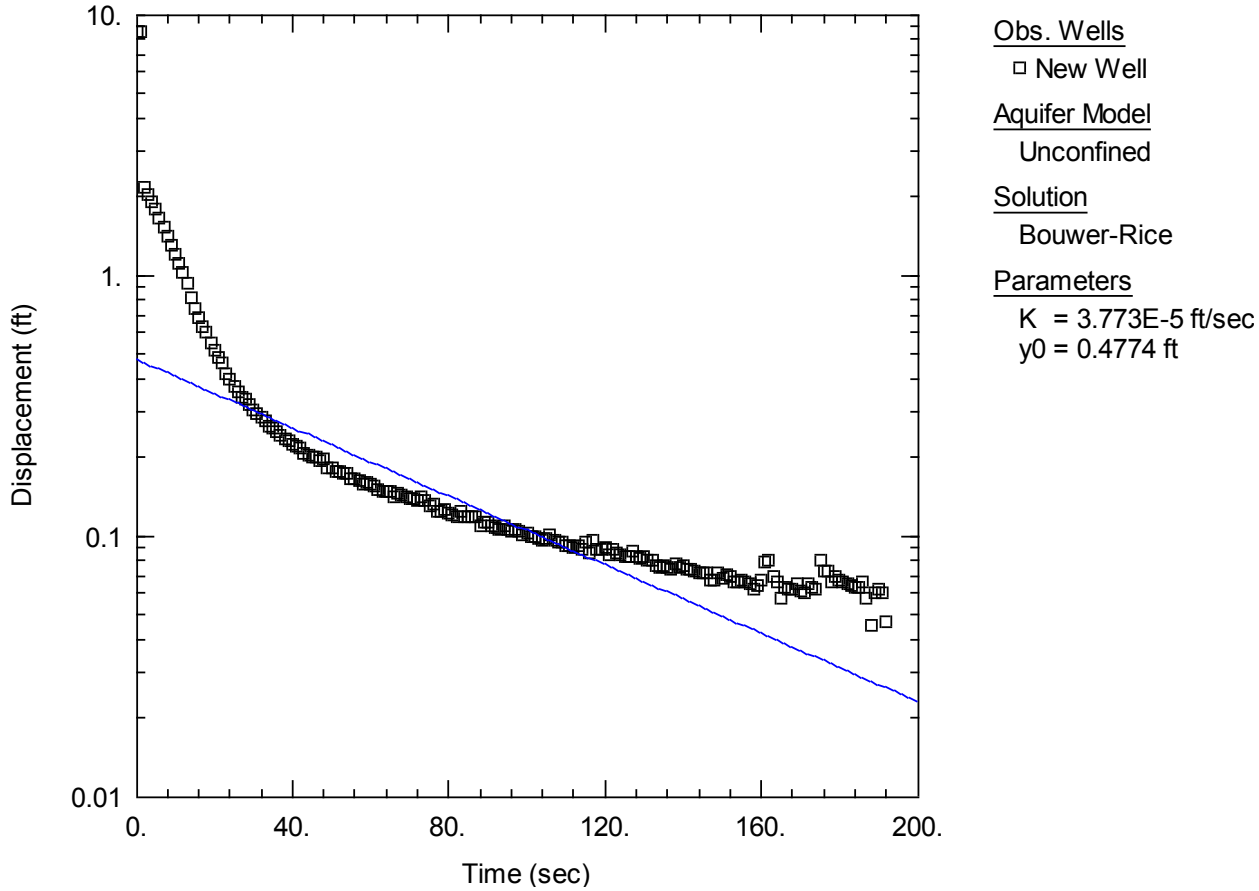

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 3.713E-5 ft/sec
y0 = 0.4002 ft

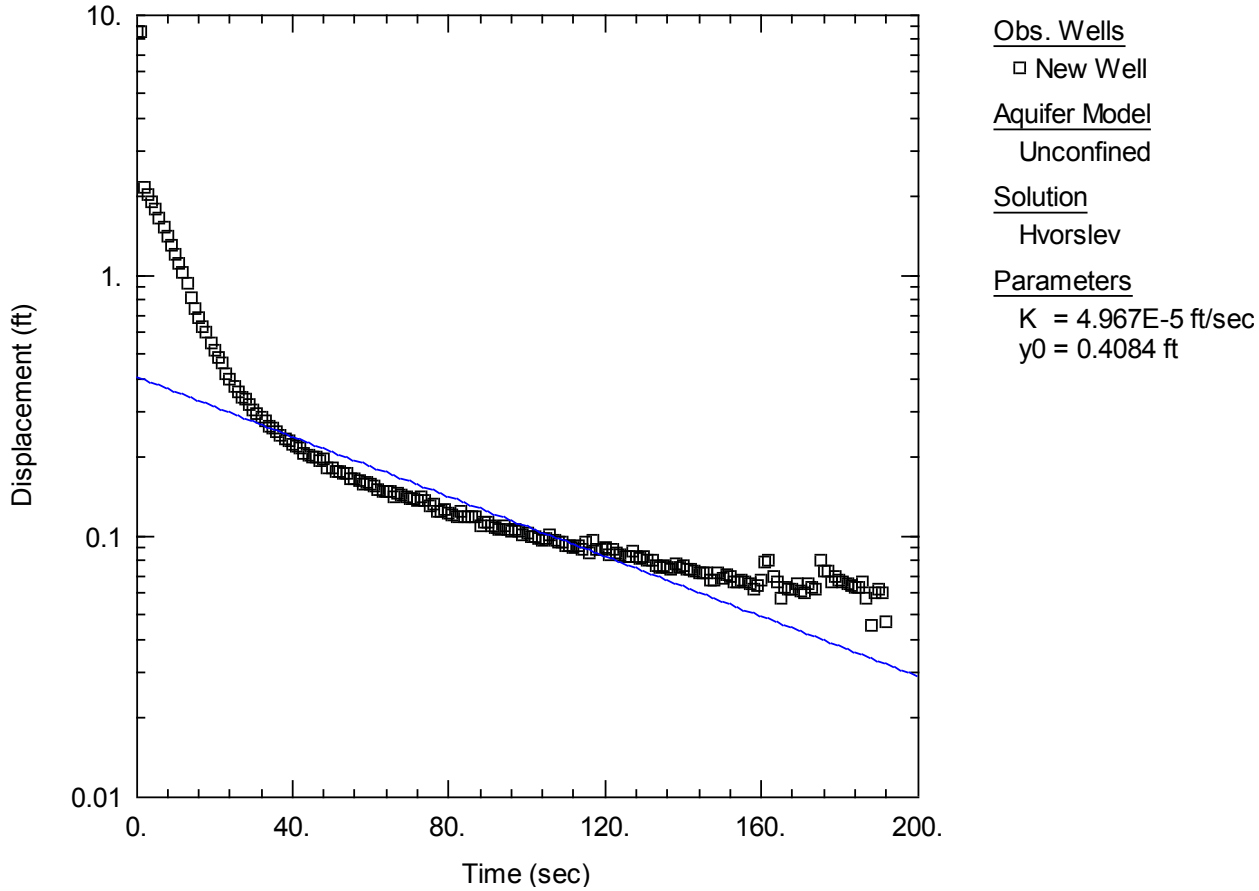

10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 2.244E-5 ft/sec
y0 = 0.3961 ft

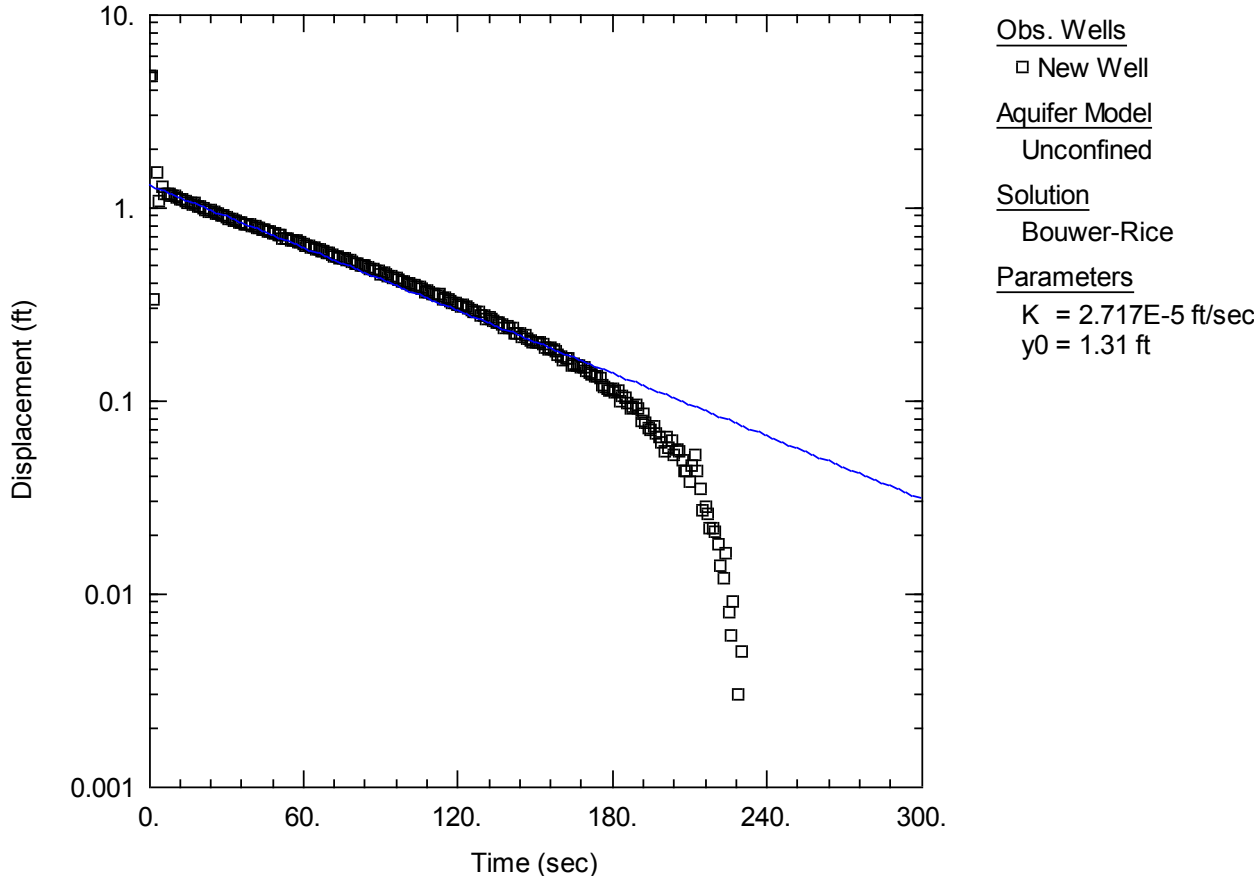

10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 3.784E-5 ft/sec
y0 = 0.4122 ft

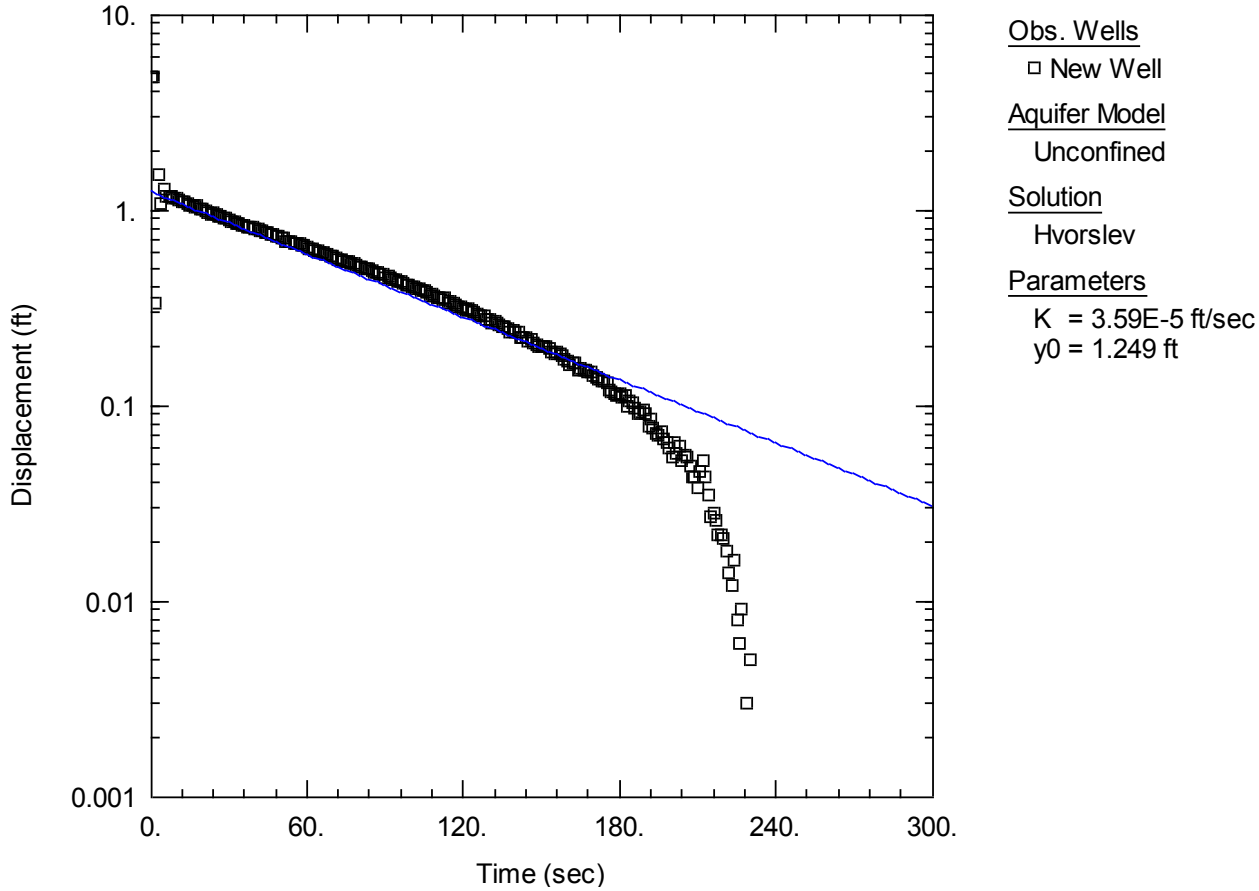

10.
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 3.632E-5 ft/sec
y0 = 0.5425 ft

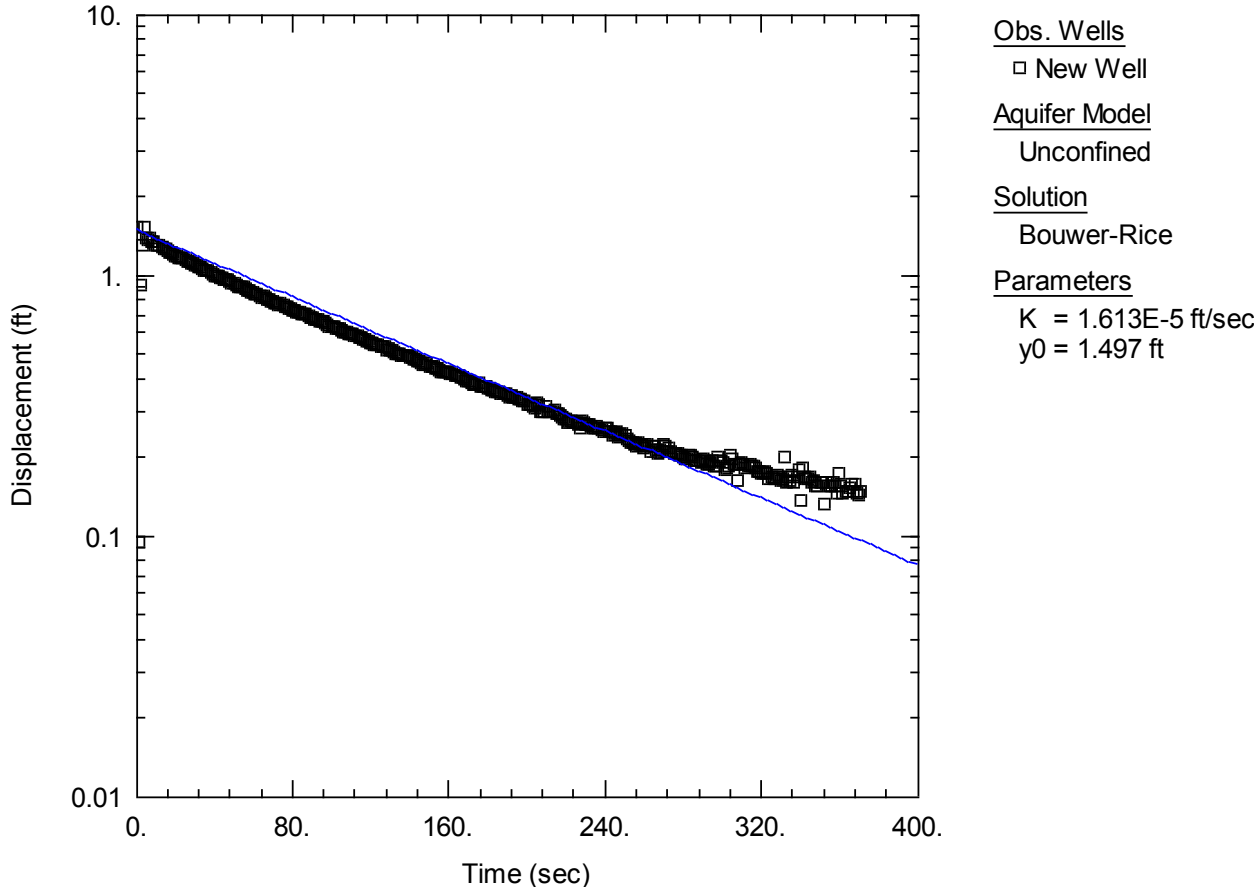

10.
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 5.12E-5 ft/sec
y0 = 0.4882 ft

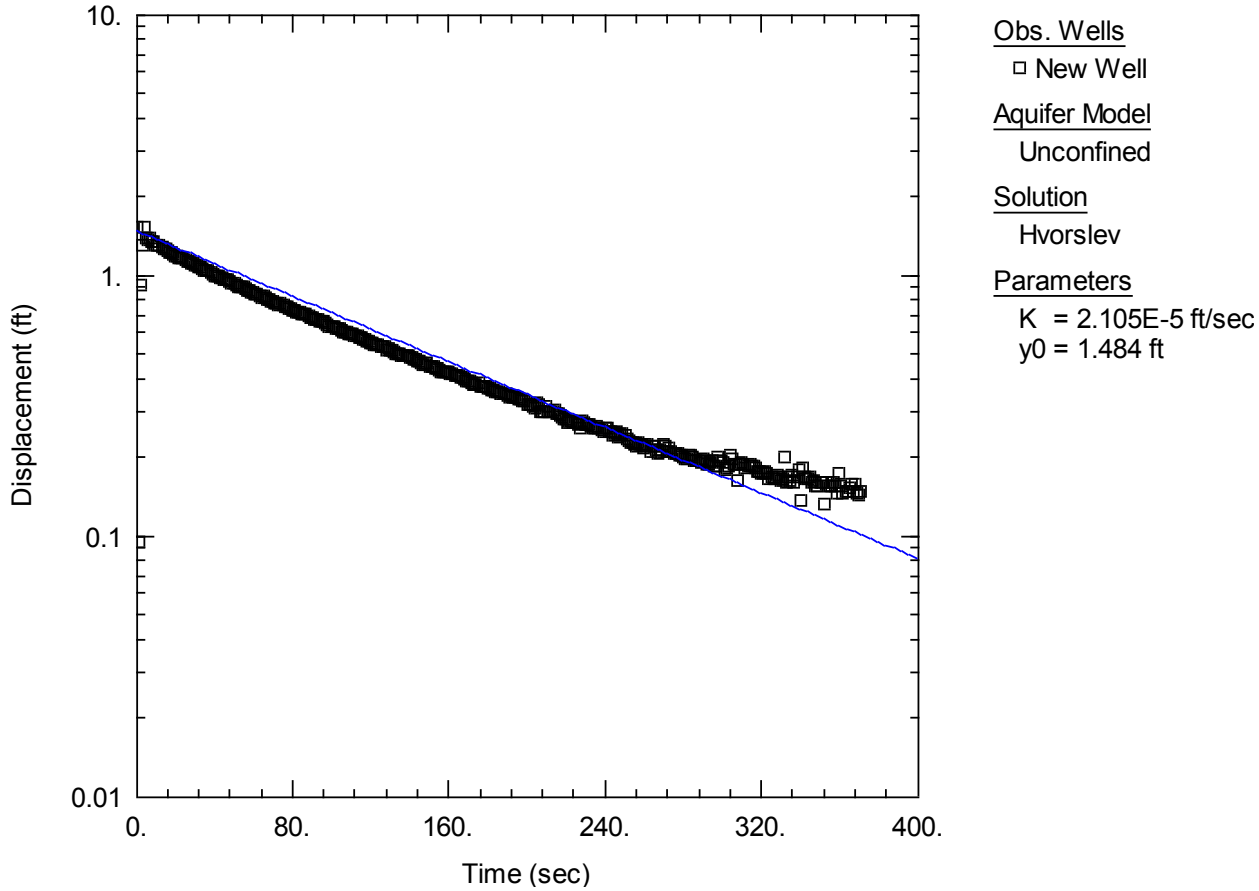

10.
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 3.773E-5 ft/sec
y0 = 0.4774 ft

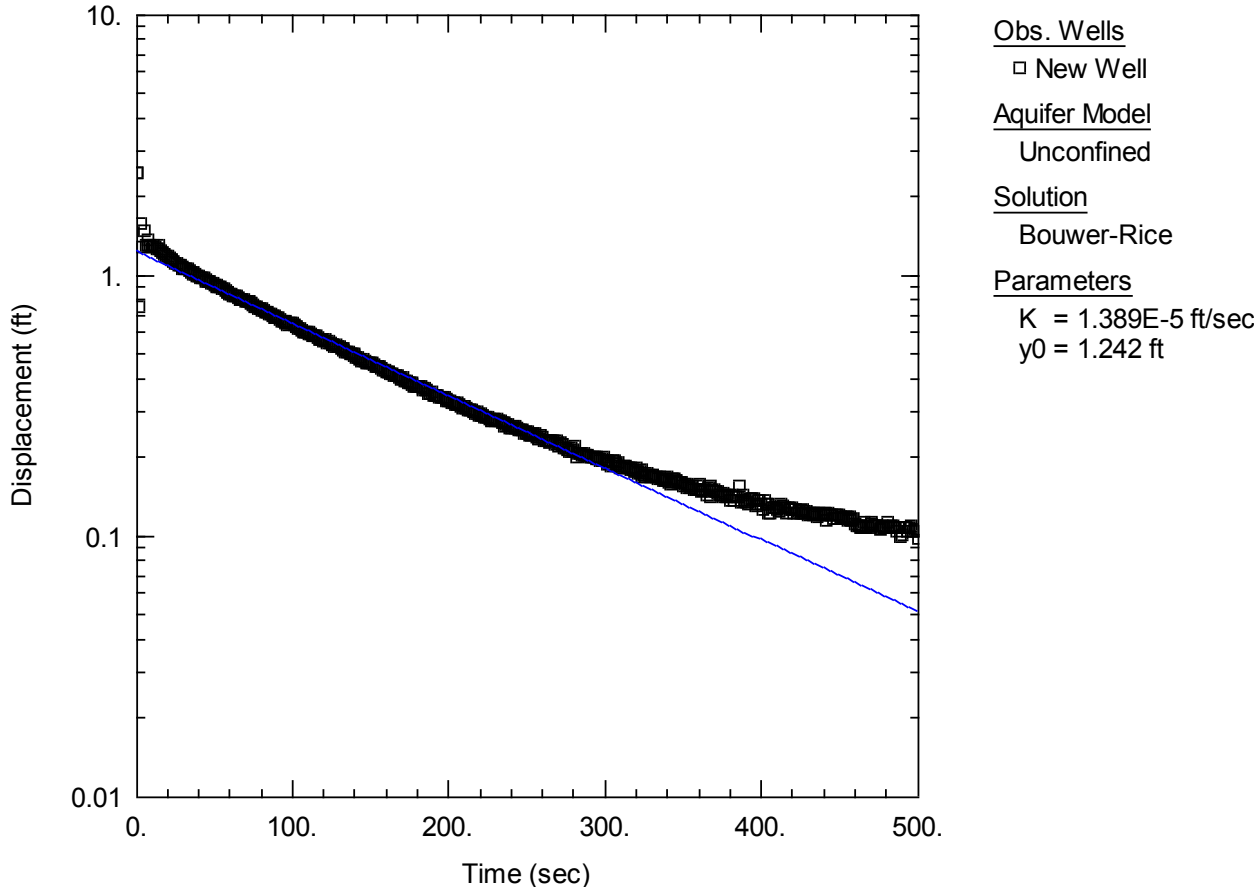

10.
1.
0.1
0.01
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 4.967E-5 ft/sec
y0 = 0.4084 ft

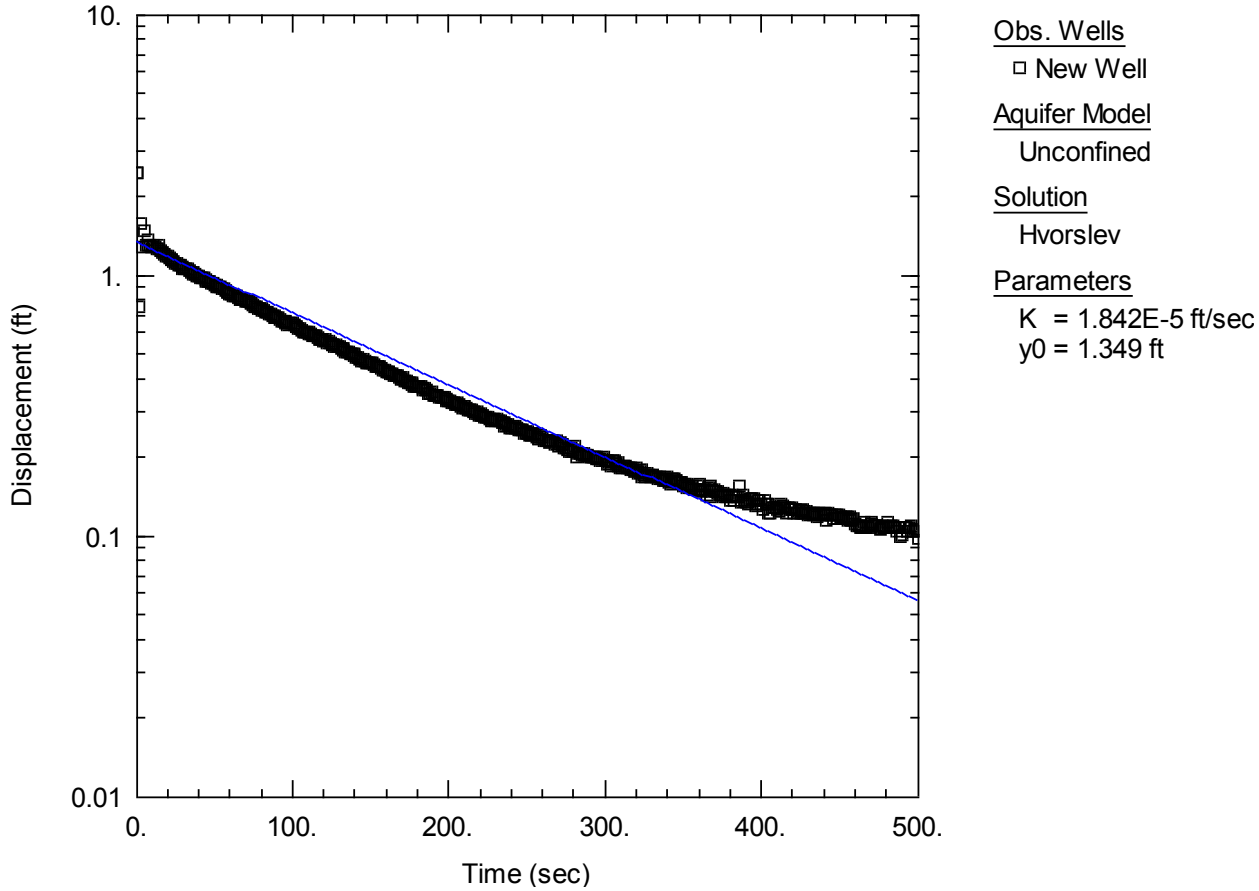

10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
60.
120.
180.
240.
300.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 2.717E-5 ft/sec
y0 = 1.31 ft

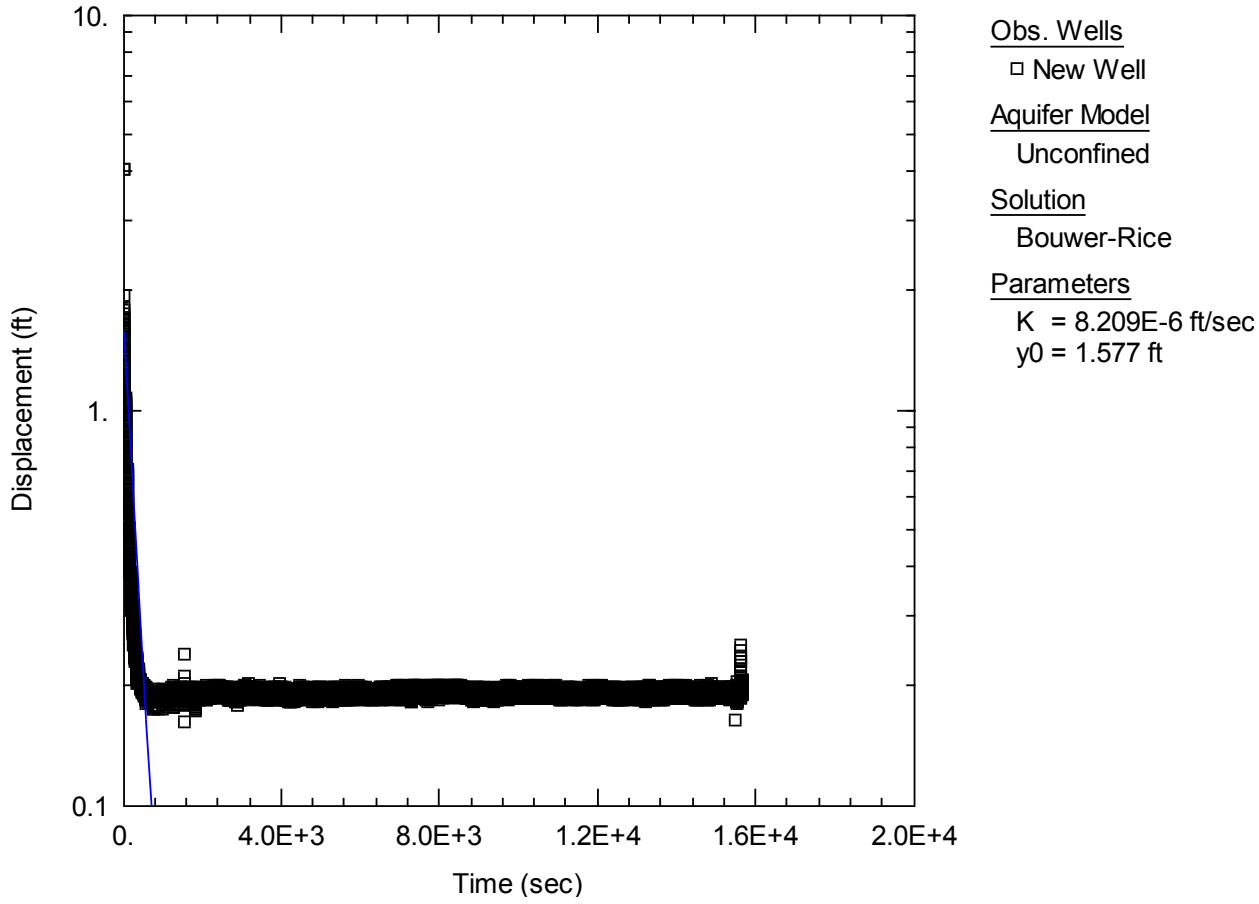

10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
60.
120.
180.
240.
300.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 3.59E-5 ft/sec
y0 = 1.249 ft

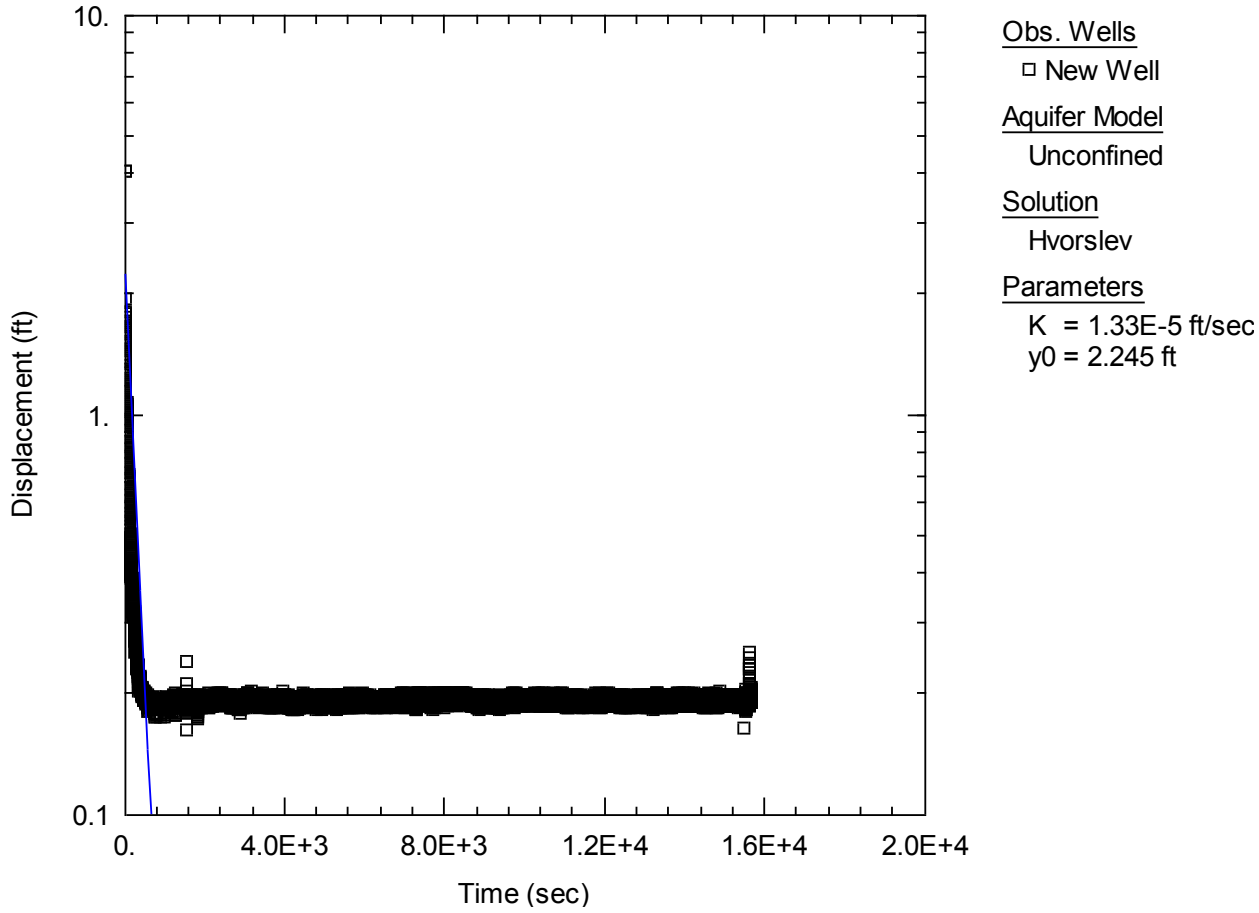

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.613E-5 ft/sec
y0 = 1.497 ft

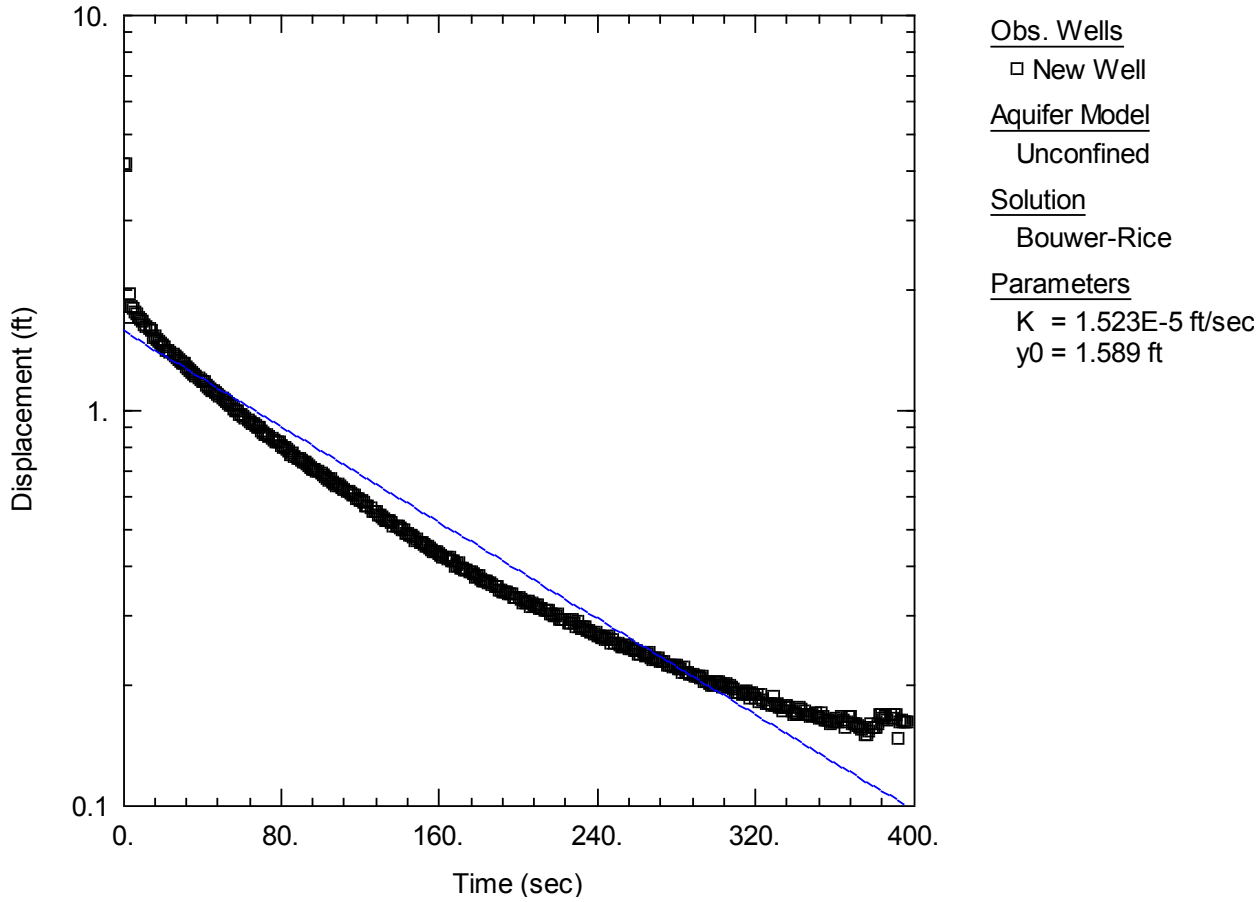

10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 2.105E-5 ft/sec
y0 = 1.484 ft

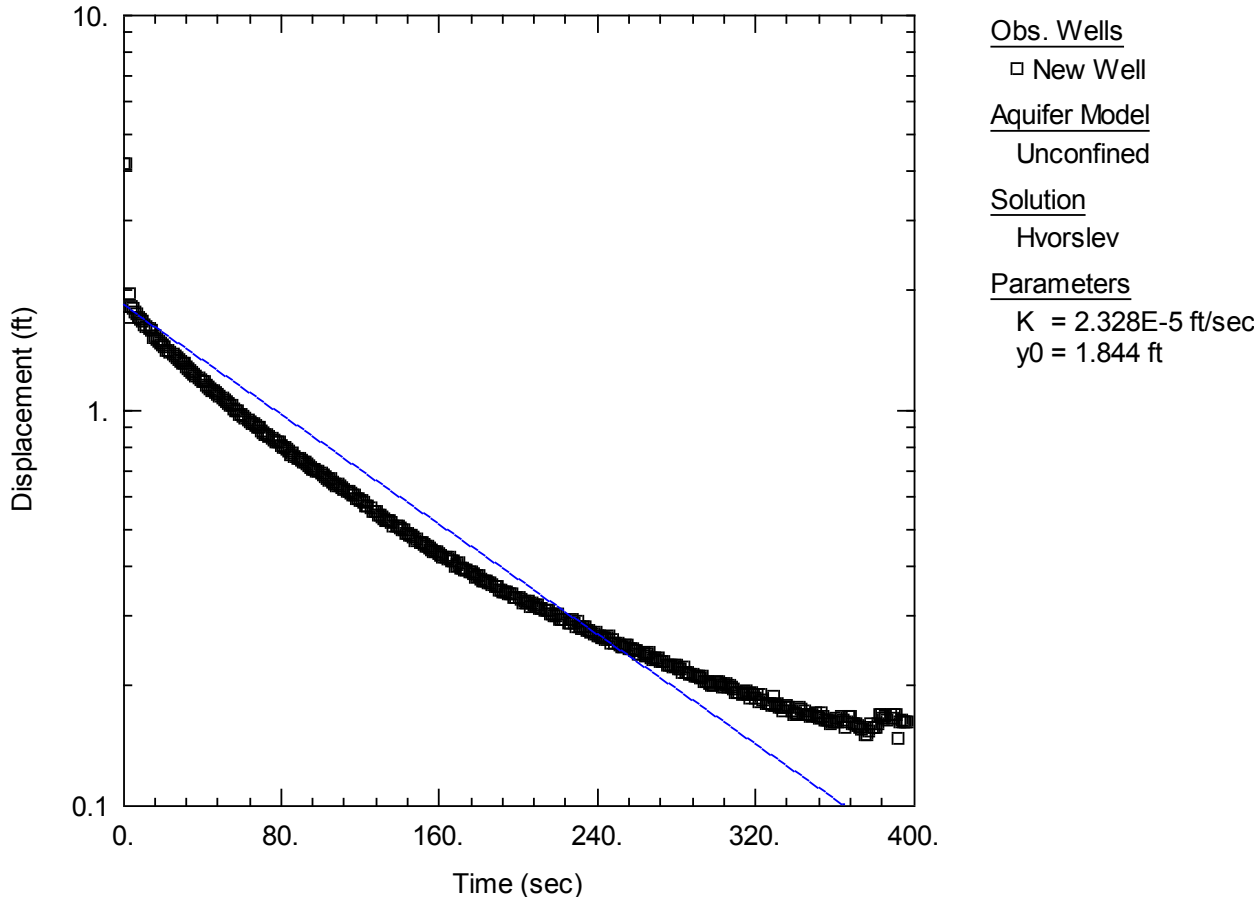

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.389E-5 ft/sec
y0 = 1.242 ft

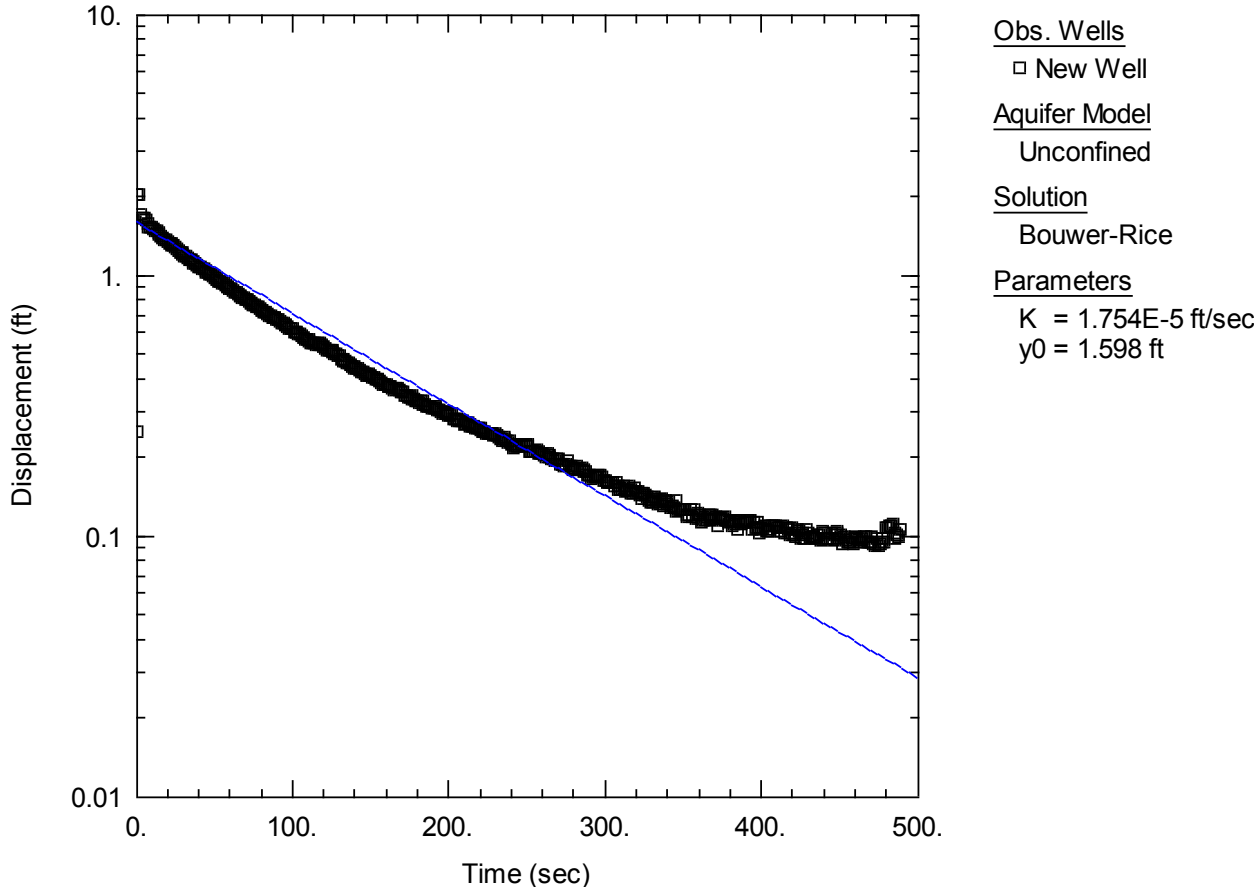

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.842E-5 ft/sec
y0 = 1.349 ft

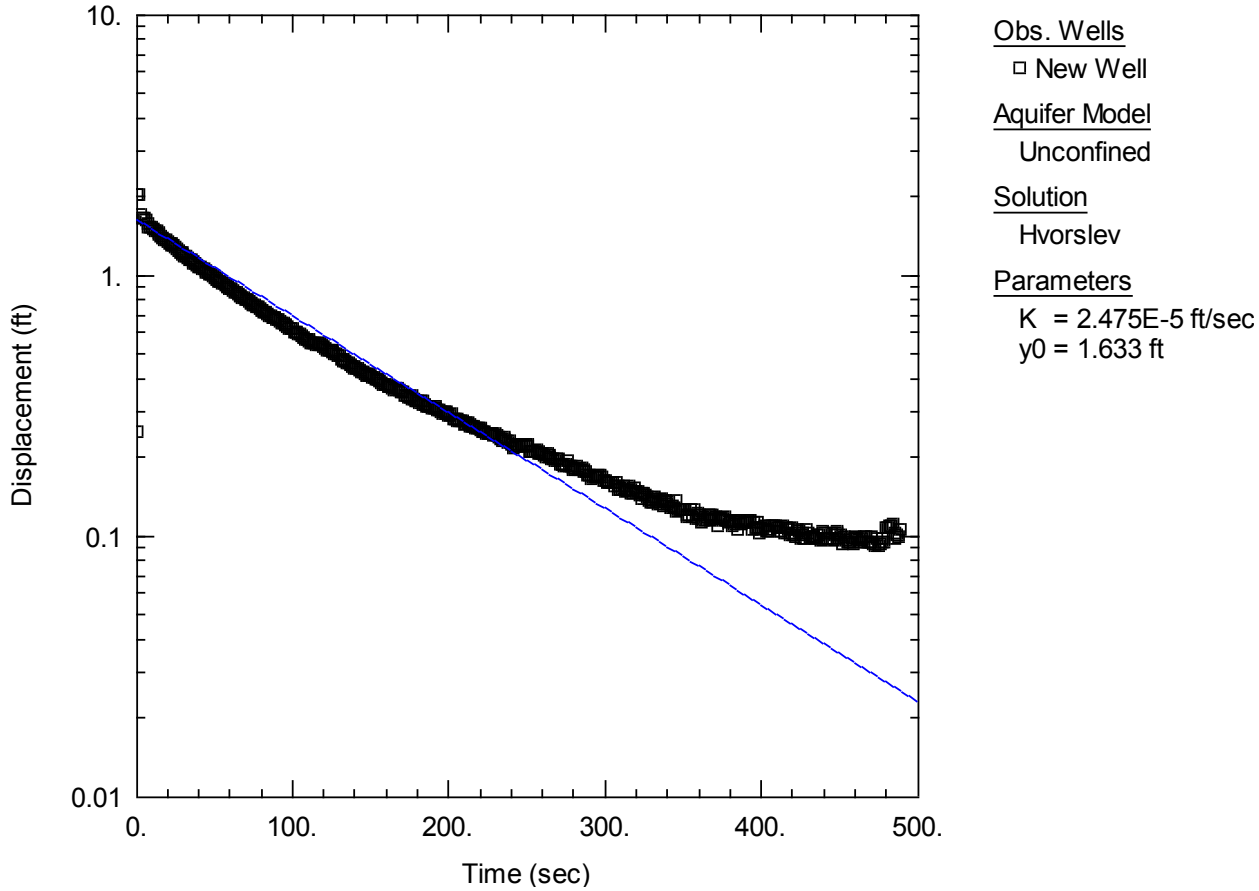

10.
1.
0.1
Displacement (ft)
0.
4.0E+3
8.0E+3
1.2E+4
1.6E+4
2.0E+4
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 8.209E-6 ft/sec
y0 = 1.577 ft

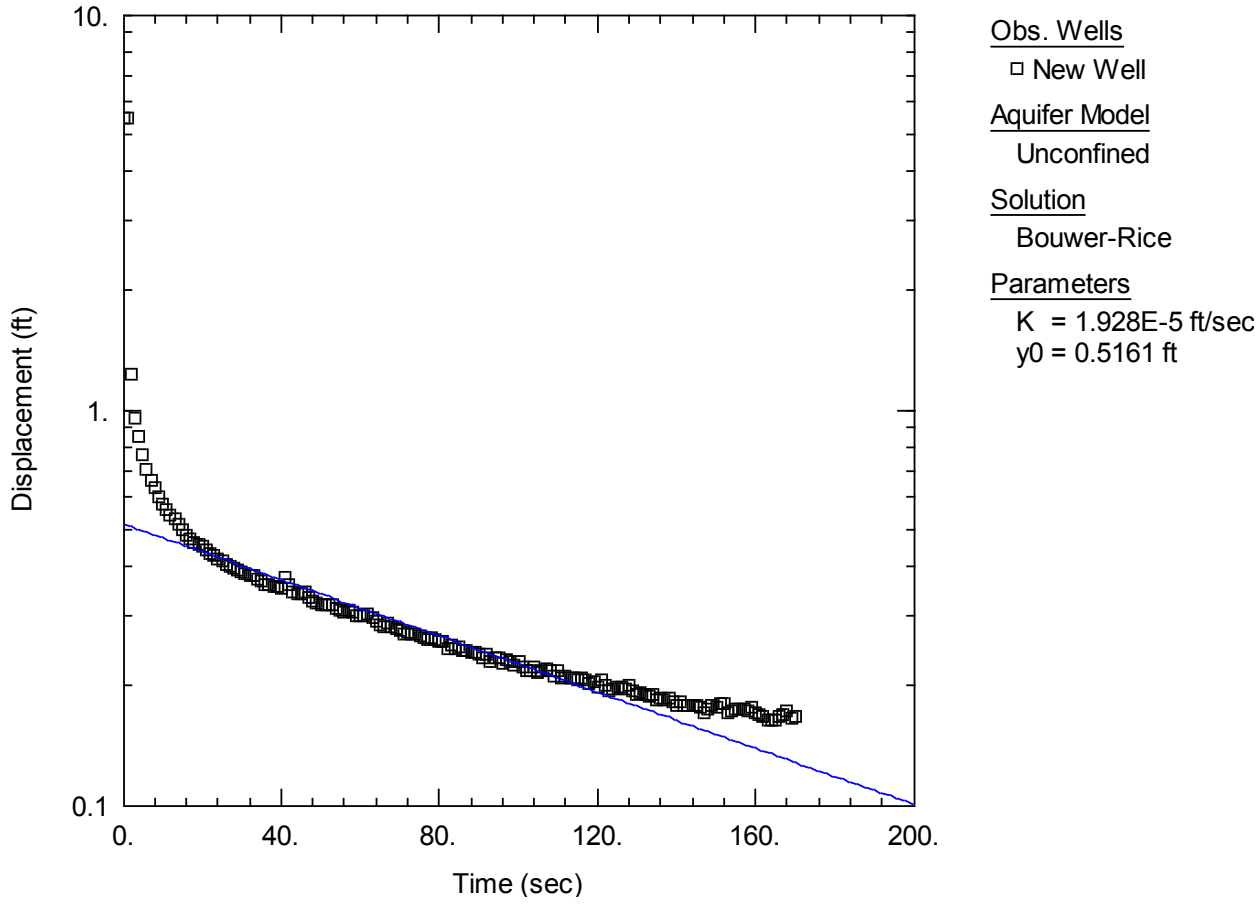

10.
1.
0.1
Displacement (ft)
0.
4.0E+3
8.0E+3
1.2E+4
1.6E+4
2.0E+4
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.33E-5 ft/sec
y0 = 2.245 ft

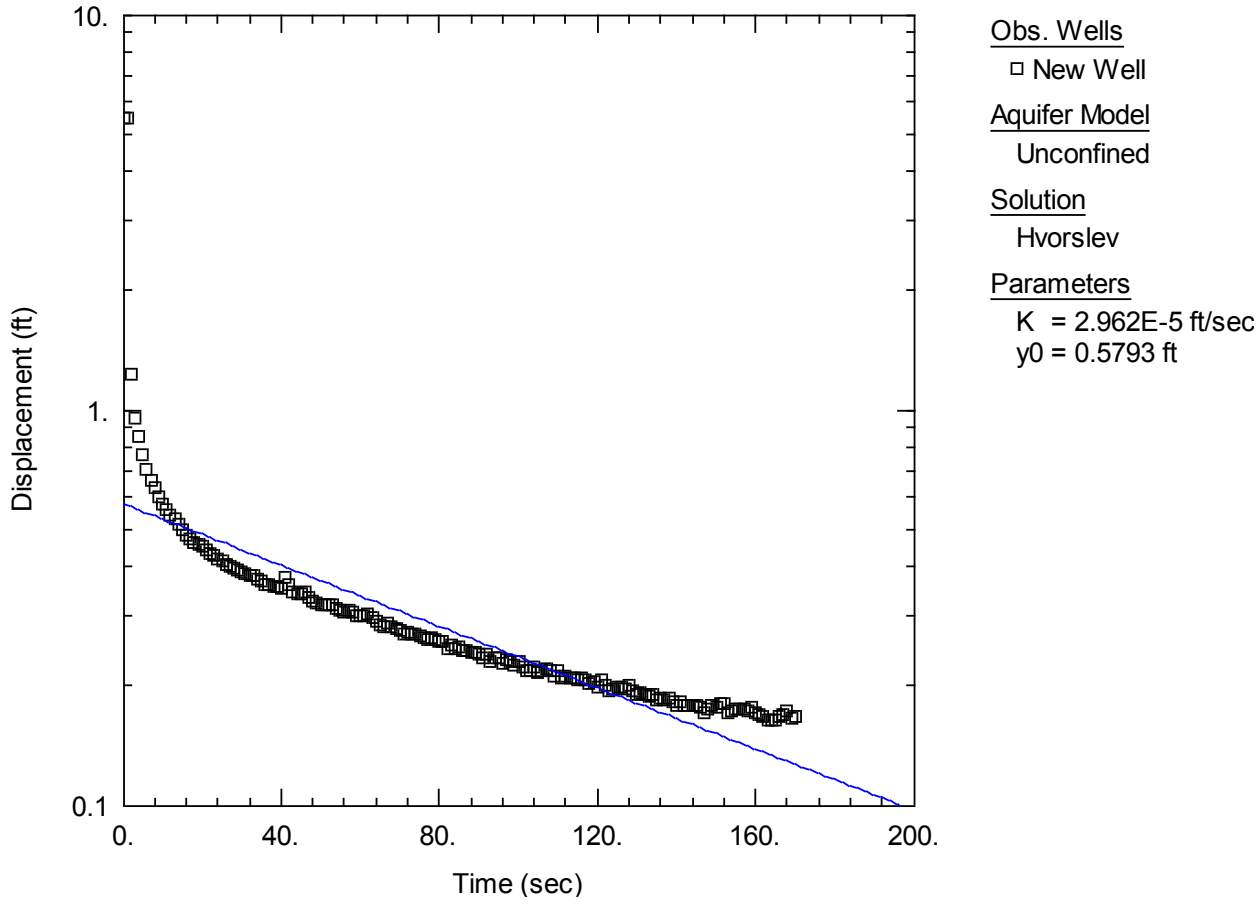

10.
1.
0.1
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.523E-5 ft/sec
y0 = 1.589 ft

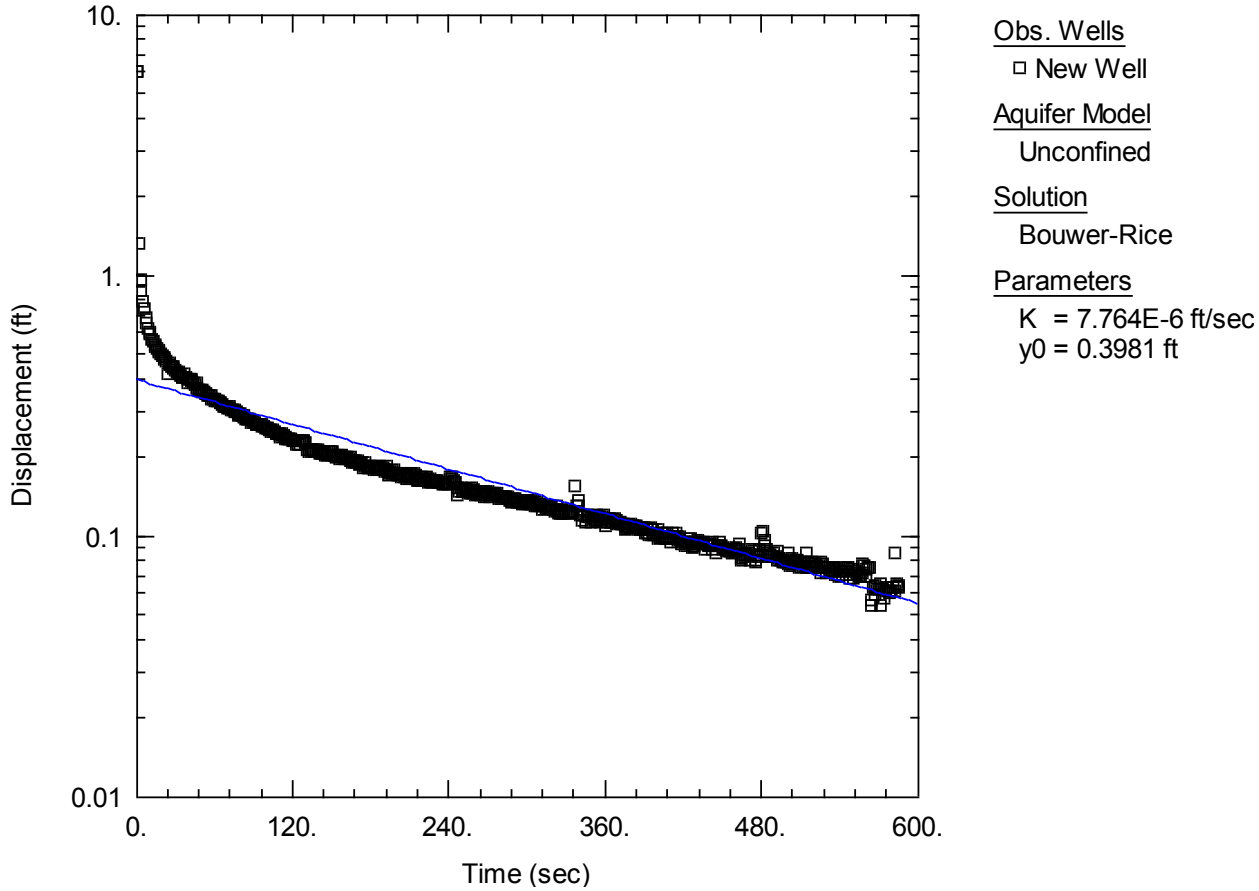

10.
1.
0.1
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 2.328E-5 ft/sec
y0 = 1.844 ft

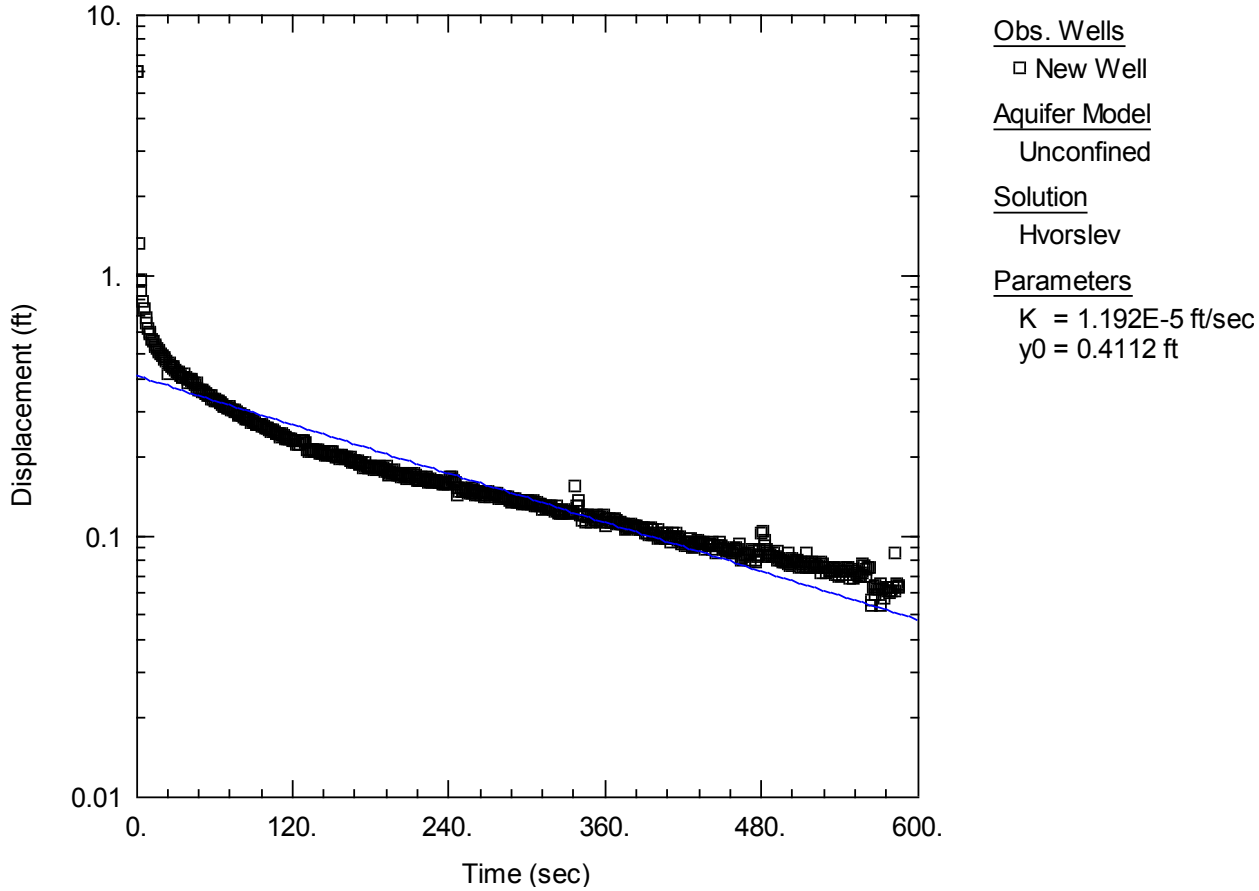

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.754E-5 ft/sec
y0 = 1.598 ft

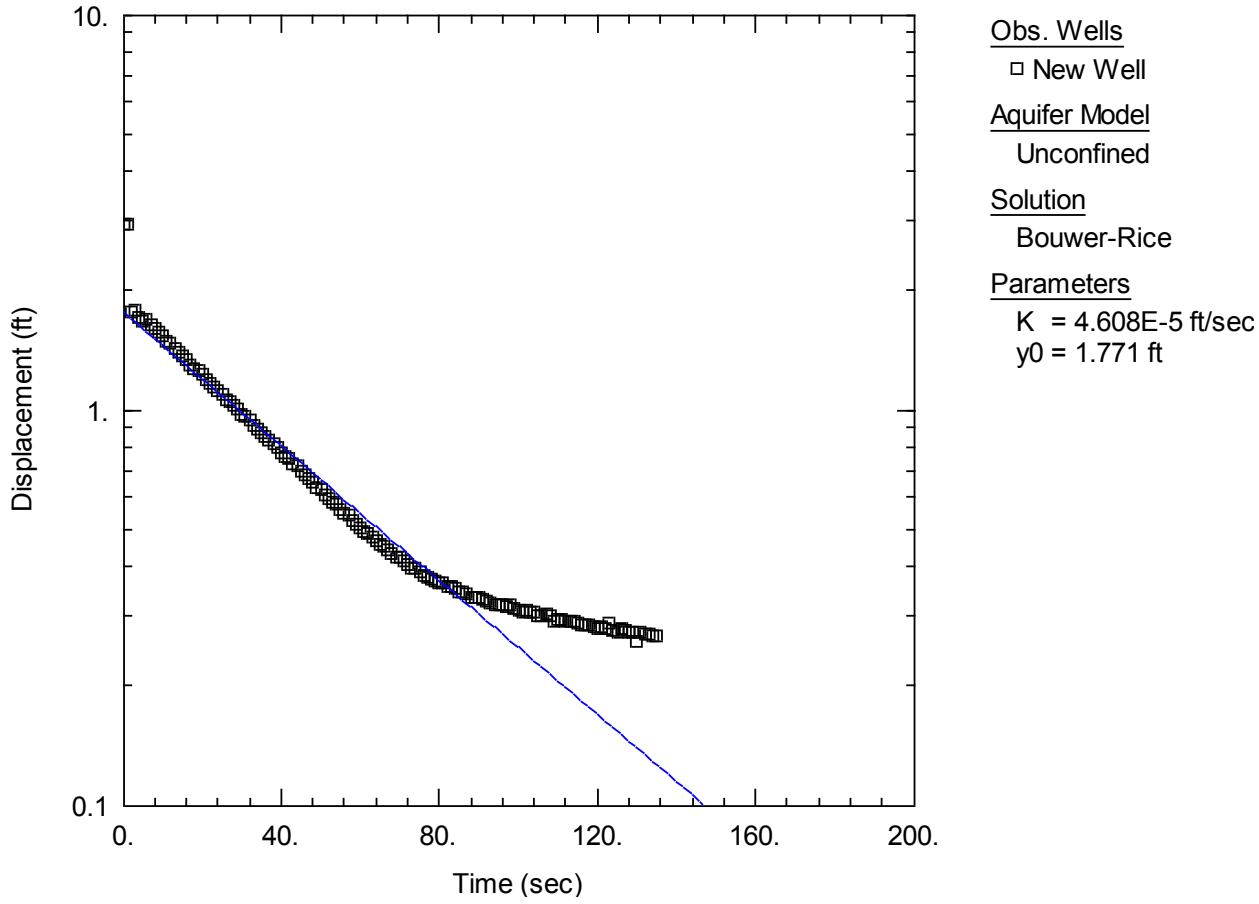

10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 2.475E-5 ft/sec
y0 = 1.633 ft

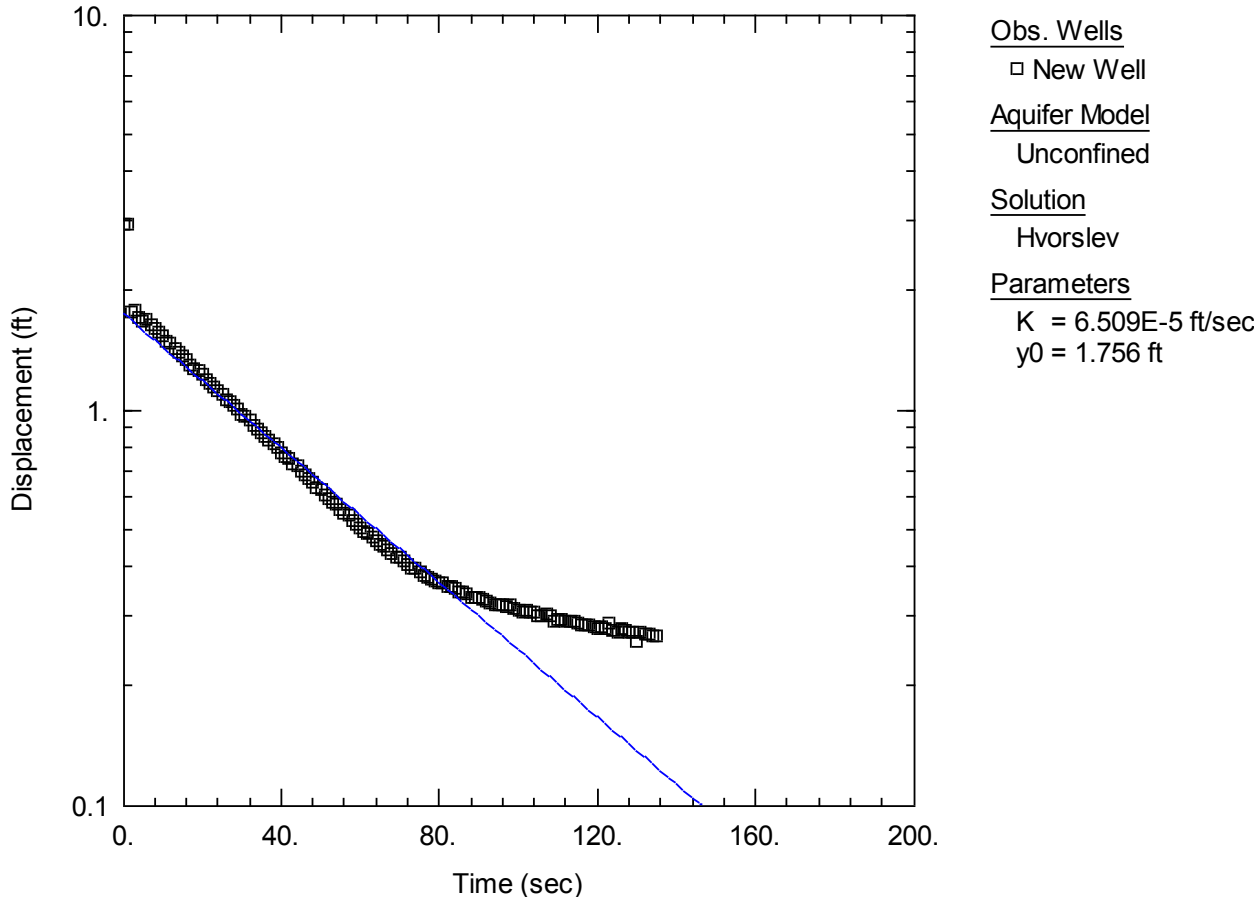

10.
1.
0.1
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.928E-5 ft/sec
y0 = 0.5161 ft

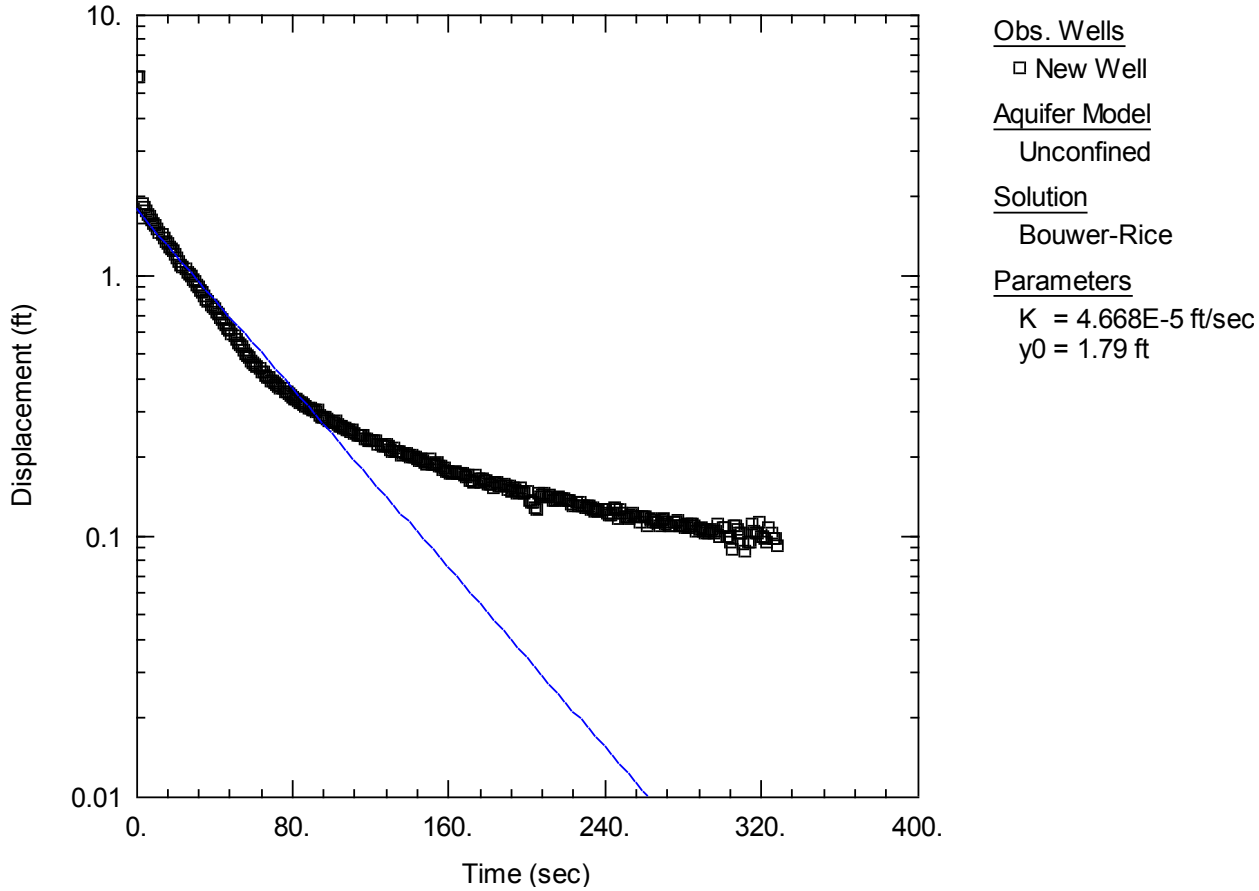

10.
1.
0.1
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 2.962E-5 ft/sec
y0 = 0.5793 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
120.
240.
360.
480.
600.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 7.764E-6 ft/sec
y0 = 0.3981 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
120.
240.
360.
480.
600.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.192E-5 ft/sec
y0 = 0.4112 ft


10.
1.
0.1
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 4.608E-5 ft/sec
y0 = 1.771 ft


10.
1.
0.1
Displacement (ft)
0.
40.
80.
120.
160.
200.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 6.509E-5 ft/sec
y0 = 1.756 ft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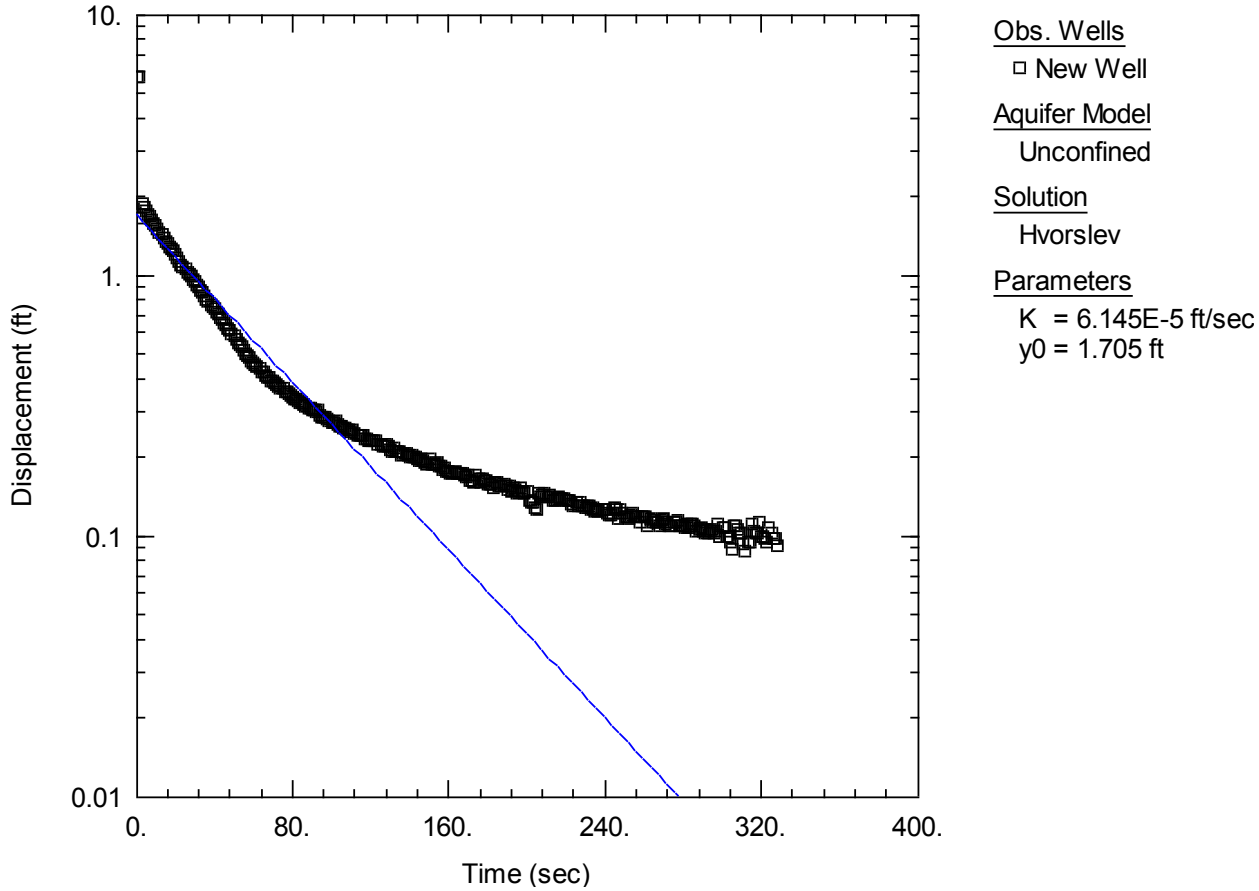
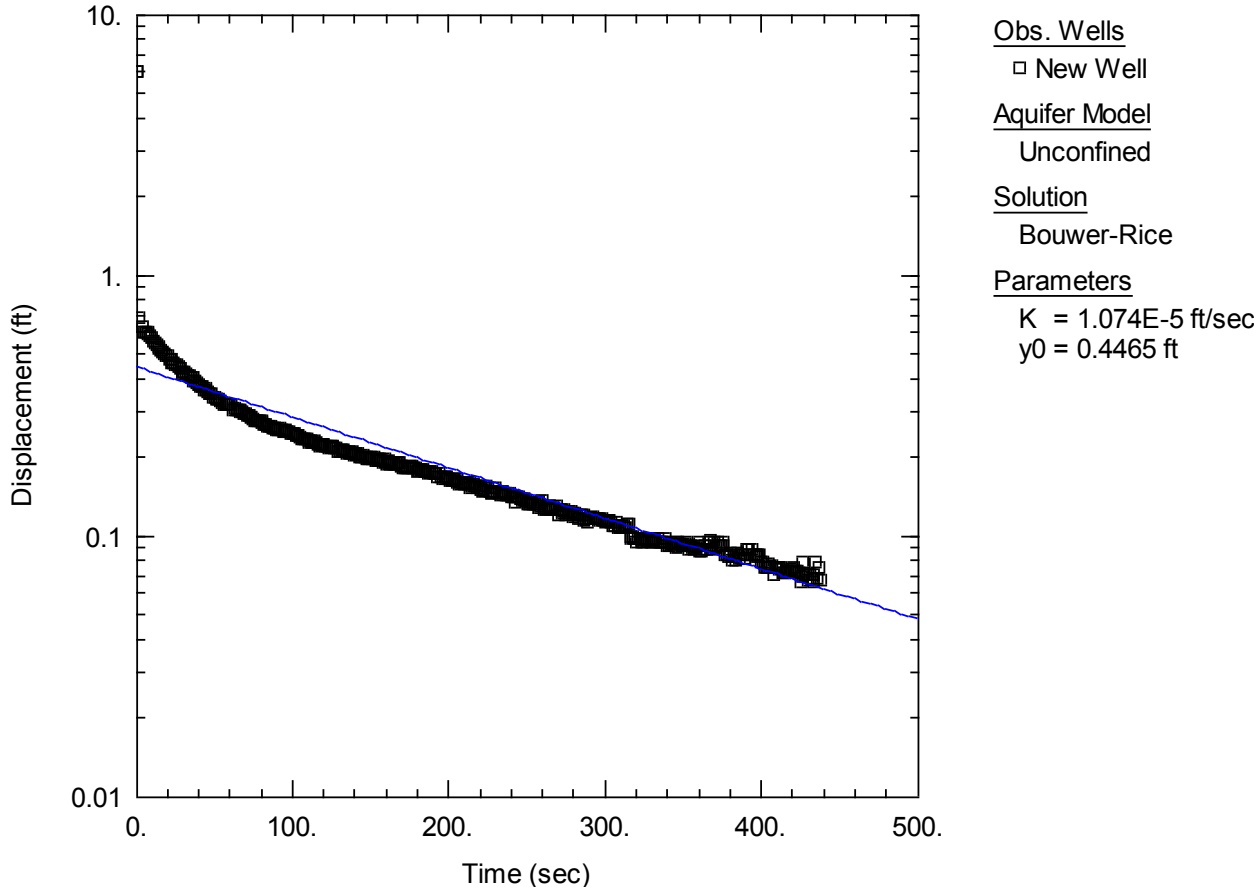
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 4.668E-5 ft/sec
y0 = 1.79 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 6.145E-5 ft/sec
y0 = 1.705 ft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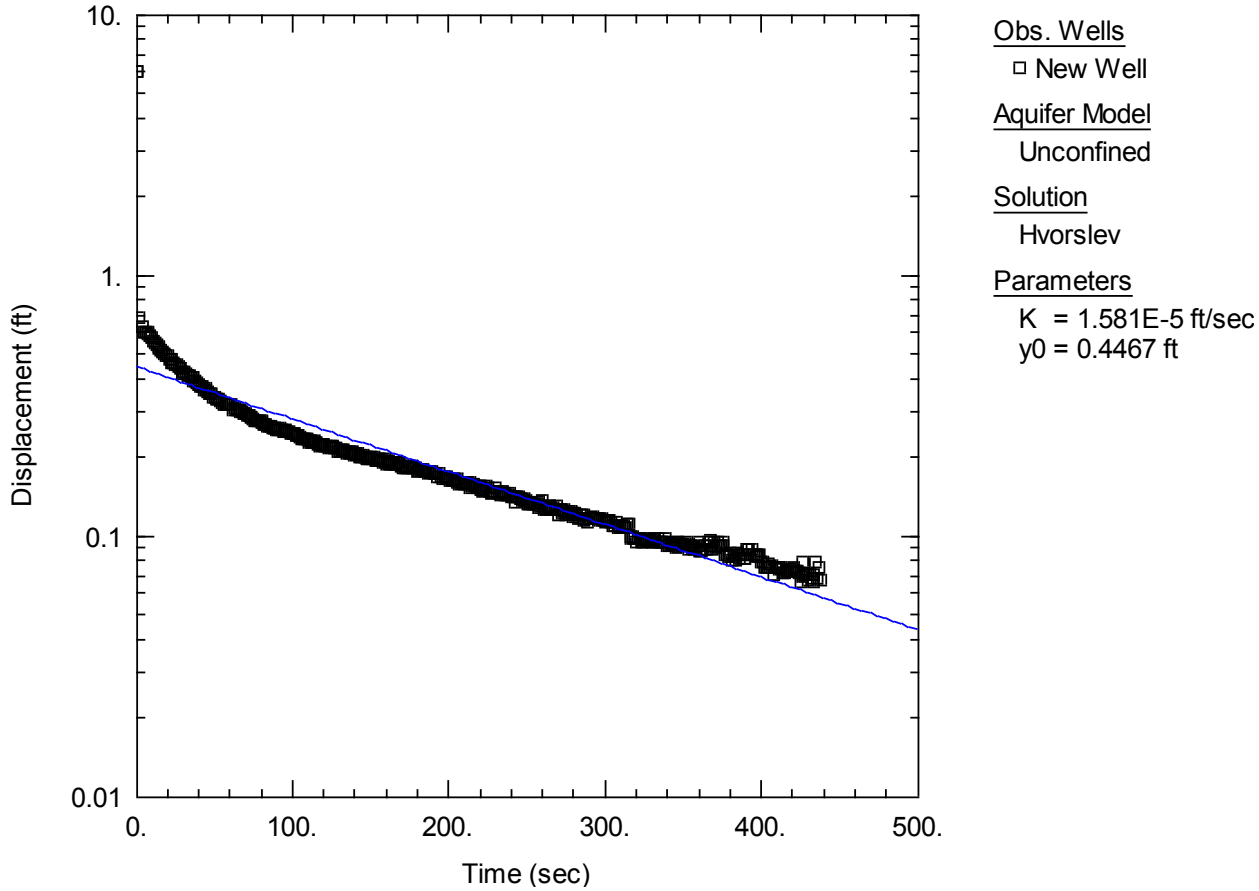
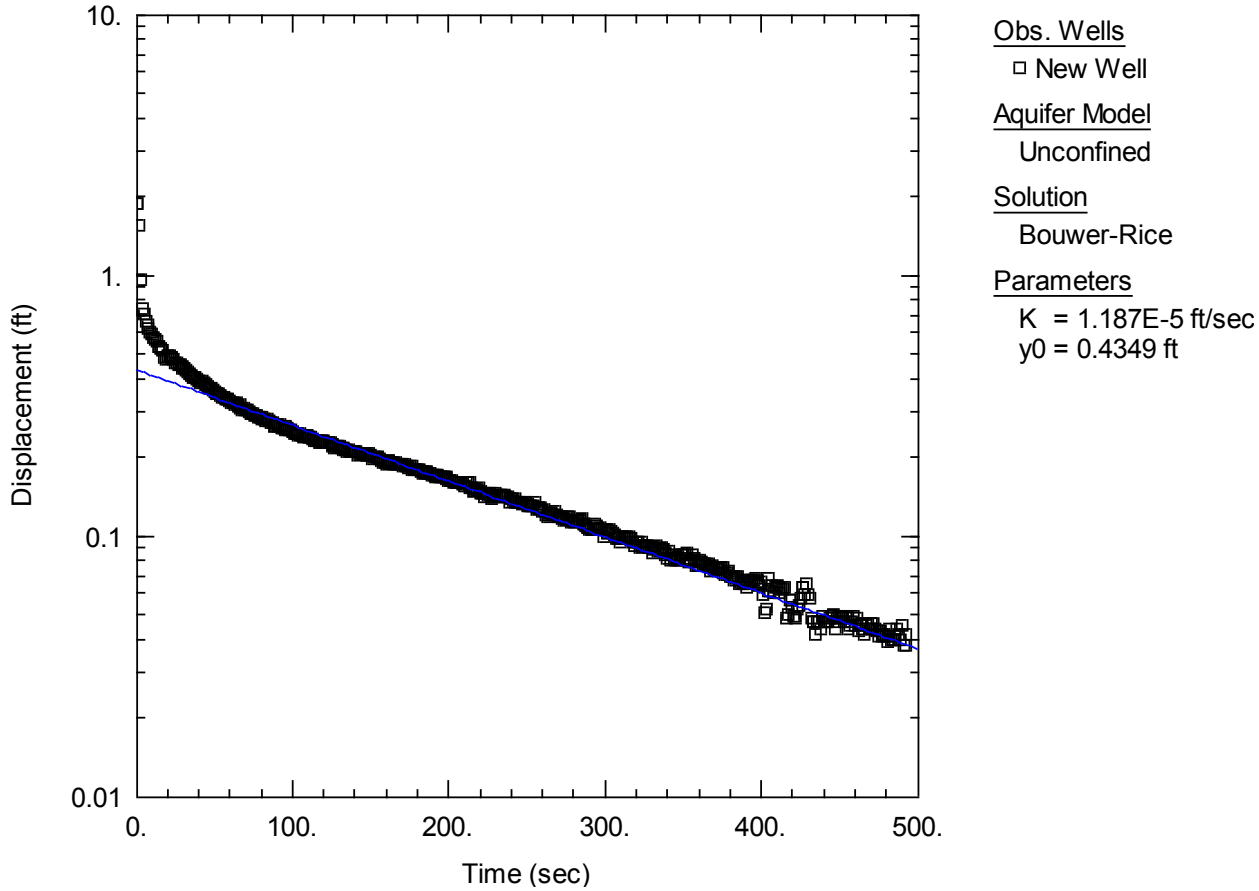
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.074E-5 ft/sec
y0 = 0.4465 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.581E-5 ft/sec
y0 = 0.4467 ft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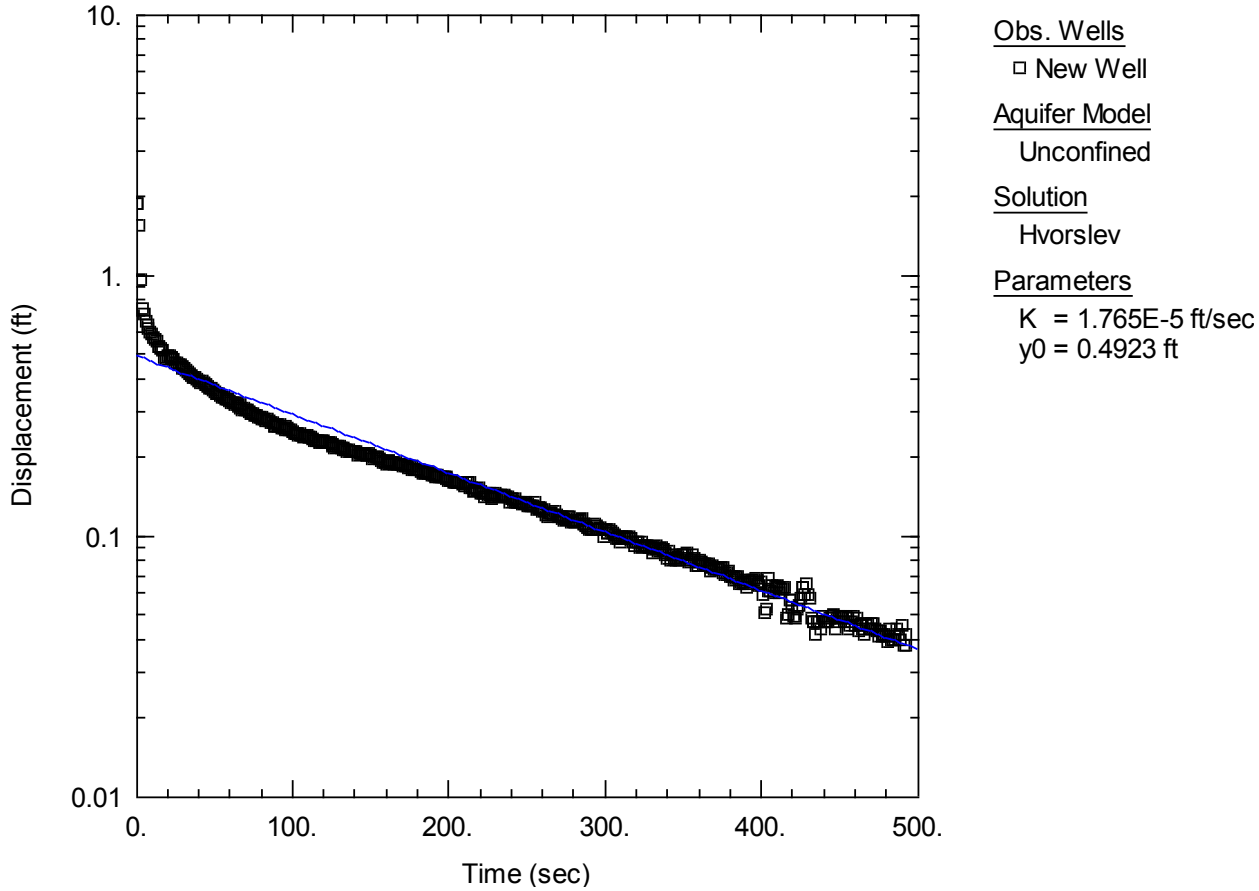
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 1.187E-5 ft/sec
y0 = 0.4349 ft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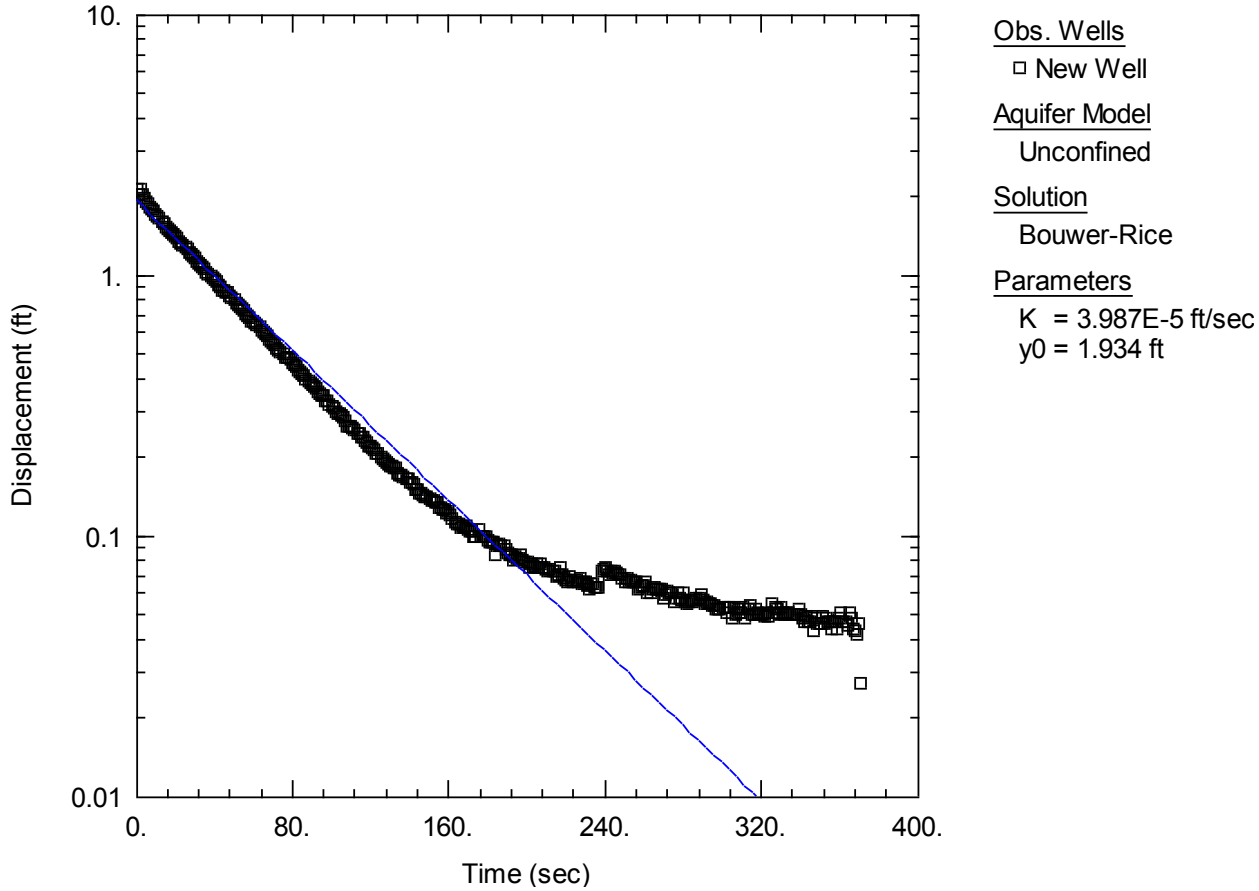
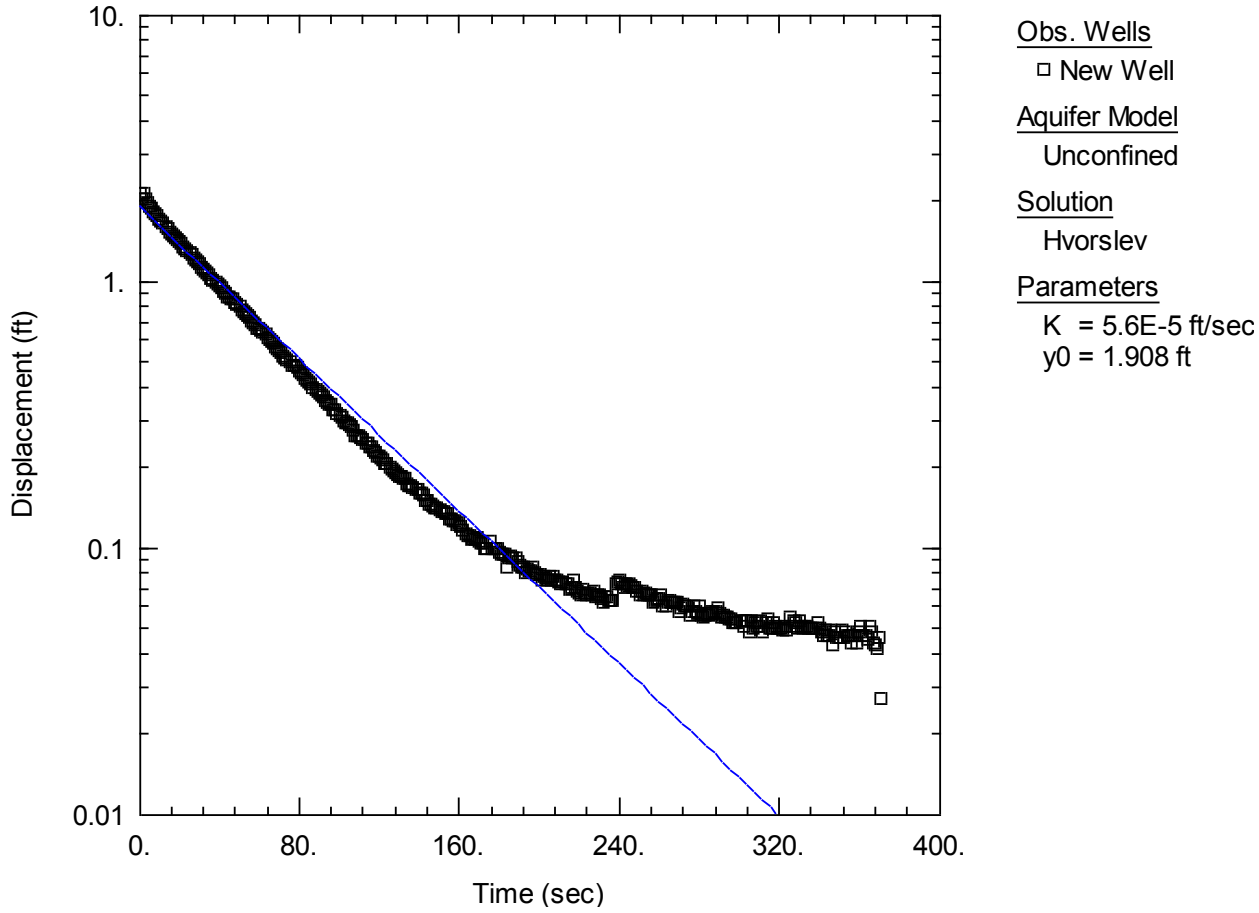
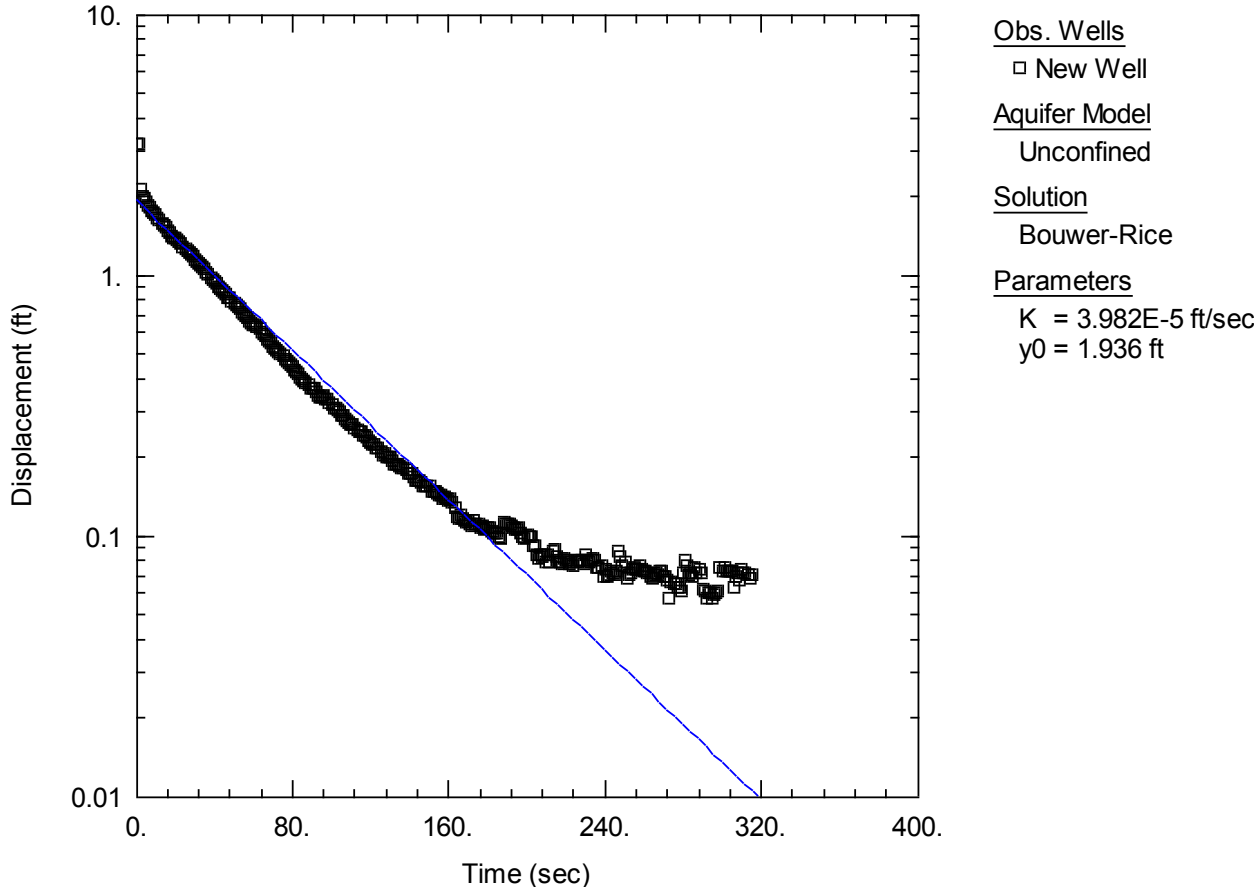
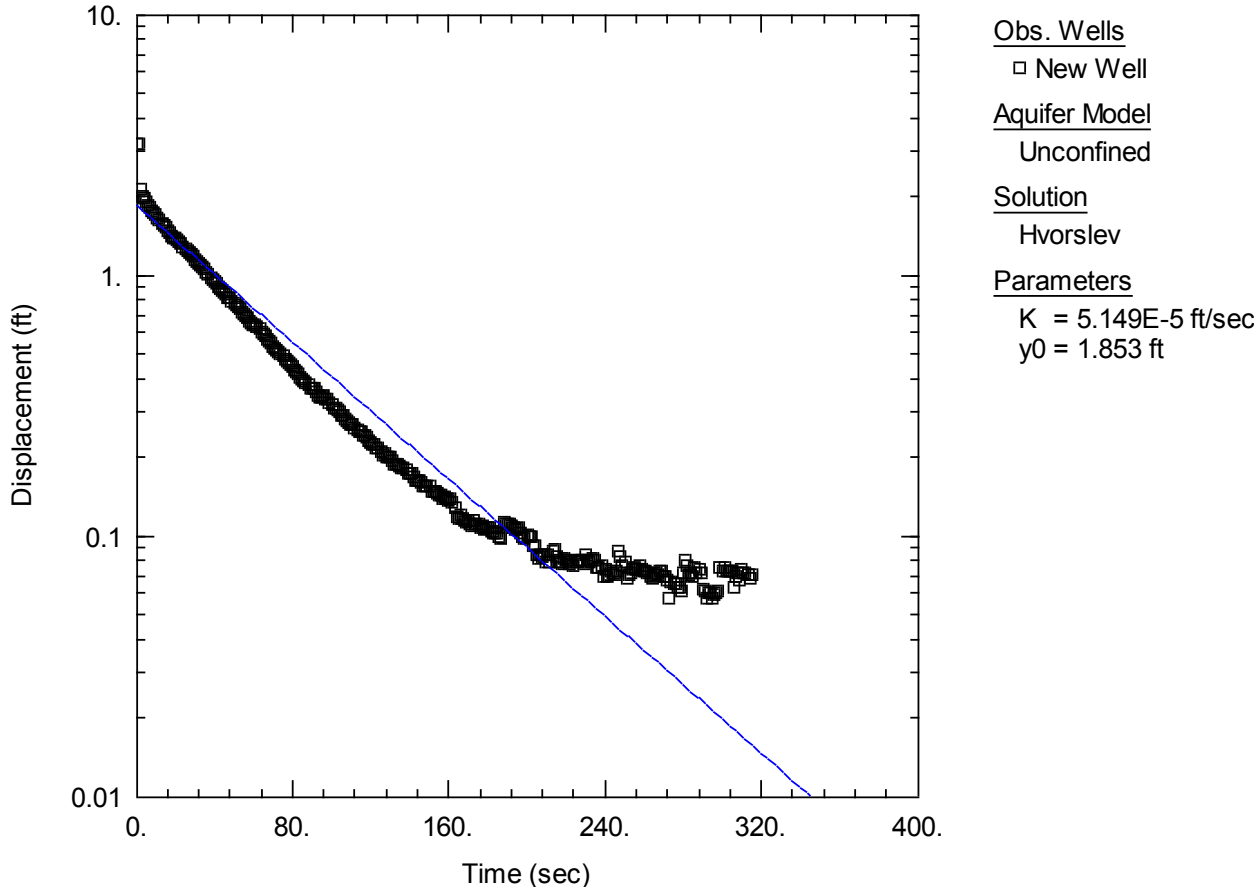
1.
0.1
0.01
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 1.765E-5 ft/sec
y0 = 0.4923 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 3.987E-5 ft/sec
y0 = 1.934 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 5.6E-5 ft/sec
y0 = 1.908 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Bouwer-Rice
Parameters
K = 3.982E-5 ft/sec
y0 = 1.936 ft


10.
1.
0.1
0.01
Displacement (ft)
0.
80.
160.
240.
320.
400.
Time (sec)
Obs. Wells
New Well
Aquifer Model
Unconfined
Solution
Hvorslev
Parameters
K = 5.149E-5 ft/sec
y0 = 1.853 ft

Appendix I
Laboratory Analytical Data

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 4, Northwest																				
Station ID	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SO08	CAS04-SO09	CAS04-SO10	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS04-SS05
Sample ID	CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012	CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS04-SS05-1109
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/03/09
Chemical Name																					
Volatile Organic Compounds (µg/kg)																					
1,1,1-Trichloroethane	6 UJ	7 UJ	8 UJ	7 UJ	6 UJ	7 UJ	6 UJ	7 UJ	8 UJ	7 UJ	8 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
1,1,2,2-Tetrachloroethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	6 UJ	7 UJ	8 UJ	7 UJ	6 UJ	7 UJ	6 UJ	7 UJ	8 UJ	7 UJ	8 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
1,1,2-Trichloroethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,1-Dichloroethane	6 UJ	7 UJ	8 UJ	7 UJ	6 UJ	7 UJ	6 UJ	7 UJ	8 UJ	7 UJ	8 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
1,1-Dichloroethene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2,4-Trichlorobenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2-Dibromo-3-chloropropane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2-Dibromoethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2-Dichlorobenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2-Dichloroethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,3-Dichlorobenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
1,4-Dichlorobenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
2-Butanone	25 UJ	29 UJ	32 UJ	28 UJ	25 UJ	29 UJ	25 UJ	31 UJ	34 UJ	24 J	22 J	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	30 UJ
2-Hexanone	25 UJ	29 UJ	32 UJ	28 UJ	25 UJ	29 UJ	25 UJ	31 UJ	34 UJ	31 UJ	34 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	30 UJ
4-Methyl-2-pentanone	25 UJ	29 UJ	32 UJ	28 UJ	25 UJ	29 UJ	25 UJ	31 UJ	34 UJ	31 UJ	34 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	30 UJ
Acetone	82 B	74 B	71 B	78 B	100 J	43 B	54 B	110 B	100 B	640 J	560 J	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	120 J
Benzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Bromodichloromethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Bromoform	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Bromomethane	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
Carbon disulfide	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Carbon tetrachloride	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Chlorobenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Chloroethane	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
Chloroform	6 UJ	7 UJ	8 UJ	7 UJ	0.6 J	7 UJ	6 UJ	7 UJ	8 UJ	0.9 J	0.6 J	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
Chloromethane	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
cis-1,2-Dichloroethene	6 UJ	7 UJ	8 UJ	7 UJ	6 UJ	7 UJ	6 UJ	7 UJ	8 UJ	7 UJ	8 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
cis-1,3-Dichloropropene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Cyclohexane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Dibromochloromethane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Dichlorodifluoromethane (Freon-12)	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
Ethylbenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Isopropylbenzene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
m- and p-Xylene	11 UJ	13 UJ	14 UJ	12 UJ	11 UJ	13 UJ	11 UJ	14 UJ	15 UJ	14 UJ	15 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	13 UJ
Methyl acetate	9 UJ	10 UJ	12 UJ	10 UJ	9 UJ	10 UJ	9 UJ	11 UJ	12 UJ	11 UJ	12 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	11 UJ
Methylcyclohexane	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Methylene chloride	25 UJ	9 J	32 UJ	12 J	25 UJ	13 J	25 UJ	31 UJ	34 UJ	31 UJ	34 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	30 UJ
Methyl-tert-butyl ether (MTBE)	9 UJ	10 UJ	12 UJ	10 UJ	9 UJ	10 UJ	9 UJ	11 UJ	12 UJ	11 UJ	12 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	11 UJ
o-Xylene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Styrene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	1 J	7 UJ	6 UJ	10 J	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Tetrachloroethene	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	7 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
Toluene	5 UJ	6 UJ	6 UJ	4 B	5 UJ	6 UJ	5 UJ	6 UJ	7 UJ	6 UJ	3 J	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ
trans-1,2-Dichloroethene	7 UJ	8 UJ	9 UJ	8 UJ	7 UJ	8 UJ	7 UJ	9 UJ	10 UJ	9 UJ	10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	8 UJ
trans-1,3-Dichloropropene	7 UJ	8 UJ	9 UJ	8 UJ	7 UJ	8 UJ	7 UJ	9 UJ	10 UJ	9 UJ	10 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	8 UJ
Trichloroethene	6 UJ	7 UJ	8 UJ	7 UJ	6 UJ	7 UJ	6 UJ	7 UJ	8 UJ	7 UJ	8 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	7 UJ
Trichlorofluoromethane (Freon-11)	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
Vinyl chloride	10 UJ	12 UJ	13 UJ	11 UJ	10 UJ	12 UJ	10 UJ	12 UJ	14 UJ	12 UJ	14 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
Xylene, total	15 UJ	17 UJ	19 UJ	17 UJ	15 UJ	18 UJ	15 UJ	19 UJ	20 UJ	18 UJ	20 UJ	12.1 UL	NA	NA	NA	NA	NA	NA	NA	NA	18 UJ
Semivolatile Organic Compounds (µg/kg)																					
1,1-Biphenyl	380 U	390 U	390 U	380 U	340 U	3,800	340 U	420 U	410 U	350 U	350 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	380 U
1,2,4,5-Tetrachlorobenzene	490 U	500 U	490 U	480 U	440 U	510 U	440 U	540 U	530 U	450 U	440 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U
2,2'-Oxybis(1-chloropropane)	380 U	390 UJ	390 U	380 UJ	340 UJ	400 UJ	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
2,4,5-Trichlorophenol	950 U	980 U	960 U	950 U	850 U	1,000 U	860 U	1,000 U	1,000 U	870 U	860 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	940 U
2,4,6-Trichlorophenol	560 U	570 U	560 U	560 U	500 U	580 U	500 U	620 U	600 U	510 U	510 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	550 U
2,4-Dichlorophenol	520 U	540 U	530 U	520 U	470 U	550 U	470 U	580 U	560 U	480 U	480 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	510 U
2,4-Dimethylphenol	580 U	600 U	590 U	580 U	520 U	420 J	520 U	640 U	630 U	530 U	530 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	570 U
2,4-Dinitrophenol	1,300 U	1,400 U	1,300 U	1,300 U	1,200 U	1,400 U	1,200 U	1,500 U	1,400 U	1,200 U	1,200 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	1,300 U
2,4-Dinitrotoluene	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
2,6-Dinitrotoluene	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
2-Chloronaphthalene	23 U	24 U	23 U	23 U	21 U	49,000 U	21 U	26 U	25 U	21 U	21 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	23 U
2-Chlorophenol	580 U	600 U	590 U	580 U	520 U	610 U	520 U	640 U	630 U	530 U	530 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	570 U
2-Methylnaphthalene	23 J	25	6.8 J	23 U	21 U	49,000 U	20 J	26 U	25 U	21 U	21 U	3,900 U	2.5 J	48	7 J	10 U	10 U	10 U	9.2 J	NA	23 U
2-Methylphenol	700 U	720 U	700 U	690 U	620 U	440 J	630 U	770 U	750 U	640 U	630 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	680 U
2-Nitroaniline	950 U	980 U	960 U	950 U	850 U	1,000 U	860 U	1,000 U	1,000 U	870 U	860 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	940 U
2-Nitrophenol	590 U	610 U	600 U	590 U	530 U	620 U	530 U	650 U	640 U	540 U	540 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	580 U
3- and 4-Methylphenol	660 U	680 U	670 U	660 U	590 U	1,200	590 U	730 U	720 U	610 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	650 U
3,3'-Dichlorobenzidine	410 U	420 U	410 U	400 U	360 U	420 U	360 U	450 U	440 U	370 U	370 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	400 U
3-Nitroaniline	950 U	980 U	960 U	950 U	850 U	1,000 U	860 U	1,000 U	1,000 U	870 U	860 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	940 U
4,6-Dinitro-2-methylphenol	1,300 U	1,300 U	1,300 U	1,300 U	1,100 U	1,300 U	1,100 U	1,400 U	1,400 U	1,200 U	1,200 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	1,200 U
4-Bromophenyl-phenylether	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
4-Chloro-3-methylphenol	580 U	600 U	590 U	580 U	520 U	610 U	520 U	640 U	630 U	530 U	530 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	570 U
4-Chloroaniline	420 U	430 U	420 U	420 U	370 U	440 U	380 U	460 U	450 U	380 U	380 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	410 U
4-Chlorophenyl-phenylether	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	950 U	980 U	960 U	950 U	850 U	1,000 U	860 U	1,000 U	1,000 U	870 U	860 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	940 U
4-Nitrophenol	1,100 U	1,100 U	1,100 U	1,100 U	970 U	1,100 U	970 U	1,200 U	1,200 U	990 U	980 U	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	1,100 U
Acenaphthene	61	65	27	6.9 J	21 U	24,000 J	50	26 U	25 U	21 U	21 U	3,900 U	7.5 J	130	20 J	7.5 J	10 U	10 U	53 K	NA	23 U

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 4, Northwest																				
Station ID	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SO08	CAS04-SO09	CAS04-SO10	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS04-SS05
Sample ID	CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012	CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS04-SS05-1109
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/03/09
Chemical Name																					
Acenaphthylene	30	240	72	26	3.8 J	4,100 J	19 J	26 U	25 U	21 U	21 U	3,900 U	3 J	36	15 J	18 J	10 U	10 U	62	NA	23 U
Acetophenone	630 U	640 U	630 U	620 U	560 U	660 U	560 U	690 U	680 U	580 U	570 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	620 U
Anthracene	140	260	200	37	3.8 J	140,000	150	26 U	2.7 J	21 U	21 U	1,700 J	19 J	260	59	48	2.2 J	1.4 J	190 K	NA	1.8 J
Atrazine	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Benzaldehyde	420 UJ	430 U	420 U	420 U	370 U	440 U	380 U	460 U	200 J	380 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	410 U
Benzo(a)anthracene	590	1,600	740	200	26	180,000	1,100	20 J	28	14 J	18 J	8,800	120	1,200	400	370	17 J	11 J	960	NA	10 J
Benzo(a)pyrene	480	1,200	440	160	20 J	130,000	950	16 J	22 J	11 J	14 J	7,000	96	970	330	310	15 J	10 J	830	NA	4.4 J
Benzo(b)fluoranthene	840	2,100	670	190 J	28 J	200,000	1,400	29	40	20 J	26	6,800	160	1,600	590	460	22 B	17 B	1,200	NA	10 J
Benzo(g,h,i)perylene	130 L	440 L	70 L	23 L	21 UL	66,000 L	320 J	3.8 B	2.6 B	21 R	2.6 B	3,400 J	54	520	180	140	8.6 J	6.6 J	320 K	NA	23 UL
Benzo(k)fluoranthene	190	650	140	71	9.2 J	81,000	560	26 U	25 U	21 U	21 U	6,800	58	560	170	180	9 J	6 J	420	NA	23 U
bis(2-Chloroethoxy)methane	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
bis(2-Chloroethyl)ether	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
bis(2-Ethylhexyl)phthalate	120 U	120 U	120 U	120 U	100 U	240,000 U	780 J	130 U	120 U	110 U	100 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	66 J
Butylbenzylphthalate	380 U	390 U	390 U	380 U	340 U	400 U	2,800	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Caprolactam	510 U	530 R	520 R	510 R	460 R	530 R	460 R	560 R	550 R	470 R	460 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	500 R
Carbazole	230 J	190	80	18 J	3.2 J	120,000 J	90 J	3 J	5.6 J	3.8 J	4 J	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	2.1 J
Chrysene	730	1,300	580	170 J	17 J	210,000	1,400	18 J	26	12 J	16 J	8,600	130	1,500	420	380	17 J	11 J	930	NA	23 U
Dibenz(a,h)anthracene	110 J	200 K	83 K	37 K	21 U	22,000 K	160	4.3 J	4.6 J	21 U	3.6 J	1,400 J	25	190	90	67	3.6 J	3.5 J	160 K	NA	23 U
Dibenzofuran	380 U	390 U	390 U	380 U	340 U	19,000	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Diethylphthalate	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Dimethyl phthalate	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Di-n-butylphthalate	120 U	120 U	120 U	120 U	100 U	240,000 U	100 U	130 U	120 U	110 U	100 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	110 U
Di-n-octylphthalate	740 U	760 U	750 U	740 U	670 U	780 U	770	820 U	800 U	680 U	680 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	730 U
Fluoranthene	1,700	3,000	1,600	350	44	500,000	2,400	40	57	31	40	14,000	250	3,000	840	670	29	19 J	1,800	NA	14 J
Fluorene	90	130	110	11 J	21 U	40,000 J	50	26 U	25 U	21 U	21 U	3,900 U	10 J	200	32 J	16 J	10 U	10 U	92 K	NA	23 U
Hexachlorobenzene	23 U	24 U	23 U	23 U	21 U	49,000 U	21 U	26 U	25 U	21 U	21 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	23 U
Hexachlorobutadiene	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Hexachlorocyclopentadiene	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Hexachloroethane	23 U	24 U	23 U	23 U	21 U	49,000 U	21 U	26 U	25 U	21 U	21 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	23 U
Indeno(1,2,3-cd)pyrene	610 K	240 J	280 J	160 J	33 J	69,000 J	920 J	25 B	29	18 B	20 B	3,400 J	120 J	850	430 J	260 J	19 J	11 J	770	NA	23 U
Isophorone	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Naphthalene	64	31	7.7 J	23 U	21 U	26,000 J	17 J	26 U	25 U	21 U	21 U	3,900 U	6.6 J	130	11 J	10 U	10 U	10 U	13 J	NA	23 U
n-Nitroso-di-n-propylamine	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
n-Nitrosodiphenylamine	770 U	790 U	770 U	760 U	690 U	800 U	690 U	850 U	830 U	700 U	700 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	750 U
Nitrobenzene	380 U	390 U	390 U	380 U	340 U	400 U	340 U	420 U	410 U	350 U	350 U	480 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Pentachlorophenol	120 U	120 UL	120 UL	120 UL	100 UL	240,000 UL	100 UJ	130 UJ	120 UJ	110 UJ	100 UJ	9,700 U	NA	NA	NA	NA	NA	NA	NA	NA	110 U
Phenanthrene	1,300	1,800	1,300	130	17 J	470,000	1,200	23 J	41	19 J	26	5,500	170	2,400	440	320	14 J	9.5 J	990	NA	7.7 J
Phenol	540 U	560 U	550 U	540 U	490 U	600	490 U	600 U	590 U	500 U	500 U	3,900 U	NA	NA	NA	NA	NA	NA	NA	NA	540 U
Pyrene	1,400	2,400	1,000	270	26	390,000	2,800	36	54	26	36	11,000	240	2,400 J	700	550	28	19 J	1,400	NA	6.9 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																					
4,4'-DDD	2.3 J	25 J	6 J	7.4 J	2.3 J	280 J	7.7 J	4 UJ	4.2 UJ	3.6 U	3.5 U	7.6 K	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
4,4'-DDE	0.96 B	83	3.5 J	7.3	1.2 J	52 J	3.2 U	4 UJ	0.8 J	3.6 U	1.7 J	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	0.9 L
4,4'-DDT	1 B	78	3.9 J	5.4 J	1.6 J	88 J	13 J	3.1 J	4.2 UJ	3.6 U	3.4 J	18 K	NA	NA	NA	NA	NA	NA	NA	NA	1.7 J
Aldrin	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
alpha-BHC	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
alpha-Chlordane	1.6 UJ	0.99 J	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Aroclor-1016	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	39 U	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	20 U
Aroclor-1221	40 U	49 UL	47 U	49 U	48 UL	50 UJ	41 U	51 U	53 U	46 U	44 U	79 U	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	47 U
Aroclor-1232	27 U	33 UL	32 U	33 U	32 UL	33 UJ	27 U	34 U	35 U	30 U	30 U	39 U	9.7 U	11 U	23 UL	10 U	10 U	10 U	12 U	NA	31 U
Aroclor-1242	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	39 U	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	20 U
Aroclor-1248	18 U	22 UL	21 U	22 U	22 UL	22 UJ	19 U	23 U	24 U	21 U	20 U	39 U	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	21 U
Aroclor-1254	16 U	20 UL	19 U	20 U	19 UL	20 UJ	17 U	21 U	21 U	18 U	18 U	39 U	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	19 U
Aroclor-1260	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	91 K	8.3 U	9.6 U	20 UL	9 U	8.9 U	8.9 U	10 U	NA	19 J
beta-BHC	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
delta-BHC	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	140 J	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Dieldrin	3.2 UJ	3.9 U	3.7 U	1.4 J	3.8 UJ	650 J	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
Endosulfan I	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	2,200 J	1.7 U	0.79 J	0.91 J	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Endosulfan II	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
Endosulfan sulfate	1.9 J	8.9 J	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
Endrin	3.2 UJ	3.9 U	16	10	3.8 UJ	130 J	3.2 U	6.8 J	16 J	55	3.9	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
Endrin aldehyde	3.2 UJ	3.9 U	3.8 J	2.6 J	3.8 UJ	78 U	3.2 U	3.5 J	5.4 J	3.6 U	2.2 J	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	1 J
Endrin ketone	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U
gamma-BHC (Lindane)	5.2 J	9.6	0.82 J	2 U	1.9 UJ	860	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
gamma-Chlordane	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Heptachlor	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Heptachlor epoxide	1.6 UJ	2 U	1.9 U	2 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U
Methoxychlor	16 UJ	20 U	19 U	20 U	19 UJ	400 U	17 U	21 UJ	21 UJ	18 U	18 U	20 U	NA	NA	NA	NA	NA	NA	NA	NA	19 U
Toxaphene	32 UJ	39 U	37 U	39 U	38 UJ	780 U	32 U	40 UJ	42 UJ	36 U	35 U	200 U	NA	NA	NA	NA	NA	NA	NA	NA	37 U
Explosives (µg/kg)																					
1,3,5-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 4, Northwest																				
Station ID	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SO08	CAS04-SO09	CAS04-SO10	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS04-SS05
Sample ID	CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012	CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS04-SS05-1109
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/03/09
Chemical Name																					
Total Metals (mg/kg)																					
Aluminum	12,600	8,930	10,800	9,870	8,080	10,600	8,070	11,800	12,600	4,100	3,960	6,320 L	10,300	8,030	10,700	7,290	9,390	9,100	7,850	NA	18,000
Antimony	0.13 L	0.19 L	0.25 L	0.17 L	0.07 L	0.21 L	0.07 J	0.15	0.15	0.08 J	0.07 J	0.44 UJ	0.35 U	0.42 U	1.1 U	0.46 J	0.32 U	0.32 U	0.47 L	NA	0.14 L
Arsenic	7.3	3	3.2	3.4	1.6	3.7	2.8	3.5	3.4	2.2	1	2.7 L	4.6	3.1	2.4	8.5	2.9	2.7	346 J	NA	3.6
Barium	38.5	43.6 J	47.3 J	47.7 J	36 J	55.1 J	57	28.7	29.1	11.3	16.9	101 J	41.5	36.5	61.8	34.9	43.4	42.1	59.3 L	NA	22.2 J
Beryllium	0.66	0.67	0.49	0.46 J	0.44 J	0.72	0.69	0.34 J	0.34 J	0.19 J	0.24 J	0.32 B	0.58	0.52	0.6 J	0.39 J	0.48	0.46	0.34 L	NA	0.42
Cadmium	0.95 U	0.12 J	0.06 J	0.04 J	0.04 J	0.33 J	0.7 J	1.1 U	1.2 U	0.92 U	0.02 B	0.34 U	0.11 J	0.19 J	2.7	1.2 U	0.02 B	0.006 B	1.2 UL	NA	0.77 U
Calcium	16,900	5,960 J	2,850 J	2,870 J	612 J	18,800 J	7,950	2,920	2,630	730	318	2,940	18,800	2,660	4,540	541	1,270 J	1,830 J	7,130 J	NA	238 J
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.24 UL	NA
Chromium	24.9 K	15.2	13.1	16.7	9	17.8	22.8	18.4	18.8	8.4	5.8	56.6	16	12.5	16.1	34	11.1	10.7	63 J	11.9 K	26.6
Cobalt	2.9	3.4	2.7	2.5	2.5	4.4	4.9	1.8	1.9	0.72	0.84	8.8 J	3.1	2.2	2.3	4.5	2.4	2.3	11.5 J	NA	2.3
Copper	5.3 K	9.4	4.9	5	3.8	31.8	17.7	4.8	4.2	1.9 J	1.9 J	77.8 J	37.1	31	31.5	58.9	2.9 B	2.7 B	68.7 K	NA	3.1
Cyanide	0.84 U	0.84 U	0.7 U	0.84 U	0.77 U	0.7 U	0.77 U	0.84 U	0.84 U	0.7 U	0.77 U	0.07 L	NA	NA	NA	NA	NA	NA	NA	NA	0.77 U
Iron	18,800	10,900 J	9,710 J	9,740 J	6,720 J	18,300 J	13,500	12,100	12,200	6,140	3,450	61,700 L	11,700	8,860	9,240	53,200	8,040	7,730	116,000 J	NA	15,000 J
Lead	9.4 K	35.4	25.1	14.5	10.3	793	37	18.6	18.2	9.2	10.6	105 J	13.6 B	25.9	53.3	12.9 B	11.6 B	10 B	31.7 L	NA	23.7
Magnesium	1,850 K	1,610 J	770 J	716 J	568 J	2,880 J	4,060	896	916	607	340	2,140	1,620	1,150	1,100	621	730	703	1,300 L	NA	1,200 J
Manganese	85.1 K	155 J	121 J	106 J	98.9 J	253 J	315	39.9	35.8	19.1	27.9	302 J	125	91.8	70.2	263	103	107	511 J	NA	24.7 J
Mercury	0.01 J	0.12	0.04	0.03 J	0.02 J	0.04 J	0.035 U	0.05	0.04	0.01 J	0.03 J	0.06 J	0.08	0.04	0.1	0.02 J	0.02 J	0.02 J	0.06 L	NA	0.03 J
Nickel	5.5 J	9.8	5.3	5.2	3.7 J	9	8.8	4.5	4.7 J	1.8 J	1.9 J	39.6	6.2	5.1	6.5	38	4	3.8	46.7 J	NA	5.6
Potassium	2,570 K	743 K	640 K	600 K	461 K	1,220 K	2,830	1,020	1,020	734	260	961 J	1,270	975	1,090	482	587	567	775 K	NA	1,210 K
Selenium	0.36 J	0.44 J	0.45 J	0.51	0.33 J	0.84	0.16 J	0.42 J	0.47 J	0.21 J	0.24 J	0.6 U	0.31 J	0.59 U	1.5 U	2.8 U	0.21 J	0.45 U	0.87 L	NA	0.32 J
Silver	1.4 U	1.6 U	1.4 U	1.5 U	1.5 U	2.1 U	1.3 U	0.25 J	0.27 J	0.29 J	0.1 J	20.6 L	0.28 U	0.15 J	0.09 J	0.99 B	0.05 J	0.09 J	1.3 L	NA	1.2 U
Sodium	140 K	35 K	32.3 K	34.5 K	20.1 K	176 K	154	27.7 J	32.1 J	14.8 J	15.3 J	73.1 B	115	37.8 B	50.8 B	25.8 B	27.5 B	56.8 B	61.3 B	NA	35.6 K
Thallium	0.13 B	0.17 B	0.12 B	0.13 B	0.1 B	0.13 B	0.19 B	0.14 B	0.13 B	0.09 B	0.07 B	1.1 L	0.35 U	0.42 U	1.1 U	2 U	0.32 U	0.32 U	0.47 L	NA	0.2 B
Vanadium	27.2	19.5	20	17.8	14.6	26.9	24.3	29.1	29.5	11.4	8.6	35.7 J	21.2	18.8	21.6	13.9	15.9	15.6	20.4 L	NA	41.7
Zinc	21.8 K	52.7	52.8	64.6	16.8	89.6	154	21.6	20.6	10	9.7	122 J	89.5	76.5	242	17.5	20	19	66.4 L	NA	20.3
Wet Chemistry																					
pH (ph)	8.5	7.7	7.6	7	6.4	8.3	8.8	6.5	5.9	4.6	5	NA	7.5	6.5	5.6	4.9	6.8	NA	7.1	NA	4.6
Total organic carbon (TOC) (ug/g)	6,200	36,000	26,000	24,000	12,000	33,000	8,400	37,000	51,000	18,000	18,000	NA	10,000	36,000	84,000	11,000	14,000	NA	55,000	NA	18,000
Grain Size (pct)																					
Gravel (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.9	9.8	3.2	2.3	0.1	NA	30.8	NA	NA
Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50.8	68.5	70	64.5	60.7	NA	51.5	NA	NA
Coarse Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.4	5.5	3.8	2	0.6	NA	10.1	NA	NA
Medium Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.6	13.9	17	8.9	7	NA	12.1	NA	NA
Fine Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	41.8	49.1	49.2	53.6	53.1	NA	29.3	NA	NA
Fines (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.3	21.7	26.8	33.2	39.2	NA	17.7	NA	NA
GRAINSIZE (PCT/P)																					
GS03 Sieve 3" (75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	NA	100	NA	NA
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	NA	100	NA	NA
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	NA	100	NA	NA
GS07 Sieve 1" (25.0 mm)	100	100	100	100	100	100	100	100	100	100	100	NA	100	100	100	100	100	NA	100	NA	100
GS08 Sieve 0.75" (19.0 mm)	100	100	95	100	100	100	100	100	100	100	100	NA	94.8	100	100	100	100	NA	100	NA	100
GS09 Sieve 0.5" (12.5 mm)	100	96	95	100	100	91	100	100	100	100	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	100
GS10 Sieve 0.375" (9.5 mm)	100	92	95	100	100	82	91	100	100	100	100	NA	76.7	97.3	100	99	100	NA	82	NA	100
Sieve No. 004 (4.75 mm)	99	75	93	100	100	73	77	100	100	100	100	NA	75.1	90.2	96.8	97.7	99.9	NA	69.2	NA	100
Sieve No. 010 (2.00 mm)	98	69	92	99	99	66	62	99	100	100	100	NA	72.7	84.7	93	95.7	99.3	NA	59.1	NA	100
Sieve No. 020 (850 um)	96	66	90	98	99	60	50	99	99	99	99	NA	70.8	78.9	85.7	93.3	97.9	NA	53.6	NA	99
Sieve No. 040 (425 um)	92	62	85	93	94	54	41	96	95	97	94	NA	66.1	70.8	76	86.8	92.3	NA	47	NA	96
Sieve No. 060 (250 um)	72	51	70	76	74	39	32	78	76	73	72	NA	48.3	50.8	60.4	68.1	74.4	NA	36.1	NA	80
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36.9	36.9	47.1	53.8	60.1	NA	27.9	NA	NA
Sieve No. 100 (150 um)	46	36	50	55	53	26	24	48	46	34	37	NA	31.4	30	38.4	45.1	51.2	NA	23.6	NA	52
Sieve No. 200 (75 um)	36	28	38	41	40	18	17	35	36	16	24	NA	24.3	21.7	26.8	33.2	39.2	NA	17.7	NA	37

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/26/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in

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

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, South												Site 4, East	
Station ID	CAS004-4HA01	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SO14		CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO06	CAS04-SO07
Sample ID	CAS004-4HA01-00-1199	CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199	CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS06-1012	CAS04-SS07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	10/23/12	10/23/12	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12
Chemical Name														
Volatile Organic Compounds (µg/kg)														
1,1,1-Trichloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
1,1,2,2-Tetrachloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
1,1,2-Trichloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,1-Dichloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
1,1-Dichloroethene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,2,4-Trichlorobenzene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	5 UJ	6 UJ	6 UJ	6 UJ	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,2-Dichlorobenzene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,2-Dichloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,2-Dichloroethene (total)	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,3-Dichlorobenzene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
1,4-Dichlorobenzene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
2-Butanone	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
2-Hexanone	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
4-Methyl-2-pentanone	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
Acetone	5 B	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	70 B	100	78 B	94 J	NA	NA
Benzene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Bromodichloromethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Bromoform	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Bromomethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
Carbon disulfide	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Carbon tetrachloride	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Chlorobenzene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Chloroethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
Chloroform	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
Chloromethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
cis-1,3-Dichloropropene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Dibromochloromethane	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
Ethylbenzene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	12 U	14 U	12 UJ	13 UJ	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	10 U	11 U	10 UJ	11 UJ	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Methylene chloride	7 B	8 B	11.9 U	9 B	11 B	11 B	NA	NA	26 U	31 U	28 UJ	30 UJ	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	11 U	10 UJ	11 UJ	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Styrene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	2 J	2 J	6 UJ	NA	NA
Tetrachloroethene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	6 U	6 UJ	6 UJ	NA	NA
Toluene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	5 U	6 U	6 UJ	2 J	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	7 U	9 U	8 UJ	8 UJ	NA	NA
trans-1,3-Dichloropropene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	7 U	9 U	8 UJ	8 UJ	NA	NA
Trichloroethene	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	6 U	7 U	7 UJ	7 UJ	NA	NA
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
Vinyl chloride	11.2 U	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	NA	NA	10 U	12 U	11 UJ	12 UJ	NA	NA
Xylene, total	11.2 U	2 J	11.9 U	11.6 U	14.8 UL	14.8 R	NA	NA	16 U	18 U	17 UJ	18 UJ	NA	NA
Semivolatile Organic Compounds (µg/kg)														
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	340 U	410 U	360 U	360 U	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	430 U	520 U	460 U	460 U	NA	NA
2,2'-Oxybis(1-chloropropane)	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
2,4,5-Trichlorophenol	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	850 U	1,000 U	900 U	900 U	NA	NA
2,4,6-Trichlorophenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	500 U	590 U	520 U	530 U	NA	NA
2,4-Dichlorophenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	460 U	560 U	490 U	490 U	NA	NA
2,4-Dimethylphenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	520 U	620 U	550 U	550 U	NA	NA
2,4-Dinitrophenol	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	1,200 U	1,400 U	1,200 U	1,200 U	NA	NA
2,4-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
2,6-Dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
2-Chloronaphthalene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	NA	NA
2-Chlorophenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	520 U	620 U	550 U	550 U	NA	NA
2-Methylnaphthalene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
2-Methylphenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	620 U	740 U	660 U	660 U	NA	NA
2-Nitroaniline	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	850 U	1,000 U	900 U	900 U	NA	NA
2-Nitrophenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	530 U	630 U	560 U	560 U	NA	NA
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	590 U	700 U	620 U	630 U	NA	NA
3,3'-Dichlorobenzidine	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	360 U	430 U	380 U	380 U	NA	NA
3-Nitroaniline	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	850 U	1,000 U	900 U	900 U	NA	NA
4,6-Dinitro-2-methylphenol	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	1,100 U	1,400 U	1,200 U	1,200 U	NA	NA
4-Bromophenyl-phenylether	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
4-Chloro-3-methylphenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	520 U	620 U	550 U	550 U	NA	NA
4-Chloroaniline	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	370 U	440 U	390 U	400 U	NA	NA
4-Chlorophenyl-phenylether	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
4-Methylphenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	850 U	1,000 U	900 U	900 U	NA	NA
4-Nitrophenol	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	960 U	1,100 U	1,000 U	1,000 U	NA	NA
Acenaphthene	380 U	330 J	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	3 J	10 U

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, South												Site 4, East	
Station ID	CAS004-4HA01	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SO14		CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO06	CAS04-SO07
Sample ID	CAS004-4HA01-00-1199	CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199	CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS06-1012	CAS04-SS07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	10/23/12	10/23/12	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12
Chemical Name														
Acenaphthylene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	560 U	670 U	590 U	590 U	NA	NA
Anthracene	380 U	530 J	2,100 U	400 U	2,600 U	5,500 U	NA	NA	4 J	4.2 J	1.7 J	2.4 J	6 J	2.1 J
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	370 UJ	440 UJ	390 UJ	400 U	NA	NA
Benzo(a)anthracene	380 U	1,100 J	290 J	400 U	2,600 U	1,100 J	NA	NA	16 J	23 J	14 J	16 J	24 J	12 J
Benzo(a)pyrene	380 U	950 J	440 J	400 U	2,600 U	2,300 J	NA	NA	7.8 J	14 J	5.8 J	10 J	20 J	9.3 J
Benzo(b)fluoranthene	380 U	1,100 J	320 J	76 J	330 J	1,700 J	NA	NA	18 J	29	16 J	20 J	37	18 B
Benzo(g,h,i)perylene	380 U	650 J	340 J	61 J	2,600 U	1,200 J	NA	NA	21 UL	2.5 L	22 UL	22 UL	12 J	7 J
Benzo(k)fluoranthene	380 U	770 J	470 J	53 J	320 J	1,700 J	NA	NA	3.7 J	6.3 J	22 U	5.5 J	9.3 J	5.9 J
bis(2-Chloroethoxy)methane	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
bis(2-Chloroethyl)ether	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
bis(2-Ethylhexyl)phthalate	49 B	16,000 B	3,000 B	100 B	11,000 B	5,500 U	NA	NA	100 U	120 U	110 U	110 U	NA	NA
Butylbenzylphthalate	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	450 U	540 U	480 U	480 R	NA	NA
Carbazole	380 U	250 J	2,100 U	400 U	2,600 U	5,500 U	NA	NA	2.6 J	3.8 J	22 U	3.6 J	NA	NA
Chrysene	380 U	1,300 J	520 J	75 J	410 J	2,200 J	NA	NA	4 J	8.6 J	22 U	7.7 J	29 J	12 J
Dibenz(a,h)anthracene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	10 J	13 J	22 U	22 U	4.1 J	4 J
Dibenzofuran	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Diethylphthalate	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Dimethyl phthalate	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Di-n-butylphthalate	380 U	2,100 U	2,100 U	41 B	9,900 B	5,500 U	NA	NA	100 U	120 U	110 U	110 U	NA	NA
Di-n-octylphthalate	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	660 U	790 U	700 U	700 U	NA	NA
Fluoranthene	380 U	2,700	660 J	49 J	510 J	1,800 J	NA	NA	21	36	17 J	29	48	22
Fluorene	380 U	250 J	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	4.7 J	10 U
Hexachlorobenzene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	NA	NA
Hexachlorobutadiene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Hexachlorocyclopentadiene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Hexachloroethane	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	NA	NA
Indeno(1,2,3-cd)pyrene	380 U	600 J	250 J	48 J	2,600 U	1,300 J	NA	NA	12 K	18 K	9.8 K	20 J	27 J	13 J
Isophorone	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Naphthalene	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	21 U	25 U	22 U	22 U	13 U	10 U
n-Nitroso-di-n-propylamine	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
n-Nitrosodiphenylamine	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	680 U	820 U	720 U	720 U	NA	NA
Nitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	340 U	410 U	360 U	360 U	NA	NA
Pentachlorophenol	960 U	5,200 U	5,200 U	1,000 U	6,600 U	14,000 U	NA	NA	100 U	120 U	110 U	110 U	NA	NA
Phenanthrene	380 U	2,400	560 J	400 U	2,600 U	1,400 J	NA	NA	16 J	21 J	8.4 J	15 J	38	16 J
Phenol	380 U	2,100 U	2,100 U	400 U	2,600 U	5,500 U	NA	NA	480 U	580 U	510 U	520 U	NA	NA
Pyrene	380 U	2,300	800 J	46 J	440 J	3,000 J	NA	NA	14 J	21 J	7 J	17 J	53	24
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
4,4'-DDE	3.8 U	9.6 J	4.2 U	4 U	43 J	27 U	NA	NA	0.67 B	4.1 U	0.72 B	1.2 L	NA	NA
4,4'-DDT	3.8 U	7 J	4.6 J	4 U	9.4	220 K	NA	NA	1.3 B	4.1 U	2.2 B	3.5 U	NA	NA
Aldrin	2 U	2.1 U	2.2 U	2.1 U	2.7 U	33 K	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
alpha-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
alpha-Chlordane	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	0.54 J	NA	NA
Aroclor-1016	38 U	42 U	42 U	40 U	52 U	270 U	NA	NA	20 U	22 U	20 U	19 U	12 U	9.3 U
Aroclor-1221	77 U	85 U	85 U	82 U	110 U	560 U	NA	NA	47 U	52 U	48 U	44 U	12 U	9.3 U
Aroclor-1232	38 U	42 U	42 U	40 U	52 U	270 U	NA	NA	31 U	34 U	32 U	30 U	14 U	11 U
Aroclor-1242	38 U	42 U	42 U	40 U	52 U	1,000 K	NA	NA	20 U	22 U	20 U	19 U	12 U	9.3 U
Aroclor-1248	38 U	42 U	42 U	40 U	52 U	270 U	NA	NA	21 U	23 U	22 U	20 U	12 U	9.3 U
Aroclor-1254	38 U	42 U	42 U	40 U	52 U	270 U	NA	NA	19 U	21 U	19 U	18 U	12 U	9.3 U
Aroclor-1260	53	64 J	75 J	53 J	600 J	2,700 K	NA	NA	20 U	35	20 U	33	55	9.3 U
beta-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
delta-BHC	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Dieldrin	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endosulfan I	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Endosulfan II	4.4 J	4.2 U	4.2 U	5.7 J	5.2 U	27 U	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endosulfan sulfate	3.8 U	4.2 U	4.2 U	4 U	5.2 U	27 U	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
Endrin	6.3 J	4.2 U	4.2 U	4 U	5.2 U	28 K	NA	NA	3.7 UJ	4.1 U	3.5 J	3.5 U	NA	NA
Endrin aldehyde	3.8 U	4.2 U	4.2 U	4 U	5.2 U	77 K	NA	NA	3.7 UJ	4.1 U	1.9 J	2.1 J	NA	NA
Endrin ketone	3.8 U	4.2 U	4.5	4 U	5.2 U	87 K	NA	NA	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA
gamma-BHC (Lindane)	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
gamma-Chlordane	2 U	2.1 U	2.2 U	2.1 U	2.7 U	15 K	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Heptachlor	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Heptachlor epoxide	2 U	2.1 U	2.2 U	2.1 U	2.7 U	14 U	NA	NA	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA
Methoxychlor	20 U	21 U	22 U	21 U	27 U	140 U	NA	NA	19 UJ	21 U	19 U	18 U	NA	NA
Toxaphene	200 U	210 U	220 U	210 U	270 U	1,400 U	NA	NA	37 UJ	41 U	38 U	35 U	NA	NA
Explosives (µg/kg)														
1,3,5-Trinitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
HMX	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
RDX	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	500 U	500 U	500 U	450 U	450 U	500 U	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-1

Raw Surface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, South												Site 4, East	
Station ID	CAS004-4HA01	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SO14		CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO06	CAS04-SO07
Sample ID	CAS004-4HA01-00-1199	CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199	CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS06-1012	CAS04-SS07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	10/23/12	10/23/12	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12
Chemical Name														
Total Metals (mg/kg)														
Aluminum	4,560 L	5,810 L	7,160 L	6,760 L	9,560 L	6,260 L	NA	NA	6,360	29,400	4,560	5,990	19,600	15,600
Antimony	0.49 U	0.46 U	0.55 U	0.47 U	0.67 J	12.6 B	NA	NA	0.08 L	0.2 L	0.09 L	0.08 L	0.23 J	0.12 J
Arsenic	2.9 L	2.7 L	2.6 L	3 L	4.1 L	3.5 L	NA	NA	1.6	6.4	1.4	1.1	7.2	5.2
Barium	20.3 J	36.6 J	27.1 J	25.5 J	164	68	NA	NA	17.6	32.1	14.8	24.8 J	32.7	20.6
Beryllium	0.33 B	0.64 B	0.36 B	0.35 B	0.68 B	0.65 B	NA	NA	0.24 J	0.76	0.22 J	0.46 J	0.56	0.34 J
Cadmium	0.08 U	0.07 U	0.08 U	0.07 U	0.74 J	3.3	NA	NA	0.91 U	1.2 U	0.98 U	0.96 U	0.22 J	0.13 B
Calcium	3,750	1,440	1,110 J	8,420	7,320	6,670	NA	NA	267	137	637	345 J	1,120	208
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	0.21 U	0.21 U	NA	NA	NA	NA	NA	NA
Chromium	9.4	8.7	9.6	11.8	16.9	19	7.4	7.2	9.2 K	45.2 K	7.3 K	6.9	27.8	21.8
Cobalt	1.4 U	2.8 J	3.7 J	1.7 J	4.1 J	4.6 J	NA	NA	1.2	3.5	1.1	2.1	2.7	2.4
Copper	4.5 B	10.5	12	3.8 B	26	150	NA	NA	1.8 K	4.4 K	2.4 K	2.5	4.6	2.9
Cyanide	0.02 UL	0.12 L	0.13 L	0.02 UL	0.03 UL	0.11 L	NA	NA	0.77 U	0.84 U	0.7 U	0.77 U	NA	NA
Iron	8,900 L	9,840 L	8,570 L	8,910 L	14,600 L	14,300 L	NA	NA	7,090	28,300	6,210	4,370 J	20,300	17,400
Lead	12.8	22.7	24	11.6	39.5	129	NA	NA	7.9 K	12.6 K	11.7 K	10	24	13.5
Magnesium	619 J	514 J	669 J	800 J	1,110 J	2,010	NA	NA	480 K	2,280 K	351 K	454 J	1,160	907
Manganese	48.7	233	127	43.2	151	175	NA	NA	27.7 K	33.6 K	28.8 K	59 J	40.8	30.2
Mercury	0.04 J	0.31	0.36	0.09 J	0.76	0.88	NA	NA	0.01 J	0.03 J	0.02 J	0.03 J	0.08	0.05
Nickel	2.2 B	3.8 B	4.1 B	4 B	10.1 J	12.1	NA	NA	2.3 J	8.1 J	2.2 J	3.1 J	6	4.8
Potassium	789 J	283 B	366 J	928 J	798 J	1,420	NA	NA	406 K	2,580 K	280 K	307 K	996	689
Selenium	0.67 U	0.63 U	0.75 U	0.64 U	1 J	0.81 U	NA	NA	0.22 J	0.27 J	0.18 J	0.28 J	0.74 B	0.59 J
Silver	2.8 B	2.6 B	3 B	2.4 B	5.2 B	5.2 B	NA	NA	1.4 U	1.8 U	1.5 U	1.4 U	0.34 U	0.28 U
Sodium	24.4 B	23.1 B	22.6 B	72.9 B	73.8 B	60.5 B	NA	NA	18.4 K	49.6 K	14.4 K	15.5 K	38.9 B	33.4 B
Thallium	0.54 UL	0.5 UL	0.6 UL	0.51 UL	0.72 UL	0.65 UL	NA	NA	0.09 B	0.21 B	0.08 B	0.08 B	0.18 B	0.16 B
Vanadium	13.9	13.9	15.1	16.6	22.2	23.5	NA	NA	13.3	63.6	11.9	9.8	43.3	34.1
Zinc	28.6 B	106	102	32.5 B	273	324	NA	NA	13 K	28.8 K	10.4 K	14.9	29.5	21.3
Wet Chemistry														
pH (ph)	NA	NA	NA	NA	NA	NA	NA	NA	5	6	5.2	5.5	4	3.9
Total organic carbon (TOC) (ug/g)	NA	NA	NA	NA	NA	NA	NA	NA	5,600	16,000	17,000	17,000	59,000	32,000
Grain Size (pct)														
Gravel (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0.1
Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66	64.1
Coarse Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.6	0.3
Medium Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7	8.7
Fine Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	47.7	55.1
Fines (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34	35.8
GRAINSIZE (PCT/P)														
GS03 Sieve 3" (75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	100
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	100
GS09 Sieve 0.5" (12.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	NA	NA
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	100
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	100	100	100	100	99.9
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	100	99	100	100	99.4	99.6
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	99	99	99	99	91.4	96.9
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	95	95	95	94	81.7	90.9
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	74	70	77	73	63.3	72.3
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	49.4	56
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	45	41	48	45	41.5	45.8
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	30	30	31	29	34	35.8

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in

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

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct - Percent

PCT/P - Percent passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 4, Northwest																	
Station ID	CAA03-SB01	CAA03-SB02		CAA03-SB03		CAA03-SB04		CAA03-SB05		CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06	CAS04-SB05	CAS04-SO15
Sample ID	CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB02-1109B	CAA03-SB03-1109A	CAA03-SB03-1109B	CAA03-SB04-1109A	CAA03-SB04-1109B	CAA03-SB05-1109A	CAA03-SB05-1109B	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199	CAS04-SB05-1109	CAS04-SB15-1012
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	11/03/09	10/23/12
Chemical Name																		
Volatile Organic Compounds (µg/kg)																		
1,1,1-Trichloroethane	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	6 UJ	9 UJ	6 UJ	6 UJ	7 UJ	7 UJ	7 UJ	6 UJ	12.8 U	7 U	NA
1,1,2,2-Tetrachloroethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	6 UJ	9 UJ	6 UJ	6 UJ	7 UJ	7 UJ	7 UJ	6 UJ	NA	7 U	NA
1,1,2-Trichloroethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
1,1-Dichloroethane	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	6 UJ	9 UJ	6 UJ	6 UJ	7 UJ	7 UJ	7 UJ	6 UJ	12.8 U	7 U	NA
1,1-Dichloroethene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
1,2,4-Trichlorobenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	3,800 U	6 U	NA
1,2-Dibromo-3-chloropropane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 UJ	NA
1,2-Dibromoethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 U	NA
1,2-Dichlorobenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	3,800 U	6 U	NA
1,2-Dichloroethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12.8 U	NA	NA
1,2-Dichloropropane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
1,3-Dichlorobenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	3,800 U	6 U	NA
1,4-Dichlorobenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	3,800 U	6 U	NA
2-Butanone	24 UJ	25 UJ	31 J	30 UJ	34 UJ	28 UJ	40 J	23 UJ	34 J	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	27 UJ	12.8 U	28 U	NA
2-Hexanone	24 UJ	25 UJ	50 UJ	30 UJ	34 UJ	28 UJ	48 UJ	23 UJ	37 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	27 UJ	12.8 UL	28 U	NA
4-Methyl-2-pentanone	24 UJ	25 UJ	50 UJ	30 UJ	34 UJ	28 UJ	48 UJ	23 UJ	37 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	27 UJ	12.8 U	28 U	NA
Acetone	69 B	29 B	290 J	68 B	73 B	60 B	310 J	65 B	210 J	45 B	52 B	220 J	240 J	74 B	100 B	12.8 U	98	NA
Benzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	2 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Bromodichloromethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Bromoform	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Bromomethane	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	12.8 U	11 U	NA
Carbon disulfide	5 UJ	5 UJ	4 J	6 UJ	7 UJ	6 UJ	3 J	5 UJ	1 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Carbon tetrachloride	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Chlorobenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA
Chloroethane	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	12.8 U	11 U	NA
Chloroform	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	1 J	9 UJ	6 UJ	6 UJ	0.8 J	7 UJ	7 UJ	6 UJ	12.8 U	7 U	NA
Chloromethane	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	12.8 U	11 U	NA
cis-1,2-Dichloroethene	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	6 UJ	9 UJ	6 UJ	6 UJ	7 UJ	7 UJ	7 UJ	6 UJ	NA	7 U	NA
cis-1,3-Dichloropropene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Cyclohexane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 U	NA
Dibromochloromethane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 U	6 U	NA
Dichlorodifluoromethane (Freon-12)	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	NA	11 U	NA
Ethylbenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	2 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA
Isopropylbenzene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	9 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 U	NA
m- and p-Xylene	10 UJ	11 UJ	22 UJ	13 UJ	15 UJ	12 UJ	3 J	10 UJ	19 J	11 UJ	11 UJ	13 UJ	13 UJ	13 UJ	12 UJ	NA	12 U	NA
Methyl acetate	8 UJ	9 UJ	18 UJ	11 UJ	12 UJ	10 UJ	17 UJ	8 UJ	13 UJ	9 UJ	9 UJ	11 UJ	11 UJ	10 UJ	10 UJ	NA	10 U	NA
Methylcyclohexane	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	2 J	5 UJ	6 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 U	NA
Methylene chloride	13 J	25 UJ	19 J	16 J	17 J	28 UJ	48 UJ	23 UJ	37 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	12 J	20 B	28 U	NA
Methyl-tert-butyl ether (MTBE)	8 UJ	9 UJ	18 UJ	11 UJ	12 UJ	10 UJ	17 UJ	8 UJ	13 UJ	9 UJ	9 UJ	11 UJ	11 UJ	10 UJ	10 UJ	NA	10 U	NA
o-Xylene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	5 J	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	NA	6 U	NA
Styrene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	2 J	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA
Tetrachloroethene	5 UJ	5 UJ	10 UJ	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	7 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA
Toluene	5 UJ	5 UJ	3 J	6 UJ	7 UJ	6 UJ	10 UJ	5 UJ	4 J	2 J	5 UJ	6 UJ	5 J	6 UJ	5 UJ	12.8 UL	6 U	NA
trans-1,2-Dichloroethene	6 UJ	7 UJ	14 UJ	8 UJ	9 UJ	8 UJ	13 UJ	6 UJ	10 UJ	7 UJ	7 UJ	8 UJ	8 UJ	8 UJ	8 UJ	NA	8 U	NA
trans-1,3-Dichloropropene	6 UJ	7 UJ	14 UJ	8 UJ	9 UJ	8 UJ	13 UJ	6 UJ	10 UJ	7 UJ	7 UJ	8 UJ	8 UJ	8 UJ	8 UJ	12.8 U	8 U	NA
Trichloroethene	6 UJ	6 UJ	12 UJ	7 UJ	8 UJ	7 UJ	12 UJ	6 UJ	9 UJ	6 UJ	6 UJ	7 UJ	7 UJ	7 UJ	6 UJ	12.8 U	7 U	NA
Trichlorofluoromethane (Freon-11)	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	NA	11 U	NA
Vinyl chloride	9 UJ	10 UJ	20 UJ	12 UJ	14 UJ	11 UJ	19 UJ	9 UJ	15 UJ	10 UJ	10 UJ	12 UJ	12 UJ	12 UJ	11 UJ	12.8 U	11 U	NA
Xylene, total	14 UJ	15 UJ	30 UJ	18 UJ	20 UJ	16 UJ	3 J	14 UJ	24 J	15 UJ	15 UJ	18 UJ	18 UJ	17 UJ	16 UJ	12.8 UL	17 U	NA
Semivolatile Organic Compounds (µg/kg)																		
1,1-Biphenyl	350 U	370 U	540 U	360 U	380 U	360 U	690	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	NA	380 U	NA
1,2,4,5-Tetrachlorobenzene	450 U	470 U	690 U	460 U	480 U	450 U	640 U	450 U	590 U	470 U	460 U	490 U	460 U	460 U	370 U	NA	480 U	NA
2,2'-Oxybis(1-chloropropane)	350 U	370 UJ	540 UJ	360 U	380 U	360 UJ	500 U	360 UJ	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
2,4,5-Trichlorophenol	880 U	920 U	1,300 U	900 U	940 U	880 U	1,200 U	880 U	1,200 U	920 U	900 U	950 U	890 U	900 U	730 U	9,500 U	940 U	NA
2,4,6-Trichlorophenol	510 U	540 U	790 U	530 U	550 U	520 U	740 U	520 U	670 U	540 U	520 U	560 U	520 U	530 U	430 U	3,800 U	550 U	NA
2,4-Dichlorophenol	480 U	500 U	740 U	490 U	510 U	480 U	690 U	480 U	630 U	500 U	490 U	520 U	490 U	500 U	400 U	3,800 U	520 U	NA
2,4-Dimethylphenol	540 U	560 U	820 U	550 U	570 U	540 U	770 U	540 U	700 U	560 U	540 U	580 U	540 U	550 U	440 U	3,800 U	580 U	NA
2,4-Dinitrophenol	1,200 U	1,300 U	1,900 U	1,200 U	1,300 U	1,200 U	1,700 U	1,200 U	1,600 U	1,300 U	1,200 U	1,300 U	1,200 U	1,200 U	1,000 U	9,500 U	1,300 U	NA
2,4-Dinitrotoluene	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	480 U	380 U	NA
2,6-Dinitrotoluene	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	480 U	380 U	NA
2-Chloronaphthalene	21 U	22 U	33 U	22 U	23 U	22 U	31 U	22 U	28 U	22 U	22 U	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
2-Chlorophenol	540 U	560 U	820 U	550 U	570 U	540 U	770 U	540 U	700 U	560 U	540 U	580 U	540 U	550 U	440 U	3,800 U	580 U	NA
2-Methylnaphthalene	120 J	3.6 J	210	22 U	23 U	22 U	1,600	22 U	640	9.5 J	32 J	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
2-Methylphenol	640 U	670 U	980 U	660 U	680 U	650 U	920 U	650 U	840 U	670 U	660 U	700 U	650 U	660 U	530 U	3,800 U	690 U	NA
2-Nitroaniline	880 U	920 U	1,300 U	900 U	940 U	880 U	1,200 U	880 U	1,200 U	920 U	900 U	950 U	890 U	900 U	730 U	9,500 U	940 U	NA
2-Nitrophenol	540 U	570 U	840 U	560 U	580 U	550 U	780 U	550 U	720 U	570 U	560 U	590 U	550 U	560 U	450 U	3,800 U	590 U	NA
3- and 4-Methylphenol	610 U	640 U	940 U	630 U	650 U	620 U	870 U	610 U	800 U	640 U	620 U	660 U	620 U	630 U	510 U	NA	660 U	NA
3,3'-Dichlorobenzidine	370 U	390 U	580 U	380 U	400 U	380 U	540 U	380 U	490 U	390 U	380 U	410 U	380 U	380 U	310 U	3,800 U	400 U	NA
3-Nitroaniline	880 U	920 U	1,300 U	900 U	940 U	880 U	1,200 U	880 U	1,200 U	920 U	900 U	950 U	890 U	900 U	730 U	9,500 U	940 U	NA
4,6-Dinitro-2-methylphenol	1,200 U	1,200 U	1,800 U	1,200 U	1,200 U	1,200 U	1,700 U	1,200 U	1,500 U	1,200 U	1,200 U	1,300 U	1,200 U	1,200 U	980 U	9,500 U	1,300 U	NA
4-Bromophenyl-phenylether	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
4-Chloro-3-methylphenol	540 U	560 U	820 U	550 U	570 U	540 U	770 U	540 U	700 U	560 U	540 U	580 U	540 U	550 U	440 U	3,800 U	580 U	NA
4-Chloroaniline	380 U	400 U	590 U	400 U	410 U	390 U	550 U	390 U	500 U	400 U	390 U	420 U	390 U	400 U	320 U	3,800 U	420 U	NA
4-Chlorophenyl-phenylether	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,800 U	NA	NA
4-Nitroaniline	880 U	920 U	1,300 U	900 U	940 U	880 U	1,200 U	880 U	1,200 U	920 U	900 U	950 U	890 U	900 U	730 U	9,500 U	940 U	NA
4-Nitrophenol	1,000 U	1,000 U	1,500 U	1,000 U	1,100 U	1,000 U	1,400 U	1,000 U	1,300 U	1,000 U	1,000 U	1,100 U	1,000 U	1,000 U	830 U	9,500 U	1,100 U	NA
Acenaphthene	290 J	8.5 J	58	22 U	12 J	5.9 J	660	22 U	140	38	160	23 U	22 U	22 U	18 U	3,800 U	23 U	NA

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, Northwest																	
Station ID	CAA03-SB01	CAA03-SB02		CAA03-SB03		CAA03-SB04		CAA03-SB05		CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06	CAS04-SB05	CAS04-SO15
Sample ID	CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB02-1109B	CAA03-SB03-1109A	CAA03-SB03-1109B	CAA03-SB04-1109A	CAA03-SB04-1109B	CAA03-SB05-1109A	CAA03-SB05-1109B	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199	CAS04-SB05-1109	CAS04-SB15-1012
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	11/03/09	10/23/12
Chemical Name																		
Acenaphthylene	21 U	100	140	22 U	8.8 J	23	390 J	22 U	66	18 J	50 J	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
Acetophenone	580 U	600 U	890 U	590 U	620 U	580 U	830 U	580 U	760 U	610 U	590 U	630 U	580 U	590 U	480 U	NA	620 U	NA
Anthracene	1,200	66	280	22 U	17 J	35	2,400	22 U	1,500	120	560	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
Atrazine	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	NA	380 U	NA
Benzaldehyde	380 UJ	400 U	590 U	400 U	410 U	390 U	550 U	390 U	500 U	400 U	390 U	420 U	390 U	400 U	320 U	NA	420 U	NA
Benzo(a)anthracene	1,900	350	840	11 J	34	180	2,700	8 J	320	440	1,800	23 U	11 J	22 U	18 U	500 J	6.2 J	NA
Benzo(a)pyrene	1,100	330	690	5.3 J	26	260	1,700	22 U	210	250	1,400	23 U	12 J	22 U	18 U	600 J	23 U	NA
Benzo(b)fluoranthene	1,700	470	900	22 U	44 J	360	2,200	8.9 J	250 J	480	2,300	23 U	19 J	22 U	18 U	490 J	23 U	NA
Benzo(g,h,i)perylene	220 L	130 L	140 L	22 UL	23 UL	66 L	490 L	22 UL	27 L	48 L	560 J	23 R	3 B	22 R	18 R	440 J	23 UL	NA
Benzo(k)fluoranthene	710	150	220	22 U	9.8 J	84	910	22 U	77	160	600	23 U	22 U	22 U	18 U	760 J	23 U	NA
bis(2-Chloroethoxy)methane	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
bis(2-Chloroethyl)ether	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
bis(2-Ethylhexyl)phthalate	110 U	110 U	660 J	110 U	110 U	110 U	290	110 U	320	41 J	160	120 U	110 U	110 U	89 U	3,800 U	120 U	NA
Butylbenzylphthalate	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Caprolactam	470 U	490 R	720 R	480 R	500 R	470 R	670 R	470 R	620 R	490 R	480 R	510 R	480 R	480 R	390 R	NA	510 R	NA
Carbazole	650 J	39	940	22 U	18 J	17 J	2,400	22 U	1,900	180 J	210 J	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
Chrysene	1,800	320	840	22 U	19 J	160 J	2,000	22 U	320 J	420	1,800	23 U	18 J	22 U	18 U	620 J	23 U	NA
Dibenz(a,h)anthracene	180 J	85 K	120 K	22 U	23 U	70 K	330 K	22 U	36 K	52 K	250	23 U	4.2 J	22 U	18 U	3,800 U	23 U	NA
Dibenzofuran	350 J	370 U	280 J	360 U	380 U	360 U	2,000	360 U	350 J	370 U	120 J	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Diethylphthalate	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Dimethyl phthalate	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Di-n-butylphthalate	110 U	110 U	160 U	110 U	110 U	110 U	150 U	110 U	140 U	110 U	110 U	120 U	110 U	110 U	89 U	3,800 U	120 U	NA
Di-n-octylphthalate	680 U	710 U	1,000 U	700 U	730 U	690 U	980 U	690 U	900 U	720 U	700 U	740 U	690 U	700 U	570 U	3,800 U	740 U	NA
Fluoranthene	5,400	620	2,400	8.4 B	72	320	6,000	7.4 B	820	1,000	4,400	4.5 J	22 U	22 U	18 U	880 J	23 U	NA
Fluorene	660	33	390	22 U	29	12 J	2,000	22 U	450	58	220	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
Hexachlorobenzene	21 U	22 U	33 U	22 U	23 U	22 U	31 U	22 U	28 U	22 U	22 U	23 U	7.2 J	22 U	18 U	3,800 U	23 U	NA
Hexachlorobutadiene	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Hexachlorocyclopentadiene	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Hexachloroethane	21 U	22 U	33 U	22 U	23 U	22 U	31 U	22 U	28 U	22 U	22 U	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
Indeno(1,2,3-cd)pyrene	1,400 K	230 J	430 J	14 J	52 J	280 J	240 J	22 U	200 J	150 J	1,300 J	5.6 B	21 B	22 U	18 U	3,800 U	23 U	NA
Isophorone	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
Naphthalene	240	7.4 J	630	22 U	14 J	22 U	8,000	22 U	3,500 J	28	29	23 U	22 U	22 U	18 U	3,800 U	23 U	NA
n-Nitroso-di-n-propylamine	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	3,800 U	380 U	NA
n-Nitrosodiphenylamine	710 U	740 U	1,100 U	720 U	750 U	710 U	1,000 U	710 U	930 U	740 U	720 U	770 U	720 U	730 U	590 U	3,800 U	760 U	NA
Nitrobenzene	350 U	370 U	540 U	360 U	380 U	360 U	500 U	360 U	460 U	370 U	360 U	380 U	360 U	360 U	290 U	480 U	380 U	NA
Pentachlorophenol	110 U	110 UL	160 UL	110 UL	110 UL	110 UL	150 UL	110 UL	140 UL	110 UL	110 UL	120 UJ	110 UJ	110 UJ	89 UJ	9,500 U	120 U	NA
Phenanthrene	5,000	260	2,600	2.5 B	48	130	8,000	3.4 B	1,400	800	2,900	23 U	22 U	22 U	18 U	400 J	23 U	NA
Phenol	500 U	520 U	770 U	520 U	540 U	510 U	720 U	510 U	660 U	530 U	510 U	550 U	510 U	520 U	420 U	3,800 U	540 U	NA
Pyrene	4,000	480	1,700	4.4 J	41	260	4,100	4.1 J	640	810	3,900	23 U	22 U	22 U	18 U	670 J	23 U	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)																		
4,4'-DDD	2.8 J	9.2	3.3 J	5.1 J	1.2 J	13	170 J	2.6 J	4.8 UJ	2.4 J	20 J	3.8 UJ	1.1 J	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
4,4'-DDE	1.6 B	24	1.6 J	7.4 J	1.6 J	20	150 J	6	1.5 J	1.2 J	19	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
4,4'-DDT	3.6 UJ	23	5.3 UJ	3.5 UJ	11 J	3.8	5.1 UJ	1.8 J	4.8 UJ	3.5 UJ	32	12 J	3.8 U	3.6 UJ	3.5 U	8.4 J	3.4 UJ	NA
Aldrin	1.9 UJ	1.8 U	1.2 J	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	1.1 J	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
alpha-BHC	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
alpha-Chlordane	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	4 J	1.8 U	2.4 UJ	1.8 UJ	0.89 J	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Aroclor-1016	20 U	19 U	29 U	19 U	21 U	20 U	28 U	19 U	26 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U	18 U	NA
Aroclor-1221	46 U	45 U	67 U	44 U	49 U	46 U	65 U	43 U	60 U	44 U	46 U	48 UJ	48 U	46 UL	44 U	76 U	43 U	NA
Aroclor-1232	31 U	30 U	45 U	29 U	33 U	30 U	44 U	29 U	40 U	29 U	31 U	32 UJ	32 U	31 UL	29 U	38 U	29 U	NA
Aroclor-1242	20 U	19 U	29 U	19 U	21 U	20 U	28 U	19 U	26 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U	18 U	NA
Aroclor-1248	21 U	20 U	30 U	20 U	22 U	21 U	30 U	20 U	27 U	20 U	21 U	22 UJ	22 U	21 UL	20 U	38 U	20 U	NA
Aroclor-1254	19 U	18 U	27 U	18 U	20 U	18 U	26 U	18 U	24 U	18 U	19 U	20 UJ	20 U	19 UL	18 U	38 U	18 U	NA
Aroclor-1260	20 U	19 U	29 U	19 U	21 U	20 U	28 U	19 U	26 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U	18 U	NA
beta-BHC	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
delta-BHC	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	1.3 J	1.4 J	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Dieldrin	3.6 UJ	1.9 J	5.3 UJ	2 J	3.9 UJ	3.2 J	30 J	1 J	4.8 UJ	3.5 UJ	3.6 U	1.3 J	3.8 U	0.65 J	3.5 U	3.8 U	3.4 UJ	NA
Endosulfan I	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Endosulfan II	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
Endosulfan sulfate	3.6 UJ	3.6 U	2.7 J	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	9.2 J	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
Endrin	3.6 UJ	3.6 U	5.3 UJ	13 J	76 J	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	96 J	5.5 J	8.6 J	3.5 U	3.8 U	3.4 UJ	NA
Endrin aldehyde	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	2.9 J	3.4 U	4.8 UJ	3.5 UJ	3.6 U	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
Endrin ketone	3.6 UJ	3.6 U	5.3 UJ	3.5 UJ	3.9 UJ	3.6 U	5.1 UJ	3.4 U	4.8 UJ	3.5 UJ	3.6 U	0.88 J	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA
gamma-BHC (Lindane)	6.4 J	1.5 J	6.4 J	1.8 UJ	0.72 J	0.57 J	1.6 J	1.8 U	1.2 J	4.1 J	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
gamma-Chlordane	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1 J	11 J	1.8 U	2.4 UJ	1.8 UJ	23 J	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Heptachlor	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.4 B	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Heptachlor epoxide	1.9 UJ	1.8 U	2.7 UJ	1.8 UJ	2 UJ	1.8 U	2.6 UJ	1.8 U	2.4 UJ	1.8 UJ	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA
Methoxychlor	19 UJ	18 U	27 UJ	18 UJ	20 UJ	18 U	26 UJ	18 U	24 UJ	18 UJ	19 U	20 UJ	20 U	19 UJ	18 U	19 U	18 UJ	NA
Toxaphene	36 UJ	36 U	53 UJ	35 UJ	39 UJ	36 U	51 UJ	34 U	48 UJ	35 UJ	36 U	38 UJ	38 U	36 UJ	35 U	190 U	34 UJ	NA
Explosives (µg/kg)																		
1,3,5-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA
Tetryl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	480 U	NA	NA

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, Northwest																	
Station ID	CAA03-SB01	CAA03-SB02		CAA03-SB03		CAA03-SB04		CAA03-SB05		CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06	CAS04-SB05	CAS04-SO15
Sample ID	CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB02-1109B	CAA03-SB03-1109A	CAA03-SB03-1109B	CAA03-SB04-1109A	CAA03-SB04-1109B	CAA03-SB05-1109A	CAA03-SB05-1109B	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199	CAS04-SB05-1109	CAS04-SB15-1012
Sample Date	11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	11/03/09	10/23/12
Chemical Name																		
Total Metals (mg/kg)																		
Aluminum	8,290	15,800	28,600	12,100	14,000	10,600	12,800	10,300	2,790	11,600	10,800	23,100	24,500	22,600	4,310	3,550 L	20,700	NA
Antimony	0.1 L	0.11 L	0.11 L	0.11 L	1.2 L	0.09 L	0.26 L	0.05 L	0.08 L	0.08 L	0.08	0.14	0.12	0.22	0.04 J	1.1 B	0.12 L	NA
Arsenic	2.4	4	7.6	2.3	21	2.4	3.9	1.7	3.7	2.7	2.4	5.7	5.7	12.7	0.71	4.2 L	5.7	NA
Barium	33	54.8 J	53.1 J	50.4 J	72.4 J	45.7 J	49.8 J	49.5 J	9 J	31.8 J	32.3	28.1	30.8	31.2	17	33.2 J	22 J	NA
Beryllium	0.45 J	0.6	1.4	0.56	0.49 J	0.53	0.98	0.53	0.18 J	0.51	0.95	0.52 J	0.55	0.89	0.31 J	0.35 B	0.57	NA
Cadmium	1 U	0.86 U	0.1 J	1 U	0.12 J	0.85 U	0.2 J	0.89 U	0.07 J	0.03 J	0.06 J	1.1 U	0.98 U	0.03 J	0.65 U	0.15 U	0.07 J	NA
Calcium	7,510	1,620 J	3,780 J	1,790 J	2,900 J	1,700 J	4,970 J	943 J	1,990 J	13,200 J	10,400	862	714	350	107	2,460	108 J	NA
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U
Chromium	12 K	18.1	49.6	14.6	33.3	13.7	23.8	11.5	6.8	16	17.6	33.6	35.6	46.2	6	29.2	33.4	13.9
Cobalt	2.7	3.4	9.8	2.8	3.5	3	4.1	2.7	0.68	2.6	3.5	3	3.1	3.9	1	3.6 J	2.8	NA
Copper	4.9 K	3.6	14.8	3.6	9	2.9	5.7	3	2.2 B	3.3	9.4	3.4	3.8	4	1.4 J	19.4	3.4	NA
Cyanide	0.84 U	0.77 U	1.1 U	0.84 U	0.91 U	0.7 U	0.98 U	0.77 U	0.98 U	0.7 U	0.77 U	0.84 U	0.77 U	0.7 U	0.7 U	0.02 UL	0.77 U	NA
Iron	8,040	16,000 J	30,300 J	10,000 J	22,700 J	11,100 J	12,300 J	7,800 J	2,850 J	9,950 J	12,300	22,400	22,900	31,800	3,390	28,000 L	21,800 J	NA
Lead	10 K	12.9	16.7	14.9	23.4	10.8	8.2	9	3.5	9.6	20	11.3	10.8	9.8	3.8	29.7	10.7	NA
Magnesium	823 K	907 J	7,120 J	864 J	3,600 J	785 J	1,680 J	707 J	351 J	1,120 J	2,780	1,530	1,580	2,710	355	1,730	1,670 J	NA
Manganese	64.1 K	161 J	410 J	86.4 J	79.4 J	92.8 J	30 J	122 J	13.1 J	46.8 J	259	27.3	26.8	30.5	20.7	114	22.7 J	NA
Mercury	0.036 U	0.06	0.05 J	0.02 J	0.06	0.03 J	0.04 J	0.01 J	0.045 U	0.01 J	0.02 J	0.02 J	0.02 J	0.01 J	0.01 J	0.05 J	0.01 J	NA
Nickel	4.1 J	5.3	22.4	5	32.4	4.5	8.2	4.4	1.4 J	5.3	7.4	6.5	6.8	8.9	2.1 J	20.4	5.8	NA
Potassium	826 K	734 K	4,770 K	702 K	695 K	605 K	2,010 K	593 K	343 K	1,110 K	996	1,690	1,740	3,660	235	920 B	1,910 K	NA
Selenium	0.35 J	0.51	0.71	0.32 J	0.36 J	0.34 J	0.65	0.29 J	0.13 J	0.31 J	0.43	0.4 J	0.47 J	0.41 J	0.23 J	0.66 U	0.26 J	NA
Silver	1.6 U	1.3 U	2.1 U	1.6 U	1.7 U	1.3 U	1.6 U	1.3 U	1.5 U	1.4 U	1.2 U	0.44 J	0.21 J	0.82 J	0.98 U	8.5 L	1.4 U	NA
Sodium	66.8 K	37.2 K	690 K	43.3 K	77.2 K	39.6 K	60.2 K	27.9 K	20.8 K	101 K	70.8 J	38.9 J	39.9 J	42.3 J	12.8 J	31 B	31.4 K	NA
Thallium	0.11 B	0.18 B	0.26 B	0.13 B	0.11 B	0.13 B	0.16 B	0.11 B	0.04 B	0.11 B	0.12 B	0.2 B	0.2 B	0.22 B	0.06 B	0.53 UL	0.16 B	NA
Vanadium	14.8	29.2	55.2	20.2	30.4	20.1	31.6	16.8	7.1	20.9	23.8	51.1	52.2	57	6.5	20.8	51.8	NA
Zinc	16.4 K	20.2	86.8	21.1	158	18.1	26.6	15.1	6.9	15.5	39.6	20.9	21.3	28.1	8.1	236	22.2	NA
Wet Chemistry																		
pH (ph)	8.1	7.6	7.9	8.2	7.7	8.3	7.6	7.3	7.4	8.4	7.2	5.2	5.2	4.6	5	NA	4.4	NA
Total organic carbon (TOC) (ug/g)	3,900	8,400	17,000	5,400	11,000	18,000	32,000	5,300	24,000	3,600	14,000	11,000	9,200	5,700	6,700	NA	3,400	NA
Grain Size (pct/p)																		
GS07 Sieve 1" (25.0 mm)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA	100	NA
GS08 Sieve 0.75" (19.0 mm)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA	100	NA
GS09 Sieve 0.5" (12.5 mm)	100	100	100	100	93	100	100	100	100	100	100	100	100	100	100	NA	100	NA
GS10 Sieve 0.375" (9.5 mm)	100	98	100	100	82	99	100	100	100	100	100	100	100	100	100	NA	100	NA
Sieve No. 004 (4.75 mm)	99	95	100	100	78	98	99	99	99	99	98	100	100	100	100	NA	100	NA
Sieve No. 010 (2.00 mm)	98	93	100	99	75	97	98	99	99	97	93	100	100	100	100	NA	100	NA
Sieve No. 020 (850 um)	97	91	100	98	73	96	96	99	98	95	89	99	99	100	99	NA	100	NA
Sieve No. 040 (425 um)	92	87	99	94	67	90	94	94	96	91	84	98	97	99	95	NA	98	NA
Sieve No. 060 (250 um)	70	73	99	77	55	73	84	79	76	66	67	81	78	84	72	NA	79	NA
Sieve No. 100 (150 um)	47	51	98	56	39	54	46	55	30	44	47	52	49	57	36	NA	50	NA
Sieve No. 200 (75 um)	35	39	94	43	30	41	25	42	12	34	38	39	38	45	22	NA	33	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/26/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks

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

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

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

P - Estimate (unvalidated data)

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct/p - Percent Passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, South									Site 4, East		
Station ID	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
Sample ID	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109	CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,1,1-Trichloroethane	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ	6 UJ	6 UJ	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	7 UJ	6 UJ	6 UJ	6 UJ	NA	NA	NA	NA
1,1,2-Trichloroethane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,1-Dichloroethane	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ	6 UJ	6 UJ	NA	NA	NA	NA
1,1-Dichloroethene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2,4-Trichlorobenzene	480 U	11,000 UJ	17,000 UJ	4,300 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2-Dichlorobenzene	480 U	11,000 UJ	17,000 UJ	4,300 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2-Dichloroethane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,2-Dichloroethene (total)	13.7 U	14.2 U	20.4 U	13.0 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,3-Dichlorobenzene	480 U	11,000 UJ	17,000 UJ	4,300 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
1,4-Dichlorobenzene	480 U	11,000 UJ	17,000 UJ	4,300 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
2-Butanone	8 J	14.2 U	20.4 U	13.0 U	28 UJ	27 UJ	27 UJ	27 UJ	NA	NA	NA	NA
2-Hexanone	13.7 U	14.2 U	20.4 U	13.0 U	28 UJ	27 UJ	27 UJ	27 UJ	NA	NA	NA	NA
4-Methyl-2-pentanone	13.7 U	14.2 U	20.4 U	13.0 U	28 UJ	27 UJ	27 UJ	27 UJ	NA	NA	NA	NA
Acetone	43 B	14.2 U	20.4 U	13.0 U	74 B	46 B	76 B	120 J	NA	NA	NA	NA
Benzene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Bromodichloromethane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Bromoform	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Bromomethane	13.7 U	14.2 U	20.4 U	13.0 U	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
Carbon disulfide	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Carbon tetrachloride	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Chlorobenzene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Chloroethane	13.7 U	14.2 U	20.4 U	13.0 U	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
Chloroform	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ	6 UJ	1 J	NA	NA	NA	NA
Chloromethane	13.7 U	14.2 U	20.4 U	13.0 U	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	7 UJ	6 UJ	6 UJ	6 UJ	NA	NA	NA	NA
cis-1,3-Dichloropropene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Dibromochloromethane	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
Ethylbenzene	2 J	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	12 UJ	12 UJ	12 UJ	12 UJ	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	10 UJ	10 UJ	10 UJ	10 UJ	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Methylene chloride	7 B	17 B	13 B	12 B	28 UJ	27 UJ	27 UJ	12 J	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	10 UJ	10 UJ	10 UJ	10 UJ	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Styrene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Tetrachloroethene	13.7 U	3 J	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	5 UJ	NA	NA	NA	NA
Toluene	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ	5 UJ	2 J	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	8 UJ	8 UJ	7 UJ	8 UJ	NA	NA	NA	NA
trans-1,3-Dichloropropene	13.7 U	14.2 U	20.4 U	13.0 U	8 UJ	8 UJ	7 UJ	8 UJ	NA	NA	NA	NA
Trichloroethene	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ	6 UJ	6 UJ	NA	NA	NA	NA
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
Vinyl chloride	13.7 U	14.2 U	20.4 U	13.0 U	11 UJ	11 UJ	11 UJ	11 UJ	NA	NA	NA	NA
Xylene, total	13.7 U	14.2 U	20.4 U	13.0 U	17 UJ	16 UJ	16 UJ	16 UJ	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)												
1,1-Biphenyl	NA	NA	NA	NA	370 U	330 U	390 U	350 U	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	480 U	420 U	490 U	440 U	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 UJ	350 U	NA	NA	NA	NA
2,4,5-Trichlorophenol	1,200 U	29,000 UJ	42,000 UJ	11,000 U	930 U	830 U	960 U	870 U	NA	NA	NA	NA
2,4,6-Trichlorophenol	480 U	11,000 UJ	17,000 UJ	4,300 U	540 U	490 U	560 U	510 U	NA	NA	NA	NA
2,4-Dichlorophenol	480 U	11,000 UJ	17,000 UJ	4,300 U	510 U	460 U	530 U	480 U	NA	NA	NA	NA
2,4-Dimethylphenol	480 U	11,000 UJ	17,000 UJ	4,300 U	560 U	510 U	580 U	530 U	NA	NA	NA	NA
2,4-Dinitrophenol	1,200 U	29,000 UJ	42,000 UJ	11,000 U	1,300 U	1,200 U	1,300 U	1,200 U	NA	NA	NA	NA
2,4-Dinitrotoluene	480 U	450 U	450 U	450 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
2,6-Dinitrotoluene	480 U	450 U	450 U	450 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
2-Chloronaphthalene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
2-Chlorophenol	480 U	11,000 UJ	17,000 UJ	4,300 U	560 U	510 U	580 U	530 U	NA	NA	NA	NA
2-Methylnaphthalene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
2-Methylphenol	480 U	11,000 UJ	17,000 UJ	4,300 U	680 U	610 U	700 U	640 U	NA	NA	NA	NA
2-Nitroaniline	1,200 U	29,000 UJ	42,000 UJ	11,000 U	930 U	830 U	960 U	870 U	NA	NA	NA	NA
2-Nitrophenol	480 U	11,000 UJ	17,000 UJ	4,300 U	580 U	520 U	600 U	540 U	NA	NA	NA	NA
3- and 4-Methylphenol	NA	NA	NA	NA	640 U	580 U	670 U	600 U	NA	NA	NA	NA
3,3'-Dichlorobenzidine	480 U	11,000 UJ	17,000 UJ	4,300 U	400 U	350 U	410 U	370 U	NA	NA	NA	NA
3-Nitroaniline	1,200 U	29,000 UJ	42,000 UJ	11,000 U	930 U	830 U	960 U	870 U	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	1,200 U	29,000 UJ	42,000 UJ	11,000 U	1,200 U	1,100 U	1,300 U	1,200 U	NA	NA	NA	NA
4-Bromophenyl-phenylether	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
4-Chloro-3-methylphenol	480 U	11,000 UJ	17,000 UJ	4,300 U	560 U	510 U	580 U	530 U	NA	NA	NA	NA
4-Chloroaniline	480 U	11,000 UJ	17,000 UJ	4,300 U	410 U	360 U	420 U	380 U	NA	NA	NA	NA
4-Chlorophenyl-phenylether	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
4-Methylphenol	480 U	11,000 UJ	17,000 UJ	4,300 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,200 U	29,000 UJ	42,000 UJ	11,000 U	930 U	830 U	960 U	870 U	NA	NA	NA	NA
4-Nitrophenol	1,200 U	29,000 UJ	42,000 UJ	11,000 U	1,000 U	940 U	1,100 U	990 U	NA	NA	NA	NA
Acenaphthene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 4, South									Site 4, East		
Station ID	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
Sample ID	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109	CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Chemical Name												
Acenaphthylene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Acetophenone	NA	NA	NA	NA	610 U	550 U	630 U	570 U	NA	NA	NA	NA
Anthracene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Atrazine	NA	NA	NA	NA	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	410 UJ	360 UJ	420 U	380 U	NA	NA	NA	NA
Benzo(a)anthracene	77 J	11,000 UJ	17,000 UJ	4,300 U	8.5 J	7.3 J	6.2 J	21 U	NA	2.7 J	12 U	13 U
Benzo(a)pyrene	110 J	11,000 UJ	17,000 UJ	550 J	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Benzo(b)fluoranthene	130 J	11,000 UJ	17,000 UJ	510 J	23 U	20 U	23 U	21 U	NA	12 U	9.9 B	9.8 B
Benzo(g,h,i)perylene	79 J	11,000 UJ	17,000 UJ	4,300 U	23 UL	20 UL	23 UL	21 UL	NA	12 U	2.4 J	13 U
Benzo(k)fluoranthene	64 J	11,000 UJ	17,000 UJ	490 J	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
bis(2-Chloroethoxy)methane	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
bis(2-Chloroethyl)ether	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	670 B	63,000 J	2,600 B	4,300 U	110 U	100 U	120 U	110 U	NA	NA	NA	NA
Butylbenzylphthalate	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	500 U	450 U	520 R	470 R	NA	NA	NA	NA
Carbazole	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
Chrysene	130 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	2.2 J	13 U
Dibenz(a,h)anthracene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	8.1 J	13 U
Dibenzofuran	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Diethylphthalate	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Dimethyl phthalate	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Di-n-butylphthalate	66 B	5,700 B	90,000 J	4,300 U	110 U	100 U	120 U	110 U	NA	NA	NA	NA
Di-n-octylphthalate	480 U	11,000 UJ	17,000 UJ	4,300 U	720 U	650 U	750 U	680 U	NA	NA	NA	NA
Fluoranthene	160 J	11,000 UJ	17,000 UJ	880 J	23 U	20 U	23 U	21 U	NA	4.7 J	3.8 J	2.7 J
Fluorene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
Hexachlorobenzene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
Hexachlorobutadiene	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Hexachlorocyclopentadiene	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Hexachloroethane	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	66 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	7.3 J	4.1 J	3.7 J
Isophorone	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Naphthalene	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	12 U	12 U	13 U
n-Nitroso-di-n-propylamine	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
n-Nitrosodiphenylamine	480 U	11,000 UJ	17,000 UJ	4,300 U	750 U	670 U	770 U	700 U	NA	NA	NA	NA
Nitrobenzene	480 U	450 U	450 U	450 U	370 U	330 U	390 U	350 U	NA	NA	NA	NA
Pentachlorophenol	1,200 U	29,000 UJ	42,000 UJ	11,000 U	110 U	100 U	120 U	110 U	NA	NA	NA	NA
Phenanthrene	100 J	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U	23 U	21 U	NA	3.2 J	2.7 J	13 U
Phenol	480 U	11,000 UJ	17,000 UJ	4,300 U	530 U	480 U	550 U	500 U	NA	NA	NA	NA
Pyrene	210 J	11,000 UJ	17,000 UJ	930 J	23 U	20 U	23 U	21 U	NA	3.8 J	3.6 J	13 U
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	4.5 L	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
4,4'-DDE	5.3 P	4.6 U	24 J	10 J	3.6 UJ	3.3 U	3.8 UL	3.3 UJ	NA	NA	NA	NA
4,4'-DDT	5.8 P	4.6 U	13 J	150 L	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Aldrin	2.5 UL	2.4 U	3.4 U	27 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
alpha-BHC	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
alpha-Chlordane	2.5 UL	2.4 U	3.4 U	2.4 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Aroclor-1016	48 UL	46 U	67 U	43 U	20 U	18 U	21 U	18 U	NA	9.3 U	9.8 U	11 U
Aroclor-1221	97 UL	93 U	140 U	87 U	46 U	42 U	49 U	42 U	NA	9.3 U	9.8 U	11 U
Aroclor-1232	48 UL	46 U	67 U	43 U	31 U	28 U	32 U	28 U	NA	11 U	12 U	12 U
Aroclor-1242	48 UL	46 U	67 U	2,300 L	20 U	18 U	21 U	18 U	NA	9.3 U	9.8 U	11 U
Aroclor-1248	48 UL	46 U	67 U	43 U	21 U	19 U	22 U	19 U	NA	9.3 U	9.8 U	11 U
Aroclor-1254	48 UL	46 U	67 U	43 U	19 U	17 U	20 U	17 U	NA	9.3 U	9.8 U	11 U
Aroclor-1260	48 UL	51 K	330 J	1,600 L	20 U	18 U	21 U	18 U	NA	9.3 U	9.8 U	11 U
beta-BHC	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
delta-BHC	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Dieldrin	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan I	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Endosulfan II	4.8 UL	6.5 K	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan sulfate	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin aldehyde	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin ketone	4.8 UL	4.6 U	8.9 J	19 J	3.6 UJ	3.3 U	3.8 U	3.3 UJ	NA	NA	NA	NA
gamma-BHC (Lindane)	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
gamma-Chlordane	2.5 UL	2.4 U	3.4 U	4.3 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Heptachlor	2.5 UL	2.4 U	3.4 U	9.9 J	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Heptachlor epoxide	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U	2 U	1.7 UJ	NA	NA	NA	NA
Methoxychlor	25 UL	24 U	34 U	25 J	19 UJ	17 U	20 U	17 UJ	NA	NA	NA	NA
Toxaphene	250 UL	240 U	340 U	220 U	36 UJ	33 U	38 U	33 UJ	NA	NA	NA	NA
Explosives (µg/kg)												
1,3,5-Trinitrobenzene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
HMX	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
RDX	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	500 U	450 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-2

Raw Subsurface Soil Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Site 4, South									Site 4, East		
Station ID	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
Sample ID	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109	CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
Sample Date	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Chemical Name												
Total Metals (mg/kg)												
Aluminum	3,670 L	9,660 L	7,520 L	5,850 L	29,400	5,310	22,800	6,400	NA	25,100	25,800	31,900
Antimony	0.53 U	0.53 U	0.69 U	1.1 B	0.15 L	0.04 L	0.12 L	0.05 L	NA	0.85 U	0.62 U	0.94 UL
Arsenic	1.8 L	2.9 L	3.9 L	3.7 L	6.9	0.62	4.8	0.89	NA	8.8	8.9	8.4
Barium	20.2 J	48 J	247	30.6 J	42.8	28.6	32 J	25.8 J	NA	26.1	26.8	32.8
Beryllium	0.31 B	0.39 B	0.4 B	0.55 B	0.49 J	0.35 J	0.48	0.53	NA	0.47	0.48	0.5
Cadmium	0.08 U	0.08 U	0.96 J	1.2 J	2.2 U	0.73 U	0.94 U	0.86 U	NA	0.51 U	0.37 U	0.56 U
Calcium	478 J	4,060	5,970	3,240	744	300	278 J	183 J	NA	216 J	346 J	136
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	0.43 J	NA	NA	NA
Chromium	6.9	15.9	13.4	17.4	39.6 K	6.1 K	32	7.3	25.8	38.8	38.7	41.3 K
Cobalt	1.6 J	4.3 J	3.8 J	2.8 J	3.9	1.8	3.4	2.6	NA	3	2.9	4
Copper	4.4 B	40.4	30	30.1	2.9 K	2.8 K	2.7	2 B	NA	3.6 J	3.6	1.9 B
Cyanide	0.03 UL	0.03 UL	0.44 L	0.03 UL	0.84 U	0.77 U	0.77 U	0.77 U	NA	NA	NA	NA
Iron	4,960 L	19,300 L	12,100 L	12,700 L	31,600	3,830	20,900 J	4,300 J	NA	28,900	26,800	27,800
Lead	11.3	45.3	42.3	36.2	11 K	4.4 K	9.7	5.1	NA	12	12.1	11 B
Magnesium	327 J	499 J	812 J	1,310 J	1,600 K	400 K	1,230 J	478 J	NA	1,540	1,540	1,690 K
Manganese	28.3	120	105	40.4	32.7 K	72.8 K	28 J	47.2 J	NA	31.9	30.8	35.6 L
Mercury	0.1 J	0.91	0.9	0.44	0.05	0.03 U	0.04	0.01 J	NA	0.03 J	0.03 J	0.04 L
Nickel	3.5 B	17.3	13.6	7.7 B	8 J	2.8 J	6.7	3.6	NA	6.8	7.1	8.5
Potassium	249 B	566 J	531 J	1,700	1,050 K	305 K	944 K	319 K	NA	1,380	1,470	1,530 K
Selenium	0.78 J	0.72 U	0.94 U	0.79 U	0.51 J	0.2 J	0.45 J	0.3 J	NA	0.43 J	0.42 J	0.6 B
Silver	1.6 B	5.8 B	3.9 B	3.7 B	3.2 U	1.1 U	1.4 U	1.3 U	NA	0.64 J	0.4 J	0.5 B
Sodium	11.6 B	37.4 B	57.1 B	48.7 B	54.8 K	21.1 K	31.4 K	15.8 K	NA	37.9 B	38.5 B	53 B
Thallium	0.58 UL	0.58 UL	0.75 UL	0.63 UL	0.33	0.07 B	0.23 B	0.08 B	NA	0.85 U	0.19 B	0.94 U
Vanadium	10.1 B	12.2	17.1	20.5	57.7	7.8	53.7	8.4	NA	58.7	58	64
Zinc	28.6 B	334	373	150	28.2 K	7.8 K	22.6	11.5	NA	24.5	24.4	27.1
Wet Chemistry												
pH (ph)	NA	NA	NA	NA	5	5.8	4.7	5	NA	3.9	NA	4
Total organic carbon (TOC) (ug/g)	NA	NA	NA	NA	4,800	3,400	6,100	5,400	NA	NA	NA	NA
Grain Size (pct/p)												
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS09 Sieve 0.5" (12.5 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	100	100	100	100	NA	NA	NA	NA
Sieve No. 020 (850 um)	NA	NA	NA	NA	99	99	100	99	NA	NA	NA	NA
Sieve No. 040 (425 um)	NA	NA	NA	NA	95	95	97	95	NA	NA	NA	NA
Sieve No. 060 (250 um)	NA	NA	NA	NA	77	66	83	73	NA	NA	NA	NA
Sieve No. 100 (150 um)	NA	NA	NA	NA	56	36	62	41	NA	NA	NA	NA
Sieve No. 200 (75 um)	NA	NA	NA	NA	45	27	53	27	NA	NA	NA	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Rep

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks

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

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

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

P - Estimate (unvalidated data)

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

pct/p - Percent Passing

ph - pH units

µg/g - Micrograms per gram

µg/kg - Micrograms per kilogram

TABLE I-3

Raw Groundwater Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

Station ID	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID	CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date	11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chemical Name															
Volatile Organic Compounds (µg/l)															
1,1,1-Trichloroethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.5 UJ	0.5 UJ	0.5 UL	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	1 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	1 U	1 U	2 J	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	6 U	6 U	6 UJ	6 U	6 U	6 U	6 U	6 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	3 B	4 B	3 B	7 U	3 B	3 B	3 B	7 U	2.5 U	2.5 U	2.5 U	2.5 U	2.6 J	2.5 U	2.5 U
Benzene	1 U	1 U	1 UJ	1 U	14	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	0.7 B	1 U	1 UJ	1 U	1 U	2 B	2 B	2 B	0.5 U	0.5 U	0.5 U	0.86 J	0.54 J	0.46 J	0.29 J
Carbon tetrachloride	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
cis-1,2-Dichloroethene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	1 U	1 U	1 UJ	1 U	12	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 UJ	0.2 J	10	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	1 U	1 U	1 UJ	1 U	4	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	2 U	2 U	2 UJ	1 J	20	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl acetate	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.75 U	0.75 U	0.75 UL	0.75 U	0.75 U	0.75 U	0.75 U
Methylcyclohexane	1 U	1 U	1 UJ	1 U	11	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl-tert-butyl ether (MTBE)	3	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	1 U	1 U	1 UJ	0.4 J	5	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	1 U	1 U	1 UJ	1 U	0.5 J	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	3 U	3 U	3 UJ	3 U	3 U	3 U	3 U	3 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	1 U	1 U	1 UJ	1 U	2	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	0.4 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 UJ	2 J	25	3 U	3 U	3 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (µg/l)															
1,1-Biphenyl	10 U	9 U	12 U	9 U	8 J	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	10 U	9 U	12 U	9 U	12 U	10 R	10 R	9 R	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	25 U	24 U	30 U	24 U	29 U	26 U	24 UL	24 U	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	10 U	9 U	12 U	9 U	12 U	10 U	10 R	9 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	10 U	9 U	12 U	9 U	12 U	10 U	10 UL	9 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	14 U	13 U	17 U	13 U	29	15 U	14 U	13 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	25 U	24 U	30 U	24 U	29 U	26 U	24 R	24 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	0.2 U	0.24 U	0.3 U	0.71 U	0.29 U	0.21 U	0.2 U	0.19 U	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	10 U	9 U	12 U	9 U	12 U	10 U	10 UL	9 U	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	0.2 U	1.5	0.3 U	3.3	32	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U

TABLE I-3

Raw Groundwater Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

Station ID	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID	CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date	11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chemical Name															
2-Methylphenol	12 U	11 U	14 U	11 U	14 U	13 U	12 U	11 U	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	25 U	24 U	30 U	24 U	29 U	26 U	24 U	24 U	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	10 U	9 U	12 U	9 U	12 U	10 U	10 UL	9 U	NA	NA	NA	NA	NA	NA	NA
3- and 4-Methylphenol	17 U	16 U	20 U	16 U	12 J	18 U	16 U	16 U	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	25 U	24 U	30 U	24 U	29 U	26 U	24 U	24 U	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	25 U	24 U	30 U	24 U	29 U	26 U	24 R	24 U	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	11 U	10 U	13 U	10 U	13 U	12 U	11 U	10 U	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	25 U	24 U	30 U	24 U	29 U	26 U	24 U	24 U	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	25 U	24 U	30 U	24 U	29 U	26 U	24 R	24 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.2 U	0.54	0.24 U	1.4	8.9 J	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Acenaphthylene	0.2 U	0.3	0.24 U	0.26 J	4.8	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Acetophenone	12 U	11 U	14 U	11 U	14 U	13 U	12 U	11 U	NA	NA	NA	NA	NA	NA	NA
Anthracene	0.2 U	0.26	0.24 U	1	6.7	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Atrazine	10 UJ	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	10 UJ	9 UJ	12 UJ	9 U	2 J	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.2 U	0.29	0.24 U	1.3	2.9	0.21 U	0.2 U	0.19 U	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ	0.094 UJ
Benzo(a)pyrene	0.2 U	0.17 J	0.1 J	1.7	2	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Benzo(b)fluoranthene	0.2 U	0.15 J	0.36 U	2.2	2.7	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Benzo(g,h,i)perylene	0.2 U	0.083 J	0.24 U	0.49 J	1.2	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Benzo(k)fluoranthene	0.2 U	0.19 U	0.24 U	0.92	0.94	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
bis(2-Chloroethoxy)methane	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	1 U	1.9 U	2.4 U	5.7 U	2.3 U	1 UL	0.99 UL	0.94 UL	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Caprolactam	10 UL	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Carbazole	0.2 U	4.3	0.71 U	8.6 J	0.7 U	0.21 U	0.2 U	0.19 U	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.2 U	0.19 U	0.24 U	0.58 B	2.1	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Dibenz(a,h)anthracene	0.2 U	0.24 U	0.3 U	0.21 J	0.26 J	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Dibenzofuran	10 U	9 U	12 U	3 J	19	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	1 U	2.4 U	3 U	7.1 U	2.9 U	1 U	0.99 U	0.94 U	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.2 U	0.52	0.3 U	1.8	8.6 J	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Fluorene	0.2 U	0.98	0.24 U	3.2	21 J	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U	0.094 U
Hexachlorobenzene	0.2 U	0.19 U	0.24 U	0.57 U	0.23 U	0.21 U	0.2 U	0.19 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	0.2 U	0.24 U	0.3 U	0.71 U	0.29 U	0.21 U	0.2 U	0.19 U	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.2 U	0.24 B	0.29 B	0.89 B	1.2 J	0.21 UL	0.2 UL	0.19 UL	0.22 B	0.21 B	0.21 B	0.094 UJ	0.2 B	0.2 B	0.094 UJ
Isophorone	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Naphthalene	0.2 U	11	0.24 U	13	560	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 U	0.094 U	0.063 J	0.094 U	0.094 U
n-Nitroso-di-n-propylamine	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	12 U	11 U	14 U	11 U	14 U	13 U	12 U	11 U	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	10 U	9 U	12 U	9 U	12 U	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	1 UL	0.94 U	1.2 U	2.8 U	1.2 U	1 U	0.99 U	0.94 U	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.2 U	1.6	0.24 U	3.1	36	0.21 U	0.2 U	0.19 U	0.094 U	0.094 U	0.094 UL	0.094 U	0.094 U	0.094 U	0.094 U
Phenol	10 U	9 U	12 U	9 U	5 J	10 U	10 U	9 U	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.2 U	0.42	0.24 U	1.5	6.3	0.21 U	0.2 U	0.19 U	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL	0.094 UL
Pesticide/Polychlorinated Biphenyls (µg/l)															
4,4'-DDD	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	0.1 U	0.11 UJ	0.11 U	0.013 J	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Aldrin	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	0.5 U	0.56 U	0.54 U	0.49 U	0.6 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.7 U	0.79 U	0.76 U	0.69 U	0.83 U	0.71 U	0.7 U	0.7 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.5 U	0.56 U	0.54 U	0.49 U	0.6 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.6 U	0.67 U	0.65 U	0.59 U	0.71 U	0.61 U	0.6 U	0.6 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.7 U	0.79 U	0.76 U	0.69 U	0.83 U	0.71 U	0.7 U	0.7 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.5 U	0.56 U	0.54 U	0.49 U	0.6 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA

TABLE I-3

Raw Groundwater Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

Station ID	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID	CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date	11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chemical Name															
Aroclor-1260	0.6 U	0.67 U	0.65 U	0.59 U	0.71 U	0.61 U	0.6 U	0.6 U	NA	NA	NA	NA	NA	NA	NA
beta-BHC	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
delta-BHC	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Dieldrin	0.1 U	0.11 UJ	0.11 U	0.017 J	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Endrin	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	0.1 U	0.11 UJ	0.11 U	0.098 U	0.12 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	0.05 U	0.056 UJ	0.054 U	0.049 U	0.06 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	0.5 U	0.56 UJ	0.54 U	0.49 U	0.6 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA
Toxaphene	1 U	1.1 UJ	1.1 U	0.98 U	1.2 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)															
Aluminum	2,240	13,300	23,300	357	1,450	78.6 B	2,700	206 J	85.7 J	80.6 J	60.1 J	51.6 J	198 J	498	80.6 J
Antimony	0.54 J	0.67 J	0.58 J	0.35 J	0.54 J	0.17 J	0.4 J	0.37 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	5.5	8	53.8	16.8	4.8 J	5 U	7.4	1.8 J	2.8 B	2.8 B	4.1 B	8.3 B	6.6 B	4.4 J	5 U
Barium	26	114	107	139	302	18.6	25.7	12.1	22.5	23.1	16.7	24.5	25.3	33.9	32.3
Beryllium	0.17 J	0.71 J	1.4	1 U	0.11 J	1 U	0.16 J	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.31 J	0.26 J	0.23 J	1 U	0.09 J	1 U	0.29 J	0.07 J	0.1 B	3 U	0.06 B	0.06 B	3 U	0.54 B	0.29 B
Calcium	149,000	97,300	86,600	140,000	114,000	126,000	129,000	83,200	155,000	158,000	126,000	106,000	145,000	150,000	138,000
Chromium	10.5 J	23.9	44.5	2.8 J	5 J	0.77 J	9.8 J	1.2 J	1 J	1.2 J	0.98 J	0.72 J	1.8 J	3.1 J	0.9 J
Cobalt	2.2 J	4.1 J	5.1 J	30 U	0.91 J	0.58 J	1.3 J	30 U	0.29 J	0.29 J	4 U	4 U	4 U	0.27 J	4 U
Copper	13.8 J	10.7 J	10.7 J	25 U	2 J	25 U	1.4 B	25 U	3 J	2.4 J	1.1 J	1.4 J	2.2 J	2.4 J	2.2 J
Cyanide	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	NA	NA	NA	NA	NA	NA	NA
Iron	4,660	28,800	31,900	19,900	39,400	387	5,010	296	53 B	65.3 B	492 J	996	2,300	1,560	60.6 B
Lead	2.5 J	18.6	15.1	1.6 J	5 J	5 U	3 J	5 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	3,570	19,600	5,270	6,580	10,200	2,070	2,360	946	3,180 J	3,390	1,300 J	1,220	3,630	2,760	2,490
Manganese	50.7	642	290	210	380	179	48	26.9	374	390	27 J	43.5	419	93.1	104
Mercury	0.2 U	0.73	0.03 J	0.2 U	2.3	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	8 J	11.1 J	12.8 J	1.9 J	3.8 J	1.7 J	3.5 J	0.69 J	0.38 J	0.7 J	4 U	0.29 J	0.42 J	0.97 J	0.68 J
Potassium	2,010	17,100	4,640	2,290	6,990	993 J	1,220	424 J	846 J	896 J	783 J	1,280	1,580	889 J	3,270
Selenium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3.1 J	7 U	7 U	7 U	7 U	7 U	7 U
Silver	15 U	0.85 J	0.84 J	15 U	2.2 J	15 U	15 U	15 U	4 U	0.37 B	4 U	4 U	4 U	4 U	4 U
Sodium	14,400	35,800	7,070	9,790	19,800	8,890	7,520	2,310	9,760	9,980	30,600	2,220	8,030	6,980	4,770
Thallium	0.2 B	0.81 B	1.1 B	0.45 B	0.36 B	2 U	0.32 B	0.11 B	5 U	5 U	5 U	5 U	1.1 J	5 U	5 U
Vanadium	11.8 J	24.8 J	55.2	25 U	25 U	25 U	11.1 J	25 U	1.5 J	1.7 J	0.84 J	0.36 J	1.2 J	2.6 J	1.2 J
Zinc	13.2 J	55.7	39.1	10.5 J	50.4	25 U	9 J	4 J	0.85 B	0.9 B	10 UJ	0.83 B	14.8 B	3.8 B	0.92 B
Dissolved Metals (µg/l)															
Aluminum, Dissolved	76.9 B	14.6 B	300 U	300 U	300 U	44.4 B	395	64.4 B	58.1 J	53.2 J	61.7 J	40.6 J	45.3 J	68.6 J	74.2 J
Antimony, Dissolved	0.15 J	0.17 J	0.16 J	0.23 J	0.19 J	0.18 J	0.22 J	0.26 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic, Dissolved	5 U	3.4 J	45.4	11.9	2.5 J	1.6 J	1.8 J	1.9 J	3.1 B	5 UJ	4.3 B	8.5 B	6.1 B	5 J	1.7 J
Barium, Dissolved	19.5	56.5	32.4	112	258	19.4	19.4	11.6	22.7	22.5	17.7	24.2	22.3	28.8	31
Beryllium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium, Dissolved	0.06 J	1 U	0.07 J	1 U	0.07 J	1 U	0.11 J	1 U	3 U	0.06 B	3 U	3 U	3 U	0.2 B	0.28 B
Calcium, Dissolved	139,000	92,800	89,500	135,000	111,000	131,000	126,000	80,700	160,000	155,000	136,000	105,000	126,000	132,000	132,000
Chromium, Dissolved	0.99 J	0.5 J	0.53 J	1.3 J	0.65 J	15 U	1.6 J	15 U	1 J	1 J	0.95 J	0.75 J	0.84 J	0.79 J	0.83 J
Cobalt, Dissolved	1.1 J	30 U	30 U	30 U	0.45 J	0.7 J	0.56 J	30 U	0.34 J	0.39 J	4 U	4 U	4 U	4 U	4 U
Copper, Dissolved	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	3.5 B	2.4 B	2.2 K	1.9 B	1.9 B	2.6 B	2.8 B
Iron, Dissolved	95.5 J	15,400	6,780	14,500	28,600	299	840	38.8 B	26.8 B	25.6 B	582 J	923	1,870	576	18.7 B
Lead, Dissolved	5 U	5 U	1.5 J	5 U	5 U	5 U	5 U	1 J	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium, Dissolved	3,020	16,500	2,860	5,420	9,500	2,160	1,950	905	3,600 J	3,390	1,480 J	1,260	3,320	2,530	2,480
Manganese, Dissolved	36.8	520	258	163	377	184	41.8	24.7	379	395	36.2 J	46.7	360	80.3	99
Mercury, Dissolved	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel, Dissolved	4.6 J	0.69 B	1.2 B	1.2 B	1.8 J	2 J	1 J	0.29 J	0.87 J	0.77 J	4 U	4 U	4 U	4 U	0.72 J
Potassium, Dissolved	1,360	15,000	1,800	1,970	6,550	1,080	776 J	380 J	903 J	891 J	878 J	1,280	1,450	669 J	3,170
Selenium, Dissolved	10 U	10 U	10 U	10 U	10 U	4.3 B	10 U	10 U	3.4 J	3 J	7 U	7 U	7 U	7 U	2.8 J
Silver, Dissolved	15 U	0.84 J	15 U	15 U	0.97 J	15 U	15 U	15 U	4 U	0.35 B	4 U	4 U	0.3 B	4 U	4 U
Sodium, Dissolved	14,300	35,500	7,340	9,150	19,500	9,230	7,450	2,280	10,000	9,810	29,800	2,260	7,080	6,190	4,760
Thallium, Dissolved	0.11 B	0.44 B	0.62 B	0.91 B	0.23 B	2 U	0.13 B	2 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vanadium, Dissolved	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	1.6 J	1.7 J	0.8 J	0.43 J	0.69 J	0.81 J	0.88 J
Zinc, Dissolved	25 U	25 U	2.8 B	25 U	2.5 B	4.2 J	3.5 J	2.2 J	2.2 B	0.76 B	0.94 B	1.4 B	0.94 B	1.9 B	9.1 B

TABLE I-3

Raw Groundwater Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

Station ID	CAA03-GW01	CAA03-GW02	CAA03-GW03	CAA03-GW04	CAA03-GW05	CAS04-GW01	CAS04-GW02	CAS04-GW03	CAS04-GW05		CAS04-GW06	CAS04-GW07	CAS04-GW08	CAS04-GW09	CAS04-GW10
Sample ID	CAA03-GW01-1109	CAA03-GW02-1109	CAA03-GW03-1109	CAA03-GW04-1109	CAA03-GW05-1109	CAS04-GW01-1009	CAS04-GW02-1009	CAS04-GW03-1009	CAS04-GW05-1212	CAS04-GW05P-1212	CAS04-GW06-1212	CAS04-GW07-1212	CAS04-GW08-1212	CAS04-GW09-1212	CAS04-GW10-1212
Sample Date	11/02/09	11/05/09	11/05/09	11/05/09	11/05/09	10/30/09	10/30/09	10/30/09	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12	12/13/12
Chemical Name															
Wet Chemistry (mg/l)															
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	370	NA	260	250	340	350	340
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	0.5	NA	0.044 J	0.026 J	0.025 U	0.025 U	0.069
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	0.033 J	NA	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	14	NA	8.2	4.5	0.34 J	11	8.6
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	0.8 U	NA	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Wet Chemistry (µg/l)															
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	2 U	2 U	2 U	2 U	2 U
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	2 U	2 U	2 U	2 U	2 U
Methane	NA	NA	NA	NA	NA	NA	NA	NA	3.9 J	NA	0.91 J	18	6,000	7.4 J	5 J

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/25/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks

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

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

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond												
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01		CAS04-SD02	CAS04-SD03
Sample ID	CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A	CAS04-SD02-1209A	CAS04-SD03-1209A
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09
Chemical Name													
Volatile Organic Compounds (UG/KG)													
1,1,1-Trichloroethane	10 UJ	26 UJ	9 UJ	8 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	6 UJ	8 UJ	10 UJ	9 UJ
1,1,2,2-Tetrachloroethane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10 UJ	26 UJ	9 UJ	8 UJ	NA	NA	NA	NA	NA	6 UJ	8 UJ	10 UJ	9 UJ
1,1,2-Trichloroethane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
1,1-Dichloroethane	10 UJ	26 UJ	9 UJ	8 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	6 UJ	8 UJ	10 UJ	9 UJ
1,1-Dichloroethene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	8 UJ	21 UJ	7 UJ	7 UJ	550 U	1,200 U	530 U	1,200 U	1,600 U	5 UJ	6 UJ	8 UJ	7 UJ
1,2-Dibromo-3-chloropropane	8 UJ	21 UJ	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
1,2-Dibromoethane	8 UJ	21 UJ	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
1,2-Dichlorobenzene	8 UJ	21 UJ	7 UJ	7 UJ	550 U	1,200 U	530 U	1,200 U	1,600 U	5 UJ	6 UJ	8 UJ	7 UJ
1,2-Dichloroethane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
1,2-Dichloroethene (total)	NA	NA	NA	NA	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	NA	NA	NA	NA
1,2-Dichloropropane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
1,3-Dichlorobenzene	8 UJ	21 UJ	7 UJ	7 UJ	550 U	1,200 U	530 U	1,200 U	1,600 U	5 UJ	6 UJ	8 UJ	7 UJ
1,4-Dichlorobenzene	8 UJ	21 UJ	7 UJ	7 UJ	550 U	1,200 U	530 U	1,200 U	1,600 U	5 UJ	6 UJ	8 UJ	7 UJ
2-Butanone	40 UJ	39 J	36 UJ	56 J	12 J	15 B	17.5 U	10 B	12 B	26 UJ	31 UJ	42 UJ	37 UJ
2-Hexanone	40 UJ	110 UJ	36 UJ	35 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	26 UJ	31 UJ	42 UJ	37 UJ
4-Methyl-2-pentanone	40 UJ	110 UJ	36 UJ	35 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	26 UJ	31 UJ	42 UJ	37 UJ
Acetone	140 J	270 J	74 J	250 J	37 B	44 B	17 B	23 B	36 B	210 J	33 B	34 B	13 B
Benzene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Bromoform	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Bromomethane	16 UJ	43 UJ	14 UJ	14 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	10 UJ	12 UJ	17 UJ	15 UJ
Carbon disulfide	8 UJ	21 UJ	2 J	3 J	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Carbon tetrachloride	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Chlorobenzene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Chloroethane	16 UJ	43 UJ	14 UJ	14 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	10 UJ	12 UJ	17 UJ	15 UJ
Chloroform	10 UJ	26 UJ	9 UJ	8 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	6 UJ	8 UJ	10 UJ	9 UJ
Chloromethane	16 UJ	43 UJ	14 UJ	14 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	10 UJ	12 UJ	17 UJ	15 UJ
cis-1,2-Dichloroethene	10 UJ	26 UJ	9 UJ	8 UJ	NA	NA	NA	NA	NA	6 UJ	8 UJ	10 UJ	9 UJ
cis-1,3-Dichloropropene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Cyclohexane	8 UJ	21 UJ	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
Dibromochloromethane	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Dichlorodifluoromethane (Freon-12)	16 UJ	43 UJ	14 UJ	14 UJ	NA	NA	NA	NA	NA	10 UJ	12 UJ	17 UJ	15 UJ
Ethylbenzene	8 UJ	21 UJ	7 UJ	7 UJ	2 J	20.5 UL	17.5 U	3 J	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Isopropylbenzene	8 UJ	21 UJ	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
m- and p-Xylene	18 UJ	47 UJ	16 UJ	16 UJ	NA	NA	NA	NA	NA	11 UJ	14 UJ	19 UJ	16 UJ
Methyl acetate	15 UJ	38 UJ	13 UJ	5 J	NA	NA	NA	NA	NA	9 UJ	11 UJ	15 UJ	13 UJ
Methylcyclohexane	8 UJ	4 J	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
Methylene chloride	40 UJ	110 UJ	36 UJ	35 UJ	24 B	18 B	39 B	12 B	15 B	26 UJ	31 UJ	42 UJ	37 UJ
Methyl-tert-butyl ether (MTBE)	15 UJ	38 UJ	13 UJ	13 UJ	NA	NA	NA	NA	NA	9 UJ	11 UJ	15 UJ	13 UJ
o-Xylene	8 UJ	21 UJ	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ
Styrene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
Tetrachloroethene	50 J	49 J	5 J	11 J	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	11 J	8 J	28 J
Toluene	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	3 L	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ
trans-1,2-Dichloroethene	11 UJ	30 UJ	10 UJ	10 UJ	NA	NA	NA	NA	NA	7 UJ	9 UJ	12 UJ	10 UJ
trans-1,3-Dichloropropene	11 UJ	30 UJ	10 UJ	10 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	7 UJ	9 UJ	12 UJ	10 UJ
Trichloroethene	10 UJ	26 UJ	9 UJ	8 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	6 UJ	8 UJ	10 UJ	9 UJ
Trichlorofluoromethane (Freon-11)	16 UJ	43 UJ	14 UJ	14 UJ	NA	NA	NA	NA	NA	10 UJ	12 UJ	17 UJ	15 UJ
Vinyl chloride	16 UJ	43 UJ	14 UJ	14 UJ	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	10 UJ	12 UJ	17 UJ	15 UJ
Xylene, total	24 UJ	64 UJ	22 UJ	21 UJ	15.8 U	20.5 UL	17.5 U	10 J	26.4 U	16 UJ	19 UJ	26 UJ	22 UJ
Semivolatile Organic Compounds (UG/KG)													
1,1-Biphenyl	480 U	1,400 U	480 U	440 U	NA	NA	NA	NA	NA	410 U	400 U	550 U	490 U
1,2,4,5-Tetrachlorobenzene	610 U	1,800 U	610 U	560 U	NA	NA	NA	NA	NA	530 U	510 U	710 U	620 U
2,2'-Oxybis(1-chloropropane)	480 U	1,400 U	480 U	440 U	NA	NA	NA	NA	NA	410 U	400 U	550 U	490 U
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	1,200 U	3,500 U	1,200 U	1,100 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,000 U	1,000 U	1,400 U	1,200 U
2,4,6-Trichlorophenol	690 U	2,000 U	700 U	640 U	550 U	1,200 U	530 U	1,200 U	1,600 U	600 U	580 U	810 U	710 U
2,4-Dichlorophenol	650 U	1,900 U	660 U	600 U	550 U	1,200 U	530 U	1,200 U	1,600 U	560 U	550 U	760 U	670 U
2,4-Dimethylphenol	720 U	2,100 U	730 U	670 U	550 U	1,200 U	530 U	1,200 U	1,600 U	630 U	610 U	840 U	740 U
2,4-Dinitrophenol	1,600 U	4,800 U	1,700 U	1,500 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,400 U	1,400 U	1,900 U	1,700 U
2,4-Dinitrotoluene	480 U	1,400 U	480 U	440 U	480 U	480 U	480 U	480 U	500 U	410 U	400 U	550 U	490 U
2,6-Dinitrotoluene	480 U	1,400 U	480 U	440 U	480 U	480 U	480 U	480 U	500 U	410 U	400 U	550 U	490 U
2-Chloronaphthalene	29 U	84 U	29 U	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	30 U
2-Chlorophenol	720 U	2,100 U	730 U	670 U	550 U	1,200 U	530 U	1,200 U	1,600 U	630 U	610 U	840 U	740 U
2-Methylnaphthalene	29 UL	19 J	29 UL	6.1 L	550 U	1,200 U	530 U	1,200 U	1,600 U	25 UL	24 UL	34 UL	4 L
2-Methylphenol	870 U	2,500 U	880 U	800 U	550 U	1,200 U	530 U	1,200 U	1,600 U	750 U	730 U	1,000 U	890 U

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond												
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01		CAS04-SD02	CAS04-SD03
Sample ID	CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A	CAS04-SD02-1209A	CAS04-SD03-1209A
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09
Chemical Name													
2-Nitroaniline	1,200 U	3,500 U	1,200 U	1,100 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,000 U	1,000 U	1,400 U	1,200 U
2-Nitrophenol	740 U	2,200 U	740 U	680 U	550 U	1,200 U	530 U	1,200 U	1,600 U	640 U	620 U	860 U	760 U
3- and 4-Methylphenol	820 U	2,400 U	830 U	760 U	NA	NA	NA	NA	NA	720 U	690 U	960 U	840 U
3,3'-Dichlorobenzidine	500 U	1,500 U	510 U	470 U	550 U	1,200 U	530 U	1,200 U	1,600 U	440 U	420 U	590 U	520 U
3-Nitroaniline	1,200 U	3,500 U	1,200 U	1,100 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,000 U	1,000 U	1,400 U	1,200 U
4,6-Dinitro-2-methylphenol	1,600 U	4,600 U	1,600 U	1,500 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,400 U	1,300 U	1,800 U	1,600 U
4-Bromophenyl-phenylether	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
4-Chloro-3-methylphenol	720 U	2,100 U	730 U	670 U	550 U	1,200 U	530 U	1,200 U	1,600 U	630 U	610 U	840 U	740 U
4-Chloroaniline	520 U	1,500 U	520 U	480 U	550 U	1,200 U	530 U	1,200 U	1,600 U	450 U	440 U	600 U	530 U
4-Chlorophenyl-phenylether	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
4-Methylphenol	NA	NA	NA	NA	550 U	1,200 U	530 U	1,200 U	1,600 U	NA	NA	NA	NA
4-Nitroaniline	1,200 U	3,500 U	1,200 U	1,100 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,000 U	1,000 U	1,400 U	1,200 U
4-Nitrophenol	1,300 U	3,900 U	1,400 U	1,200 U	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	1,200 U	1,100 U	1,600 U	1,400 U
Acenaphthene	29 U	300	4.9 J	3.2 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	2.9 J	4.3 J
Acenaphthylene	1.8 J	34 J	5 J	2.6 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	2.3 J	120
Acetophenone	780 U	2,300 U	790 U	720 U	NA	NA	NA	NA	NA	680 U	660 U	910 U	800 U
Anthracene	4.6 J	66 J	16 J	4.1 J	550 U	1,200 U	530 U	1,200 U	1,600 U	2.8 J	24 U	5.6 J	260
Atrazine	480 U	1,400 U	480 U	440 U	NA	NA	NA	NA	NA	410 U	400 U	550 U	490 U
Benzaldehyde	520 UJ	1,500 U	520 UJ	480 UJ	NA	NA	NA	NA	NA	450 UJ	440 UJ	600 UJ	530 UJ
Benzo(a)anthracene	33 B	260	110	16 B	140 J	260 J	170 J	290 J	270 J	19 B	9 B	35 B	1,300
Benzo(a)pyrene	31 J	250	120	13 B	160 J	260 J	170 J	330 J	340 J	17 B	9 B	36	2,100
Benzo(b)fluoranthene	62 J	420	280	31 B	220 J	370 J	330 J	450 J	550 J	34 B	16 B	76	3,900
Benzo(g,h,i)perylene	8.3 B	83 J	65 L	27 UL	56 J	130 J	84 J	1,200 U	180 J	25 UL	24 UL	7.1 B	1,900 L
Benzo(k)fluoranthene	19 B	130	82	8.5 B	120 J	290 J	170 J	420 J	440 J	12 B	6.3 B	24 J	1,600
bis(2-Chloroethoxy)methane	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
bis(2-Chloroethyl)ether	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	550 U	1,200 U	530 U	1,200 U	1,600 U	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	140 U	420 U	150 U	130 U	110 J	170 J	160 J	140 J	280 J	120 U	120 U	170 U	120 J
Butylbenzylphthalate	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Caprolactam	640 R	1,900 R	640 R	590 R	NA	NA	NA	NA	NA	550 R	540 R	740 R	650 R
Carbazole	6.7 B	34 J	19 J	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	5 B	24 U	8.6 B	31
Chrysene	30 J	280	150	19 J	190 J	400 J	240 J	460 J	490 J	18 J	9.2 J	35	2,700
Dibenz(a,h)anthracene	6.8 B	110 J	27 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	660
Dibenzofuran	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Diethylphthalate	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Dimethyl phthalate	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Di-n-butylphthalate	140 U	420 U	150 U	130 U	64 J	1,200 U	81 J	1,200 U	1,600 U	120 U	120 U	170 U	72 J
Di-n-octylphthalate	920 U	2,700 U	930 U	850 U	550 U	1,200 U	530 U	1,200 U	1,600 U	800 U	780 U	1,100 U	950 U
Fluoranthene	75	510	260	37	260 J	640 J	410 J	600 J	580 J	42	22 J	72	320
Fluorene	29 U	420	6.1 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	14 B
Hexachlorobenzene	29 U	84 U	29 U	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	30 U
Hexachlorobutadiene	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Hexachlorocyclopentadiene	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Hexachloroethane	29 U	84 U	29 U	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	30 U
Indeno(1,2,3-cd)pyrene	19 B	230	81	27 U	550 U	160 J	95 J	1,200 U	210 J	9.9 B	4.9 B	23 B	2,800
Isophorone	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
Naphthalene	29 U	280	29 U	5.7 J	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	6.6 J
n-Nitroso-di-n-propylamine	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U
n-Nitrosodiphenylamine	950 U	2,800 U	960 U	880 U	550 U	1,200 U	530 U	1,200 U	1,600 U	830 U	800 U	1,100 U	980 U
Nitrobenzene	480 U	1,400 U	480 U	440 U	480 U	480 U	480 U	480 U	500 U	410 U	400 U	550 U	490 U
Pentachlorophenol	140 UL	110 J	150 UL	130 UL	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	120 UL	120 UL	170 UL	150 UL
Phenanthrene	38	420	100	19 J	120 J	330 J	210 J	340 J	330 J	20 J	12 J	39	98
Phenol	680 U	2,000 U	690 U	630 U	550 U	1,200 U	530 U	1,200 U	1,600 U	590 U	570 U	790 U	700 U
Pyrene	57	380	220	36	230 J	570 J	350 J	610 J	590 J	38	20 J	64	1,100
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	3.6 B	97 J	6.6 J	48 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.6 B	4.1 U	5.6 U	380 J
4,4'-DDE	1 B	11 J	2.1 B	12 J	5.5 U	6 UL	5.2 U	9 L	7.8 UL	1.9 B	0.92 J	1.8 J	600 J
4,4'-DDT	4.8 UJ	97 J	6.3 J	8.7 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.7 B	2.1 J	5.6 U	1,600 J
Aldrin	2.5 UJ	7.1 UJ	2.4 UL	0.85 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
alpha-BHC	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
alpha-Chlordane	2.5 UJ	7.1 UJ	2.4 UL	1.7 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	17 J
Aroclor-1016	26 U	75 UL	26 U	25 U	55 U	60 UL	52 U	60 UL	78 UL	25 UJ	22 U	31 U	280 U
Aroclor-1221	61 U	170 UL	60 U	58 U	110 U	120 UL	110 U	120 UL	160 UL	59 UJ	52 U	72 U	660 U
Aroclor-1232	40 U	120 UL	40 U	39 U	55 U	60 UL	52 U	60 UL	78 UL	39 UJ	35 U	48 U	440 U
Aroclor-1242	26 U	75 UL	26 U	25 U	55 U	60 UL	52 U	60 UL	78 UL	25 UJ	22 U	31 U	280 U
Aroclor-1248	27 U	79 UL	27 U	26 U	55 U	60 UL	52 U	19 L	78 UL	27 UJ	24 U	32 U	300 U
Aroclor-1254	24 U	71 UL	24 U	24 U	55 U	60 UL	52 U	60 UL	78 UL	24 UJ	21 U	29 U	21,000
Aroclor-1260	160 J	1,200 L	160	100	270 K	91 L	52 U	240 L	25 JP	30 J	25	200	280 U
beta-BHC	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
delta-BHC	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
Dieldrin	1.7 J	14 UJ	2.4 B	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	1.8 J	1,400 J

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond												
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01		CAS04-SD02	CAS04-SD03
Sample ID	CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A	CAS04-SD02-1209A	CAS04-SD03-1209A
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09
Chemical Name													
Endosulfan I	2.5 UJ	7.1 UJ	2.4 UL	1.6 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	1.7 J	58 L
Endosulfan II	4.8 UJ	110 J	4.7 UL	1.3 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	830 J
Endosulfan sulfate	4.8 UJ	14 UJ	35 J	14 J	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	5.2 UL
Endrin	17 J	14 UJ	4.7 UL	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	9.6	1,200
Endrin aldehyde	3.3 J	14 UJ	4.2 J	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	290 J
Endrin ketone	4.8 UJ	14 UJ	4.7 UL	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	5.2 UL
gamma-BHC (Lindane)	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
gamma-Chlordane	2.5 UJ	11 J	1.1 L	2.1 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2 J	780 J
Heptachlor	2.5 UJ	7.1 UJ	2.4 UL	0.69 J	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL
Heptachlor epoxide	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	540 J
Methoxychlor	25 UJ	71 UJ	24 UL	23 UJ	28 U	31 UL	27 U	31 UL	40 UL	24 UJ	21 U	29 U	520 J
Toxaphene	48 UJ	140 UJ	47 UL	44 UJ	280 U	310 UL	270 U	310 UL	400 UL	46 UJ	41 U	56 U	52 UL
Explosives (UG/KG)													
1,3,5-Trinitrobenzene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
HMX	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
RDX	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
Tetryl	NA	NA	NA	NA	480 U	480 U	480 U	480 U	500 U	NA	NA	NA	NA
Total Metals (MG/KG)													
Aluminum	17,800	15,000	6,490	5,090	8,340 L	6,070 L	5,950 L	4,210 L	4,070 L	5,440	5,150	5,560	20,400
Antimony	0.5 L	2.2 L	0.79 UL	0.86 UL	1.7 B	0.67 U	0.62 U	0.65 U	0.65 U	0.83 UL	0.72 UL	1.3 UL	2 L
Arsenic	17.9 K	43.6 L	6.8 K	7.4 K	12.2 L	4.5	3.2	8.8	7.2	3.5 K	2.7 K	3.5 K	8.6 K
Barium	56	118	21.6	80.1	71.7 J	27.1 J	24.9 J	27.5 J	23.6 J	11.7	9.9	25.3	80.8
Beryllium	0.98	0.87 J	0.4 J	0.3 J	0.73 B	0.56 J	0.6 J	0.36 J	0.22 J	0.25 J	0.22 J	0.28 J	0.78
Cadmium	0.45	2.9	0.6	0.46	5.7	3.2	2.9	0.79 J	0.52 J	0.11	0.07 J	0.39	4.7
Calcium	12,400	15,400	2,060	1,570	25,200	4,550 J	3,380 J	4,310 J	3,400 J	704	601	12,300	9,290
Chromium	43.1 K	29.2 L	12.7 K	8.9 K	35.8	17.9	17.2	9.5	7.7	11.1 K	9.8 K	9.6 K	49.7 K
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	3.6 J	3.2 J	1.8 J	1.3 J	4.6 J	3.9 J	2.9 J	1.8 U	1.8 U	0.97 J	0.83 J	1.2 J	5.1 J
Copper	4.1	85.3 J	26.3	7.6	30.7	62.7 J	65.3 J	33.5 J	21.2 J	3.3	2.6	11.1	142
Cyanide	0.91 U	2.7 U	0.98 U	0.98 U	0.04 UL	0.04 UL	0.03 UL	0.04 UL	0.04 UL	0.91 U	0.84 U	1.3 U	0.98 U
Iron	24,700 J	23,900	9,860 J	6,910 J	15,400	14,300 L	14,100	9,410 L	8,490 L	7,430 J	6,370 J	7,030 J	25,900 J
Lead	13.5	41.8	15.9	230	52.3	24.6	20.3	20.6	16	9.2	6.8	17.2	417
Magnesium	2,500 K	2,690	1,010 K	499 K	2,790	1,730	1,780	1,070 J	912 J	626 K	563 K	652 K	2,010 K
Manganese	37.3 J	119	59.1 J	17.3 J	62	93.4	74.9	72.7	60	14.8 J	14.2 J	43.2 J	140 J
Mercury	0.03 J	0.14	0.02 J	0.02 J	0.07 J	0.04 UL	0.03 UL	0.04 UL	0.04 L	0.02 J	0.02 J	0.05 J	0.62
Nickel	10.7	13.4	4	3.3 J	23.6	7.9 J	7.3 J	5 J	4.5 J	2.2 J	2.1 J	3.5 J	16.6
Potassium	2,170 K	1,100 K	1,210 K	560 K	1,210 J	1,290 J	1,550	352 B	368 B	637 K	598 K	504 K	1,580 K
Selenium	0.43 B	1.4 J	0.36 B	0.24 B	1.1 U	0.91 U	0.84 U	0.89 U	0.88 U	0.44 B	0.36 B	0.67 B	0.57 B
Silver	0.15 J	4.1 U	0.2 J	0.15 J	5.6 B	5.1 B	3.9 B	2.8 B	2 B	0.16 J	0.16 J	0.18 J	6.1
Sodium	65.7 B	235 J	27 B	24.2 B	191 B	118 B	101 B	73.6 B	80.3 B	23.4 B	22.3 B	57.9 B	186 B
Thallium	0.53 J	4.1 U	1.5 U	1.6 U	0.91 UL	0.73 UL	0.67 UL	0.71 UL	0.71 UL	1.6 U	1.3 U	2.5 U	1.7 U
Vanadium	53.8 K	38.1	17.2 K	12.3 K	36.6	21.9	21.1	15.1	13.2 J	14.6 K	12.8 K	14.7 K	37.6 K
Zinc	29.6 K	207	89.7 K	60 K	147	145	130	228	180	11.8 K	9.7 K	32.1 K	475 K
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)													
Zinc, SEM	0.0318 K	1.6	0.705 K	0.498 K	NA	NA	NA	NA	NA	0.0058 K	NA	0.197 K	1.16 K
Acid volatile sulfide, SEM	0.15 U	0.79	0.15 U	4.6	NA	NA	NA	NA	NA	0.14 U	NA	0.18 U	0.16 U
Cadmium, SEM	6.70E-04 J	0.0171	0.0021 J	0.0019 J	NA	NA	NA	NA	NA	5.00E-04 J	NA	0.0032	0.00948
Copper, SEM	0.0135 L	0.397	0.0627 L	0.0068 L	NA	NA	NA	NA	NA	0.0076 L	NA	0.136 L	0.343 L
Lead, SEM	0.0195 J	0.108	0.0327 J	0.527 J	NA	NA	NA	NA	NA	0.00611 J	NA	0.0611 J	0.303 J
Mercury, SEM	7.60E-05 R	2.10E-04 U	7.50E-05 R	7.10E-05 R	NA	NA	NA	NA	NA	2.80E-05 J	NA	8.80E-05 R	7.20E-05 J
Nickel, SEM	0.0045 B	0.041 J	0.0086 B	0.01 B	NA	NA	NA	NA	NA	0.0029 B	NA	0.022 J	0.035
Silver, SEM	0.0042 UL	0.0118 U	2.10E-04 J	0.0039 UL	NA	NA	NA	NA	NA	0.0037 UL	NA	4.90E-04 J	0.00624 J
Wet Chemistry													
Ammonia (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	7.6	6.2	6.9	6.8	NA	NA	NA	NA	NA	6.3	6.9	7.7	7.6
Sulfide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	43,000	250,000	60,000	38,000	NA	NA	NA	NA	NA	25,000	17,000	62,000	40,000
Grain Size (PCT)													
Gravel (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond												
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01		CAS04-SD02	CAS04-SD03
Sample ID	CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A	CAS04-SD02-1209A	CAS04-SD03-1209A
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09
Chemical Name													
Coarse Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)													
GS03 Sieve 3" (75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/26/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Upstream Pond					
Station ID	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06
Sample ID	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012	CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A
Sample Date	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	12/08/09	12/08/09
Chemical Name															
Volatile Organic Compounds (UG/KG)															
1,1,1-Trichloroethane	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
1,1,2,2-Tetrachloroethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
1,1,2-Trichloroethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,1-Dichloroethane	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
1,1-Dichloroethene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2-Dibromo-3-chloropropane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2-Dibromoethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2-Dichlorobenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2-Dichloroethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,3-Dichlorobenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
1,4-Dichlorobenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
2-Butanone	21 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	51 J	25 J
2-Hexanone	28 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44 UJ	35 UJ
4-Methyl-2-pentanone	28 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44 UJ	35 UJ
Acetone	100 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	230 J	120 J
Benzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Bromoform	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Bromomethane	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
Carbon disulfide	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 J	7 UJ
Carbon tetrachloride	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Chlorobenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Chloroethane	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
Chloroform	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
Chloromethane	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
cis-1,2-Dichloroethene	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
cis-1,3-Dichloropropene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Cyclohexane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Dibromochloromethane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Dichlorodifluoromethane (Freon-12)	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
Ethylbenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Isopropylbenzene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
m- and p-Xylene	12 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19 UJ	15 UJ
Methyl acetate	10 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	16 UJ	12 UJ
Methylcyclohexane	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Methylene chloride	28 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44 UJ	35 UJ
Methyl-tert-butyl ether (MTBE)	10 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	16 UJ	12 UJ
o-Xylene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Styrene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
Tetrachloroethene	42 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14 J	8 J
Toluene	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 UJ	7 UJ
trans-1,2-Dichloroethene	8 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ	10 UJ
trans-1,3-Dichloropropene	8 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ	10 UJ
Trichloroethene	7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	8 UJ
Trichlorofluoromethane (Freon-11)	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
Vinyl chloride	11 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 UJ	14 UJ
Xylene, total	16 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26 UJ	21 UJ
Semivolatile Organic Compounds (UG/KG)															
1,1-Biphenyl	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
1,2,4,5-Tetrachlorobenzene	530 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	750 U	600 U
2,2'-Oxybis(1-chloropropane)	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	1,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,200 U
2,4,6-Trichlorophenol	610 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	860 U	690 U
2,4-Dichlorophenol	570 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	800 U	640 U
2,4-Dimethylphenol	640 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	890 U	720 U
2,4-Dinitrophenol	1,400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,000 U	1,600 U
2,4-Dinitrotoluene	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
2,6-Dinitrotoluene	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
2-Chloronaphthalene	25 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36 U	29 U
2-Chlorophenol	640 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	890 U	720 U
2-Methylnaphthalene	25 UL	11 J	31 U	16 J	8 J	13 U	18 U	29 J	23 U	32 U	21 U	7 J	10 J	36 U	29 U
2-Methylphenol	760 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,100 U	860 U

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Upstream Pond					
Station ID	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06
Sample ID	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012	CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A
Sample Date	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	12/08/09	12/08/09
Chemical Name															
2-Nitroaniline	1,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,200 U
2-Nitrophenol	650 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	910 U	730 U
3- and 4-Methylphenol	720 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,000 U	820 U
3,3'-Dichlorobenzidine	440 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	630 U	500 U
3-Nitroaniline	1,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,200 U
4,6-Dinitro-2-methylphenol	1,400 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,000 U	1,600 U
4-Bromophenyl-phenylether	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
4-Chloro-3-methylphenol	640 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	890 U	720 U
4-Chloroaniline	460 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	640 U	520 U
4-Chlorophenyl-phenylether	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,500 U	1,200 U
4-Nitrophenol	1,200 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,700 U	1,300 U
Acenaphthene	7.9 J	29 J	21 J	32 J	32 J	4 J	13 J	33 J	23 U	6.1 J	7.9 J	18 J	30 J	12 J	29 U
Acenaphthylene	83 K	36 J	26 J	17 J	19 J	2 J	9.9 J	9.2 J	23 U	4.8 J	5.9 J	14 J	20 J	30 J	29 U
Acetophenone	690 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	970 UL	770 UL
Anthracene	75 K	66 J	53 J	86	54	5.3 J	32 J	41	7.3 J	17 J	18 J	53	82	55	29 U
Atrazine	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Benzaldehyde	460 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	640 U	520 U
Benzo(a)anthracene	1,500	590	510	440	310	26 J	230	210	55	110	120	330	520	420	28 B
Benzo(a)pyrene	1,500	520	460	440 L	330	33	220	440	60	120	120	330	500	380	18 J
Benzo(b)fluoranthene	3,300	910	820	880 L	540	75	390	580	110	220	210	640	950	690	40 B
Benzo(g,h,i)perylene	490 J	310	270	250 L	170	27 L	130 L	210	33 J	68	66	190	270	130 L	10 L
Benzo(k)fluoranthene	1,100	280	240	290 L	220	24 J	140	180	34 J	97	95	220	320	150	11 J
bis(2-Chloroethoxy)methane	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
bis(2-Chloroethyl)ether	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	130 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	180 U	140 U
Butylbenzylphthalate	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Caprolactam	560 R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	790 R	630 R
Carbazole	49 K	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23 J	7.2 J
Chrysene	1,900	650	560	790 L	510	65	360	300	79	190	200	560	810	440	17 J
Dibenz(a,h)anthracene	320 K	130	110	97 L	66	9.1 J	48	88	12 J	14 J	24 J	74	110	120	16 J
Dibenzofuran	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Diethylphthalate	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Dimethyl phthalate	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Di-n-butylphthalate	130 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	180 U	140 U
Di-n-octylphthalate	820 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,100 U	920 U
Fluoranthene	1,800	920	790	890 L	530	40	420	260	120	280	230	620	1,100	820	41
Fluorene	12 B	52 J	46 J	60	48 J	5.3 J	23 J	50	23 U	12 J	14 J	36 J	58	30 J	29 U
Hexachlorobenzene	25 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36 U	29 U
Hexachlorobutadiene	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Hexachlorocyclopentadiene	420 UL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Hexachloroethane	25 UL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36 U	29 U
Indeno(1,2,3-cd)pyrene	1,500	680 J	570 J	380 L	260 K	34	180	340 K	44 K	95 K	100 K	290 K	420 K	300	23 J
Isophorone	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Naphthalene	25 U	14 J	31 U	9 J	9.5 J	4 J	18 U	360	23 U	11 J	21 U	26 U	12 J	6 J	29 U
n-Nitroso-di-n-propylamine	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
n-Nitrosodiphenylamine	840 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200 UL	950 UL
Nitrobenzene	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	590 U	470 U
Pentachlorophenol	24 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	180 UL	140 UL
Phenanthrene	200 K	520	450	460	340	20 J	250	160	59	140	120	350	590	340	13 J
Phenol	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	840 U	670 U
Pyrene	3,800	1,000	920	880 L	770	49	520	270	120	240	250	700	1,100	690	27 J
Pesticide/Polychlorinated Biphenyls (UG/KG)															
4,4'-DDD	310	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34 J	4.5 J
4,4'-DDE	160 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.1 J	1.4 J
4,4'-DDT	55 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37 J	4.3 J
Aldrin	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
alpha-BHC	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
alpha-Chlordane	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
Aroclor-1016	24 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U	21 U	18 U	32 U	25 U
Aroclor-1221	55 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U	21 U	18 U	75 U	58 U
Aroclor-1232	37 U	38 UL	29 UL	22 U	26 UL	13 U	19 U	16 U	24 U	30 U	19 U	24 U	21 U	50 U	39 U
Aroclor-1242	24 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U	21 U	18 U	32 U	52 J
Aroclor-1248	25 U	33 UL	24 UL	19 U	22 UL	11 U	16 U	14 U	20 U	25 U	16 U	21 U	18 U	34 U	26 U
Aroclor-1254	22 U	560 L	420 L	620	270 J	11 U	240	14 U	20 U	25 U	16 U	21 U	510	330	24 U
Aroclor-1260	50 K	2,400 L	1,500 L	2,400	1,300 J	90	980	69 J	290 J	1,000 J	630 J	2,300 J	1,600	320	44
beta-BHC	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
delta-BHC	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
Dieldrin	47 K	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.9 UJ	4.6 UJ

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Upstream Pond					
Station ID	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06
Sample ID	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012	CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A
Sample Date	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	12/08/09	12/08/09
Chemical Name															
Endosulfan I	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 J	2.4 UJ
Endosulfan II	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.4 J	1.1 J
Endosulfan sulfate	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.9 UJ	3.4 J
Endrin	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.9 UJ	4.6 UJ
Endrin aldehyde	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13 J	4.6 UJ
Endrin ketone	4.3 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.9 UJ	4.6 UJ
gamma-BHC (Lindane)	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	0.78 J
gamma-Chlordane	14 L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 J	1.6 J
Heptachlor	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.7 J	2.4 UJ
Heptachlor epoxide	2.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ
Methoxychlor	22 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	30 UJ	24 UJ
Toxaphene	43 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	59 UJ	46 UJ
Explosives (UG/KG)															
1,3,5-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (MG/KG)															
Aluminum	11,800	27,100	30,900	15,000	9,440	1,570	13,800	14,400	21,100	18,700	8,490	17,600	16,800	10,100	5,510
Antimony	0.83 UL	1.1 J	0.94 J	1.1 L	0.34 J	0.4 U	0.86 J	0.83 J	0.47 J	0.78 J	0.63 J	0.92 J	0.89 J	1.1 UL	0.8 UL
Arsenic	4.5 K	38	42.2	19	26.6	1.4	14.3	111	20.1	18.1	7.3	19.1	18	4.9 L	2.5 L
Barium	166	90	103	51.8	37.8	8.4	46	78.6	74.7	76.7	34.5	62.8	56.1	31.6	17.1
Beryllium	0.49 J	1.4 J	1.6	0.97	0.49 J	0.14 J	0.87	0.47 J	0.99	0.98	0.51 J	1.1	0.93	0.57 J	0.34 J
Cadmium	0.24	8.4	9.6	7.2	1.2	0.3 J	5.3	0.54 J	2.1	3.3	2.5	5.9	5.2	0.32	0.17
Calcium	2,130	22,300	25,000	12,600	9,660	1,890 B	18,200 B	6,900	16,100	17,400	14,200	17,600	21,100	11,500	9,290
Chromium	17 K	50.2	57	28.8	14.5	5.5	24.9	23.9	32.6	31.4	18.8	33.9	29.7	18.5 L	10.5 L
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.5 J	8	9.6	4.7	2.5	0.67 B	4.1	3.1	4.7	5.1	2.8	5.5	4.5	2.7 J	1.3 J
Copper	6.9	172	197	106 K	24.2	7.5	63.4	19.6	41.7	85.6	68.4	125	85.2	7.5 J	3.7 J
Cyanide	0.91 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3 U	0.91 U
Iron	12,600 J	38,200	44,000	27,300	13,900	4,010	25,200	13,300	24,600	24,500	15,900	30,200	28,900	13,200	6,690
Lead	200	76.4	85	49.1 L	27.2	4.5	41.2	42.6	44	76.7	23.2	53.7	46.3	17.5	5.7
Magnesium	909 K	5,140	5,980	2,580 K	1,230	522 B	2,100 B	2,540	2,160	2,800	1,820	3,330	2,730	1,350	1,010
Manganese	101 J	251	290	126	71.3	13.5	106	75.1	91.3	121	74.4	157	132	47.4	20.2
Mercury	0.01 J	0.19	0.17	0.14 K	0.09 J	0.01 B	0.09	0.05	0.17	0.14	0.06	0.15	0.08	0.12	0.02 J
Nickel	4.4	23.2	27.2	14.6	7.9	1.4 B	10.8	26.3	11.7	13.5	7.9	15.6	12.9	6.5	2.9 J
Potassium	771 K	3,130	3,520	1,890 K	724	701 B	1,880 B	607	1,740	2,000	1,500	2,420	2,100	1,640 K	1,060 K
Selenium	0.31 B	0.8 J	1.1 J	0.96 U	1.2 U	0.56 U	0.9 U	0.82 U	1.1 U	0.41 J	0.8 U	1.1 U	1.2 U	0.87 J	0.37 J
Silver	0.14 J	0.79 J	0.96 J	0.55 U	0.1 J	0.05 J	0.63 J	0.14 J	0.06 J	0.26 J	0.12 J	0.17 J	0.25 J	0.18 B	1.5 U
Sodium	40.9 B	175 J	187 J	74.7 J	51.1 J	18.8 B	74.4 B	70.5 J	75.8 J	91.5 J	97.8 J	93.2 J	111 J	48.1 B	106 B
Thallium	0.15 J	1.6 U	1.6 U	0.68 U	0.88 U	0.4 U	0.64 U	0.59 U	0.8 U	0.89 U	0.58 U	0.78 U	0.85 U	2 U	1.5 U
Vanadium	24.2 K	64.5	73.4	40.2	23.4	5.3	32.8	31.5	45.8	44.2	23	45.8	40.8	23	12.2
Zinc	56.2 K	544	626	405	424	29	240	88.5	244	354	178	388	298	53.2	20.1
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)															
Zinc, SEM	0.202 K	5.98	NA	4.18	0.869	0.21	0.188	0.21	1.87	3.51	1.32	4.21	1.19	NA	NA
Acid volatile sulfide, SEM	0.18	48	NA	25	3.7	0.51	0.85	0.88	26	16	16	58	14	NA	NA
Cadmium, SEM	1.40E-04 J	0.0491	NA	0.0309	0.0015 J	0.00146	0.00203	0.00395	0.00367	0.012	0.0158	0.044	0.0143	NA	NA
Copper, SEM	0.0431 L	0.882	NA	0.185	0.017	0.0431	0.0345	0.0114	0.06	0.158	0.291	0.206	0.228	NA	NA
Lead, SEM	0.276 J	0.242	NA	0.117	0.0151	0.00619	0.00771	0.028	0.146	0.159	0.0584	0.166	0.0526	NA	NA
Mercury, SEM	6.60E-05 R	7.20E-05 U	NA	4.70E-05 U	3.80E-05 U	2.30E-05 U	3.60E-05 U	2.50E-05 U	4.40E-05 U	7.00E-05 U	3.50E-05 U	5.20E-05 U	5.30E-05 U	NA	NA
Nickel, SEM	0.0058 B	0.141	NA	0.0515	0.0086	0.00462	0.0044 J	0.0363	0.0323	0.0382	0.0374	0.0831	0.0382	NA	NA
Silver, SEM	0.0037 UL	0.003 U	NA	0.0027 J	4.60E-04 J	9.50E-04 U	0.0015 U	2.60E-04 J	0.00611	0.0018 J	0.0017 J	0.0021 J	0.0016 J	NA	NA
Wet Chemistry															
Ammonia (mg/kg)	NA	NA	NA	NA	NA	NA	NA	74	210	110	120	230	110	NA	NA
pH (ph)	7.1	6.5	NA	6.7	6.2	6.8	6.8	7	6.7	6.6	6.7	6.8	6.1	7.4	8
Sulfide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	120 U	140 U	160 U	170 U	170 U	140 U	NA	NA
Total organic carbon (TOC) (mg/kg)	16,000	88,000	NA	58,000	100,000	12,000	33,000	36,000	66,000	92,000	34,000	62,000	46,000	36,000	19,000
Grain Size (PCT)															
Gravel (%)	NA	3.6	NA	1.5	8.1	0	0	16.7	0.3	0.9	0.1	0.4	0	NA	NA
Sand (%)	NA	18.5	NA	33.3	60.4	98.4	91.5	62.3	16.1	11.6	74.5	34.1	47.4	NA	NA

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Upstream Pond					
Station ID	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06
Sample ID	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012	CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A
Sample Date	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	12/08/09	12/08/09
Chemical Name															
Coarse Sand (%)	NA	3	NA	1.5	2.8	1.8	1.9	4.1	1.3	1.9	0.4	0.5	0.9	NA	NA
Medium Sand (%)	NA	2	NA	1.6	3.9	6.2	5.7	20.1	1.1	0.5	1.1	0.7	2.6	NA	NA
Fine Sand (%)	NA	13.5	NA	30.2	53.7	90.4	83.9	38.1	13.7	9.2	73	32.9	43.9	NA	NA
Fines (%)	NA	77.9	NA	65.2	31.5	1.6	8.6	21	83.6	87.5	25.4	65.5	52.6	NA	NA
GRAINSIZE (PCT/P)															
GS03 Sieve 3" (75 mm)	NA	100	NA	100	100	100	100	100	100	100	100	100	100	NA	NA
GS05 Sieve 2" (50 mm)	NA	100	NA	100	100	100	100	100	100	100	100	100	100	NA	NA
GS06 Sieve 1.5" (37.5 mm)	NA	100	NA	100	100	100	100	100	100	100	100	100	100	NA	NA
GS07 Sieve 1" (25.0 mm)	NA	100	NA	100	100	100	100	100	100	100	100	100	100	NA	NA
GS08 Sieve 0.75" (19.0 mm)	NA	100	NA	100	100	100	100	100	100	100	100	100	100	NA	NA
GS10 Sieve 0.375" (9.5 mm)	NA	98.7	NA	99.4	94	100	100	86.9	100	100	100	100	100	NA	NA
Sieve No. 004 (4.75 mm)	NA	96.4	NA	98.5	91.9	100	100	83.3	99.7	99.1	99.9	99.6	100	NA	NA
Sieve No. 010 (2.00 mm)	NA	93.4	NA	97	89.1	98.2	98.1	79.2	98.4	97.2	99.5	99.1	99.1	NA	NA
Sieve No. 020 (850 um)	NA	93	NA	96.9	88.9	97.6	97.1	67.7	98.2	97.1	99.4	98.9	98.9	NA	NA
Sieve No. 040 (425 um)	NA	91.4	NA	95.4	85.2	92	92.4	59.1	97.3	96.7	98.4	98.4	96.5	NA	NA
Sieve No. 060 (250 um)	NA	88.9	NA	91.6	66.2	48.2	57.4	48.6	96.7	95.7	83.8	96.5	85.8	NA	NA
Sieve No. 080 (180 um)	NA	86.4	NA	84.5	52.3	17	27.7	38.2	94.3	94	52.8	89.4	69.4	NA	NA
Sieve No. 100 (150 um)	NA	84.5	NA	78.2	44.9	6.6	16.6	32.2	91.8	92.2	36.2	81	61.7	NA	NA
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	NA	77.9	NA	65.2	31.5	1.6	8.6	21	83.6	87.5	25.4	65.5	52.6	NA	NA

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream							Youth Pond								
Station ID	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08
Sample ID	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012	CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012
Sample Date	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12
Chemical Name																
Volatile Organic Compounds (UG/KG)																
1,1,1-Trichloroethane	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,1,2,2-Tetrachloroethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,1,2-Trichloroethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,1-Dichloroethane	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,1-Dichloroethene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2,4-Trichlorobenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2-Dibromo-3-chloropropane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2-Dibromoethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2-Dichlorobenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2-Dichloroethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,3-Dichlorobenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
1,4-Dichlorobenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
2-Butanone	29 U	33 U	34 UJ	44 J	NA	NA	NA	18 J	110	130	58	100	220	15	110	98
2-Hexanone	29 U	33 U	34 UJ	39 UJ	NA	NA	NA	3.7 U	12 U	13 U	9.6 U	5.6 U	11 U	2.9 U	8.9 U	6.4 U
4-Methyl-2-pentanone	29 U	33 U	34 UJ	39 UJ	NA	NA	NA	3.7 U	12 U	13 U	9.6 U	5.6 U	11 U	2.9 U	8.9 U	6.4 U
Acetone	24 B	34 B	42 B	170 J	NA	NA	NA	73 L	470	480	230	360	710	52	440	420
Benzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Bromodichloromethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Bromoform	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Bromomethane	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Carbon disulfide	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	7.4 U	24 U	25 U	19 U	11 U	23 U	5.7 U	18 U	13 U
Carbon tetrachloride	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Chlorobenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Chloroethane	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Chloroform	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Chloromethane	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
cis-1,2-Dichloroethene	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
cis-1,3-Dichloropropene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Cyclohexane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Dibromochloromethane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Dichlorodifluoromethane (Freon-12)	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Ethylbenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Isopropylbenzene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
m- and p-Xylene	13 U	14 U	15 UJ	17 UJ	NA	NA	NA	3 UL	9.7 U	10 U	7.6 U	4.5 U	9.2 U	2.3 U	7.1 U	5.1 U
Methyl acetate	10 U	12 U	12 UJ	14 UJ	NA	NA	NA	7.4 U	24 U	25 U	19 U	11 U	23 U	5.7 U	18 U	13 U
Methylcyclohexane	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Methylene chloride	29 U	33 U	34 UJ	39 UJ	NA	NA	NA	7.4 U	24 U	25 U	19 U	11 U	23 U	5.7 U	18 U	13 U
Methyl-tert-butyl ether (MTBE)	10 U	12 U	12 UJ	14 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
o-Xylene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Styrene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Tetrachloroethene	6 U	5 J	4 J	15 J	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Toluene	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
trans-1,2-Dichloroethene	8 U	9 U	10 UJ	11 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
trans-1,3-Dichloropropene	8 U	9 U	10 UJ	11 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Trichloroethene	7 U	8 U	8 UJ	9 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Trichlorofluoromethane (Freon-11)	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Vinyl chloride	12 U	13 U	14 UJ	16 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U	1.1 U	3.6 U	2.5 U
Xylene, total	17 U	20 U	20 UJ	24 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																
1,1-Biphenyl	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
1,2,4,5-Tetrachlorobenzene	530 U	570 U	550 U	670 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,2'-Oxybis(1-chloropropane)	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	1,300 U	1,500 U	1,500 U	1,300 U	890 UL	760 UL	560 UL	1,400 U	1,000 U
2,4,5-Trichlorophenol	1,000 U	1,100 U	1,100 U	1,300 U	NA	NA	NA	660 UJ	750 UJ	770 UJ	650 UJ	440 UL	380 UL	280 UL	700 UJ	500 UJ
2,4,6-Trichlorophenol	610 U	660 U	630 U	770 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,4-Dichlorophenol	570 U	620 U	590 U	720 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,4-Dimethylphenol	630 U	680 U	660 U	800 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,4-Dinitrophenol	1,400 U	1,600 U	1,500 U	1,800 U	NA	NA	NA	2,000 U	2,300 UL	2,300 UL	2,000 U	1,300 UL	1,100 UL	840 UL	2,100 UL	1,500 U
2,4-Dinitrotoluene	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2,6-Dinitrotoluene	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2-Chloronaphthalene	25 U	27 U	26 U	32 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2-Chlorophenol	630 U	680 U	660 U	800 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2-Methylnaphthalene	25 U	27 U	26 U	32 U	0.014 U	12 U	16 U	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
2-Methylphenol	760 U	820 U	790 U	960 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream							Youth Pond								
Station ID	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08
Sample ID	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012	CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012
Sample Date	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12
Chemical Name																
2-Nitroaniline	1,000 U	1,100 U	1,100 U	1,300 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
2-Nitrophenol	650 U	700 U	670 U	820 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
3- and 4-Methylphenol	720 U	780 U	750 U	910 U	NA	NA	NA	1,300 U	1,500 U	1,500 U	1,300 U	890 UL	760 UL	560 UL	1,400 U	1,000 U
3,3'-Dichlorobenzidine	440 U	480 U	460 U	560 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
3-Nitroaniline	1,000 U	1,100 U	1,100 U	1,300 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4,6-Dinitro-2-methylphenol	1,400 U	1,500 U	1,400 U	1,800 U	NA	NA	NA	2,000 U	2,300 U	2,300 U	2,000 U	1,300 UL	1,100 UL	840 UL	2,100 U	1,500 U
4-Bromophenyl-phenylether	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4-Chloro-3-methylphenol	630 U	680 U	660 U	800 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4-Chloroaniline	460 U	490 U	470 U	580 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4-Chlorophenyl-phenylether	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,000 U	1,100 U	1,100 U	1,300 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
4-Nitrophenol	1,200 U	1,300 U	1,200 U	1,500 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UJ	380 UJ	280 UJ	700 U	500 U
Acenaphthene	25 U	27 U	26 U	3.2 J	0.014 J	4.1 J	8.1 J	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
Acenaphthylene	25 U	27 U	26 U	5.4 J	0.0032 J	1.8 J	4.3 J	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
Acetophenone	680 UL	740 UL	710 UL	860 UL	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Anthracene	25 U	27 U	26 U	2.3 J	0.031	11 J	23 J	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
Atrazine	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Benzaldehyde	460 U	490 U	470 U	580 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Benzo(a)anthracene	7.3 B	7.4 B	14 B	53	0.11	63	140	170 K	95 UL	98 UL	82 J	25 J	140 L	37 J	81 J	57 J
Benzo(a)pyrene	25 U	27 U	9 J	54	0.12	57	140	160 K	95 UL	98 UL	58 J	56 U	140 L	25 J	64 J	45 J
Benzo(b)fluoranthene	25 U	27 U	26 U	82	0.21	110	240	310 K	95 UL	98 UL	130	56 U	240 L	45 J	110 J	89
Benzo(g,h,i)perylene	25 UL	27 UL	26 UL	16 L	0.056	31	63	110	95 UL	98 UL	58 J	56 U	89 L	22 J	49 J	64 U
Benzo(k)fluoranthene	25 U	27 U	26 U	25 J	0.066	34	71	120	95 UL	98 UL	49 J	56 U	91 L	36 U	43 J	64 U
bis(2-Chloroethoxy)methane	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 UJ	770 UJ	650 U	440 UL	380 UL	280 UL	700 UJ	500 U
bis(2-Chloroethyl)ether	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	130 U	140 U	100 J	160 U	NA	NA	NA	590 J	750 U	770 U	650 UJ	440 UL	380 UL	280 UL	700 U	500 UJ
Butylbenzylphthalate	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Caprolactam	560 R	600 R	580 R	700 R	NA	NA	NA	1,300 U	1,500 U	1,500 U	1,300 U	890 UL	760 UL	560 UL	1,400 U	1,000 U
Carbazole	6 J	27 U	26 U	9 J	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Chrysene	25 U	27 U	3.1 J	55	0.16	87	190	230 K	95 UL	98 UL	57 J	56 U	170 L	22 J	77 J	53 J
Dibenz(a,h)anthracene	25 U	27 U	26 U	16 J	0.02 J	11 J	25 J	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
Dibenzofuran	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Diethylphthalate	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Dimethyl phthalate	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Di-n-butylphthalate	130 U	140 U	130 U	160 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Di-n-octylphthalate	810 U	880 U	840 U	1,000 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	440 J
Fluoranthene	25 U	27 U	22 J	110	0.24 L	130 L	270 L	420 K	95 UL	98 UL	140	56 U	300 L	44 J	150	110
Fluorene	25 U	27 U	26 U	5.7 B	0.016 J	5.8 J	12 J	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
Hexachlorobenzene	25 U	27 U	26 U	32 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Hexachlorobutadiene	420 U	450 U	440 U	530 U	NA	NA	NA	660 UJ	750 U	770 U	650 UJ	440 UL	380 UL	280 UL	700 U	500 UJ
Hexachlorocyclopentadiene	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Hexachloroethane	25 U	27 U	26 U	32 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Indeno(1,2,3-cd)pyrene	25 U	27 U	11 J	42	0.084	44	100	92 J	95 UL	98 UL	84 U	56 U	75 L	36 U	89 U	64 U
Isophorone	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Naphthalene	25 U	27 U	26 U	32 U	0.0056 J	12 U	16 U	84 U	95 UL	98 UL	84 U	56 U	96 UL	36 U	89 U	64 U
n-Nitroso-di-n-propylamine	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
n-Nitrosodiphenylamine	840 UL	900 UL	870 UL	1,000 UL	NA	NA	NA	1,300 U	1,500 U	1,500 U	1,300 U	890 UL	760 UL	560 UL	1,400 U	1,000 U
Nitrobenzene	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Pentachlorophenol	130 UL	140 UL	130 UL	160 UL	NA	NA	NA	2,000 U	2,300 U	2,300 U	2,000 U	1,300 UL	1,100 UL	840 UL	2,100 U	1,500 U
Phenanthrene	25 U	27 U	9.7 J	74	0.16	76	160	240 K	95 UL	98 UL	84 U	56 U	150 L	36 U	65 J	52 J
Phenol	600 U	640 U	620 U	750 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL	280 UL	700 U	500 U
Pyrene	25 U	27 U	15 J	110	0.24	130	290	340 K	95 UL	98 UL	110	56 U	280 L	42 J	140	90
Pesticide/Polychlorinated Biphenyls (UG/KG)																
4,4'-DDD	1.6 J	4.3 UJ	21 J	12 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	30 L	110 L	14 UL	35 UL	65 L
4,4'-DDE	4.1 U	4.3 UJ	6.7	13 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	93 L
4,4'-DDT	4.1 U	0.83 J	43 J	4.6 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	3,300 L	14 UL	35 UL	50 UL
Aldrin	2.1 U	2.2 UJ	1 J	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
alpha-BHC	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
alpha-Chlordane	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Aroclor-1016	22 U	24 U	25 U	29 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1221	52 U	55 U	58 U	68 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1232	35 U	37 U	39 U	45 U	14 U	12 U	15 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1242	22 U	24 U	25 U	20 J	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1248	24 U	25 U	26 U	30 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1254	21 U	22 U	24 U	27 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL	56 U	140 UL	100 U
Aroclor-1260	23	24 U	230	29 U	380	500	390	48 J	150 UL	150 UL	140 J	89 U	150 UL	70 J	140 UL	100 J
beta-BHC	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
delta-BHC	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Dieldrin	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream							Youth Pond								
Station ID	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08
Sample ID	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012	CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012
Sample Date	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12
Chemical Name																
Endosulfan I	2.1 U	2.2 UJ	2.4 U	1.3 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Endosulfan II	0.64 J	4.3 UJ	2.9 J	1.5 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Endosulfan sulfate	4.1 U	4.3 UJ	18 J	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Endrin	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Endrin aldehyde	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Endrin ketone	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
gamma-BHC (Lindane)	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
gamma-Chlordane	2.1 U	2.2 UJ	1.4 J	2 J	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Heptachlor	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Heptachlor epoxide	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Methoxychlor	21 U	22 UJ	24 U	27 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL	14 UL	35 UL	50 UL
Toxaphene	41 U	43 UJ	46 U	53 UJ	NA	NA	NA	660 UL	760 UL	770 UL	1,300 UL	440 UL	750 UL	280 UL	710 UL	1,000 UL
Explosives (UG/KG)																
1,3,5-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
1,3-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
3-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
HMX	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
RDX	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Tetryl	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Total Metals (MG/KG)																
Aluminum	11,400	11,600	6,550	7,320	6,580	7,580	10,200	2,620 K	13,600	15,100	3,120	6,160	12,500	2,670	11,600	6,090
Antimony	0.29 B	0.92 UL	0.34 B	0.44 B	0.18 B	0.42 U	0.26 B	2.62 U	4.83 U	6.4 U	2.84 J	2.53 U	2.4 J	1.6 U	4.72 U	3.09 U
Arsenic	3.3 L	3.6 L	5 L	10.4 L	3.5	4.5	5	2.65 J	12.3	11.4 J	8.77 J	45	265	2.97 J	12.5	11.5
Barium	27.7	26.9	19.5	21.8	25.7 B	21.2 B	35 B	17.9	80.3	89.5	20.4	38.2	100	13	74	26.2
Beryllium	0.65	0.64	0.39 J	0.38 J	0.43 J	0.5	0.59	0.233	0.959	1.07	0.307	0.446	0.881	0.272	0.916	0.303
Cadmium	0.44	0.36	0.65	0.16	1.2	1.4	1.6	0.499	0.698	0.79	0.79	0.678	2.7	0.345	1.5	0.425
Calcium	2,250	2,300	12,400	2,270	3,980	2,000 B	6,040	636	5,340	5,250	5,370	7,660	9,010	3,530	5,910	4,170
Chromium	27.2 L	25.9 L	17.3 L	9.4 L	15.8	16	19.1	7.54	20.4	23.1	8.27	12.8	24.7	8.52	25	12.5
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	2.7	2.6 J	2.4 J	1.7 J	2.4	2.2	2.8	0.837 J	3.89	3.73	1.57 J	1.85	3.29	1.17	3.34	1.23 J
Copper	2.5 J	3.5 J	24.6 J	5.6 J	44.5	19.9	33.5	11.2	15.2	16.6	87.2	8.34	29.4	9.71	21.8	13.6
Cyanide	0.77 U	0.91 U	0.91 U	1.2 U	NA	NA	NA	0.3 U	0.33 J	0.7 U	0.6 U	0.41 U	0.69 U	0.26 U	0.64 U	0.46 U
Iron	11,800	12,000	13,600	6,400	11,000	12,300	13,000	4,100	15,700	17,100	6,500	12,500	40,500 J	7,570	14,700	11,000
Lead	5.7	5.6	10.6	14.2	13.6	13.3	23	15	36.6	40.4	13.6	17.9	77.2	6.57	46.8	18.2
Magnesium	1,630	1,640	1,750	545	2,020	1,410	1,660	379	1,070	1,210	498	706	1,570	660	1,060	607
Manganese	16.5	20.2	62.2	21.7	105 B	65.8 B	105 B	17.3	68.6	73.1	51.5	64.7	200	19.7	50.7	47.6
Mercury	0.02 J	0.02 J	0.01 J	0.04 J	0.03 J	0.02 J	0.13	0.0084 U	0.06	0.0565	0.027 J	0.0467	0.787	0.00538 J	0.0646	0.0131 J
Nickel	7	7.4	6.9	4.6 J	6.6	5	8.3	2.24	6.63	7.05	3.94	3.3	7.82	2.58	6.78	2.72
Potassium	1,830 K	1,940 K	1,380 K	501 K	1,490	1,720	1,610	307	872	972	417	762	1,540	843	836	694
Selenium	0.3 J	0.33 J	0.25 J	1.5 U	0.22 J	0.39 J	0.47 J	2.62 U	4.83 U	6.4 U	4.79 U	1.67 J	3.97 J	0.654 J	4.72 U	3.09 U
Silver	1.1 U	0.08 B	1.3 U	2.2 U	0.34 J	0.45 J	0.36 J	0.656 U	1.21 U	1.6 U	1.2 U	0.168 J	1.17 U	0.399 U	1.18 U	0.773 U
Sodium	29.2 B	26.8 B	140	29.9 B	47.6 B	37.6 B	47.1 B	11.4 B	53.1 J	52.6 J	36.9 J	32.3 J	65.8 J	22.1 J	37 J	28.8 B
Thallium	1.1 U	1.7 U	1.3 U	0.5 J	0.44 U	0.42 U	0.42 U	2.62 U	4.83 U	6.4 U	4.79 U	0.841 J	1.86 J	0.529 J	4.72 U	3.09 U
Vanadium	30.4	30.6	19.5	15.6	18.6	18.6	24.3	6.81	30.3	33.3	11.5	16.1	38	9.34	28.2	21.6
Zinc	19.7	21.2	64.5	49.9	88	79	134	160	125	131	137	83.6	470	44.1	300	59.7
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																
Zinc, SEM	NA	NA	NA	NA	0.353	0.165	0.158	1.22 B	1.47	NA	1.73 B	0.9	5.6	0.52	3.51	0.164 B
Acid volatile sulfide, SEM	NA	NA	NA	NA	0.11 U	0.091 U	0.12 U	0.12 U	0.45 U	NA	0.28 U	0.79	0.74	0.13 U	0.44	0.14 U
Cadmium, SEM	NA	NA	NA	NA	0.00542	0.00316	0.00848	0.00197	0.0063	NA	0.0058	0.00315	0.0134	0.00336	0.016	7.10E-04 U
Copper, SEM	NA	NA	NA	NA	0.198	0.0516	0.208	0.064	0.14	NA	0.472	0.0563	0.176	0.106	0.187	0.0273
Lead, SEM	NA	NA	NA	NA	0.0182	0.0177	0.0409	0.0335	0.13	NA	0.0686	0.0578	0.338	0.0183	0.176	0.0238
Mercury, SEM	NA	NA	NA	NA	2.40E-05 U	2.20E-05 U	2.80E-05 U	2.00E-04 U	0.0091 U	NA	4.70E-04 U	0.0037 U	0.0066 U	0.0027 U	0.0048 U	2.40E-04 U
Nickel, SEM	NA	NA	NA	NA	0.0175	0.00442	0.026	0.0092 U	0.066	NA	0.029	0.015	0.05	0.014	0.033	0.011 U
Silver, SEM	NA	NA	NA	NA	1.50E-04 J	9.00E-04 U	4.10E-04 J	0.0013 U	0.0046 U	NA	0.0029 U	0.0019 U	0.0034 U	0.0014 U	0.0024 U	0.0015 U
Wet Chemistry																
Ammonia (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	8.2	NA	8	7.2	7.1	7.4	7.5	6.7	6.4	NA	6.6	6.7	6.6	7	6.6	6.5
Sulfide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	2,300	NA	9,900	40,000	21,000	8,200	53,000	15,000	89,000	NA	74,000	46,000	100,000	13,000	78,000	46,000
Grain Size (PCT)																
Gravel (%)	NA	NA	NA	NA	0.2	0.3	0.1	0.6	0.9	NA	5.2	0.3	0.2	1.9	0.6	2.3
Sand (%)	NA	NA	NA	NA	75.1	76.5	63.2	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream							Youth Pond								
Station ID	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08
Sample ID	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012	CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112	CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012
Sample Date	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12
Chemical Name																
Coarse Sand (%)	NA	NA	NA	NA	0.4	0.1	0.5	0.6	0.9	NA	4.7	2.2	3.3	3	0.7	2.6
Medium Sand (%)	NA	NA	NA	NA	2.3	1.5	2.5	5	2	NA	17.9	7.3	8.3	10.2	1.4	9.6
Fine Sand (%)	NA	NA	NA	NA	72.4	74.9	60.2	80.9	2	NA	59.6	41.2	11.2	72.5	1.2	67.6
Fines (%)	NA	NA	NA	NA	24.7	23.2	36.7	12.9	94.2	NA	12.6	49	77	12.4	96.1	17.9
GRAINSIZE (PCT/P)																
GS03 Sieve 3" (75 mm)	NA	NA	NA	NA	100	100	100	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	100	100	100	100	100	NA	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	100	100	100	100	100	NA	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	100	100	100	100	100	NA	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	100	100	100	100	100	NA	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	100	99.7	100	99.8	99.9	NA	97.7	100	100	100	100	99.3
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	99.8	99.7	99.9	99.4	99.1	NA	94.8	99.7	99.8	98.1	99.4	97.7
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	99.4	99.6	99.4	98.8	98.2	NA	90.1	97.5	96.5	95.1	98.7	95.1
Sieve No. 020 (850 um)	NA	NA	NA	NA	99.2	99.5	98.8	98	97.1	NA	81.9	94.9	92	90.6	97.9	91.3
Sieve No. 040 (425 um)	NA	NA	NA	NA	97.1	98.1	96.9	93.8	96.2	NA	72.2	90.2	88.2	84.9	97.3	85.5
Sieve No. 060 (250 um)	NA	NA	NA	NA	79.8	80.2	83.7	66.5	95.5	NA	51	76.9	85.4	18.9	96.9	59.4
Sieve No. 080 (180 um)	NA	NA	NA	NA	53.7	52.6	62.7	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	NA	NA	NA	NA	38.7	38.7	50.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	NA	16	94.4	NA	14.3	50.6	79.5	14.8	96.4	18.7
Sieve No. 200 (75 um)	NA	NA	NA	NA	24.7	23.2	36.7	12.9	94.2	NA	12.6	49	77	12.4	96.1	17.9

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise

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

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

NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

						York River Ditch	Northern Ditch								
Station ID	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012	CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12	10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Chemical Name															
Volatile Organic Compounds (UG/KG)															
1,1,1-Trichloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,1,2,2-Tetrachloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,1,2-Trichloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,1-Dichloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,1-Dichloroethene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,2,3-Trichlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 UL
1,2,4-Trichlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 UL
1,2-Dibromo-3-chloropropane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,2-Dibromoethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,2-Dichlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 UL
1,2-Dichloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,3-Dichlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
2-Butanone	270	220	330 J	160 J	80	5.5 J	6.4	2.9 U	3.3 U	2.8 U	3.5 J	3.2 J	3.1 U	3 U	3 U
2-Hexanone	9.5 U	15 U	28 U	15 U	6 U	3.5 U	2.4 U	2.9 U	3.3 U	2.8 U	3.6 U	3.8 U	3.1 U	3 U	3 U
4-Methyl-2-pentanone	9.5 U	15 U	28 U	15 U	6 U	3.5 U	2.4 U	2.9 U	3.3 U	2.8 U	3.6 U	3.8 U	3.1 U	3 U	3 U
Acetone	960	810	1,200 J	630 J	320	26 J	42	5.4 J	16 U	14 U	45	27 J	15 U	9.6 J	15 U
Benzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Bromochloromethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Bromodichloromethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Bromoform	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Bromomethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Carbon disulfide	19 U	29 U	56 U	30 U	12 U	7.1 U	4.7 U	5.8 U	6.6 U	5.6 U	7.2 U	7.6 U	6.2 U	6 U	6 U
Carbon tetrachloride	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Chlorobenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Chloroethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Chloroform	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Chloromethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
cis-1,2-Dichloroethene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
cis-1,3-Dichloropropene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Cyclohexane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Dibromochloromethane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Dichlorodifluoromethane (Freon-12)	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Ethylbenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Isopropylbenzene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
m- and p-Xylene	7.6 U	12 U	22 U	12 U	4.8 U	2.8 U	1.9 U	2.3 U	2.6 U	2.3 U	2.9 U	3.1 U	2.5 U	2.4 U	2.4 U
Methyl acetate	19 U	29 U	56 U	30 U	12 U	7.1 U	4.7 U	5.8 U	6.6 U	5.6 U	7.2 U	7.6 U	6.2 U	6 U	6 U
Methylcyclohexane	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Methylene chloride	19 U	29 U	56 U	30 U	12 U	7.1 U	4.7 U	5.8 U	6.6 U	5.6 U	7.2 U	7.6 U	6.2 U	6 U	6 U
Methyl-tert-butyl ether (MTBE)	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
o-Xylene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Styrene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Tetrachloroethene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Toluene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.4 J	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
trans-1,2-Dichloroethene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
trans-1,3-Dichloropropene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Trichloroethene	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Trichlorofluoromethane (Freon-11)	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Vinyl chloride	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)															
1,1-Biphenyl	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
1,2,4,5-Tetrachlorobenzene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,2'-Oxybis(1-chloropropane)	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,3,4,6-Tetrachlorophenol	1,200 UJ	1,800 UJ	2,300 UJ	1,800 UJ	940 U	560 U	470 UL	510 U	520 UJ	250 UJ	250 UJ	250 UJ	500 UJ	480 UJ	480 UJ
2,4,5-Trichlorophenol	610 UJ	910 UJ	1,200 UJ	900 UJ	470 UJ	280 UJ	240 UJ	260 UJ	260 UJ	130 UJ	130 UJ	130 UJ	250 UJ	240 UJ	240 UJ
2,4,6-Trichlorophenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,4-Dichlorophenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,4-Dimethylphenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,4-Dinitrophenol	1,800 UL	2,700 UL	3,500 UL	2,700 UL	1,400 U	850 U	710 UL	770 U	790 UL	380 UL	380 UL	380 UL	740 UL	720 UL	720 UL
2,4-Dinitrotoluene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,6-Dinitrotoluene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2-Chloronaphthalene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2-Chlorophenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2-Methylnaphthalene	78 U	110 UL	150 UL	110 UL	60 U	35 U	31 U	33 U	330 U	32 U	31 U	31 U	31 U	30 U	30 UL
2-Methylphenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

						York River Ditch	Northern Ditch								
Station ID	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012	CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12	10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Chemical Name															
2-Nitroaniline	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2-Nitrophenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
3- and 4-Methylphenol	1,200 U	1,800 U	2,300 U	1,800 U	940 U	560 U	470 UL	510 U	520 U	250 U	250 UL	250 UL	500 UL	480 UL	480 UL
3,3'-Dichlorobenzidine	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
3-Nitroaniline	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4,6-Dinitro-2-methylphenol	1,800 U	2,700 U	3,500 U	2,700 U	1,400 U	850 U	710 UL	770 U	790 U	380 U	380 UL	380 UL	740 UL	720 UL	720 UL
4-Bromophenyl-phenylether	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4-Chloro-3-methylphenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4-Chloroaniline	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4-Chlorophenyl-phenylether	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
4-Nitrophenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Acenaphthene	78 U	110 UL	150 UL	110 UL	60 U	65	31 U	33 U	330 U	32 U	31 U	31 U	31 U	36 J	30 U
Acenaphthylene	78 U	110 UL	150 UL	110 UL	60 U	320	31 U	33 U	330 U	32 U	31 U	31 U	31 U	70	30 U
Acetophenone	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Anthracene	78 U	110 UL	150 UL	110 UL	44 J	600	31 U	33 U	420 J	32 U	31 U	31 U	31 J	120	22 J
Atrazine	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Benzaldehyde	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Benzo(a)anthracene	68 J	110 L	150 UL	110 UL	140	2,400	25 J	68	1,300	92	51	41	110	450	88
Benzo(a)pyrene	50 J	84 L	150 UL	110 UL	130	2,700	17 J	64	1,100	79	45	38 J	94	450	77
Benzo(b)fluoranthene	96 J	160 L	150 UL	110 UL	320	3,700	33 J	130	1,800	190	80	69	170	810	130
Benzo(g,h,i)perylene	78 U	110 UL	150 UL	110 UL	62 J	1,600	31 U	28 J	530	43	32 J	27 J	42	190	49
Benzo(k)fluoranthene	78 U	110 UL	150 UL	110 UL	90	1,200	31 U	36 J	640	59	30 J	24 J	45	260	48
bis(2-Chloroethoxy)methane	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
bis(2-Chloroethyl)ether	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	610 U	910 U	1,200 U	900 U	470 UJ	280 UJ	240 UJ	390 J	260 U	130 U	130 UL	130 UL	250 UL	3,500 L	240 UL
Butylbenzylphthalate	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	7,400	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Caprolactam	1,200 U	1,800 U	2,300 U	1,800 U	940 U	560 U	470 UL	510 U	520 U	250 U	250 UL	250 UL	500 UL	480 UL	480 UL
Carbazole	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	420 J	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Chrysene	54 J	88 L	150 UL	110 UL	270	2,400	17 J	86	1,400	120	58	47	120	580	97
Dibenz(a,h)anthracene	78 U	110 UL	150 UL	110 UL	60 U	400	31 U	33 U	330 U	17 J	31 U	31 U	31 U	54	30 U
Dibenzofuran	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	380 J	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Diethylphthalate	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Dimethyl phthalate	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Di-n-butylphthalate	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Di-n-octylphthalate	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Fluoranthene	110	200 L	150 UL	110 UL	430	4,700	36 J	180	3,400	75	100	92	260	1,100	180
Fluorene	78 U	110 UL	150 UL	110 UL	60 U	78	31 U	33 U	330 U	32 U	31 U	31 U	31 U	67	30 U
Hexachlorobenzene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Hexachlorobutadiene	610 U	910 U	1,200 U	900 U	470 UJ	280 UJ	240 UJ	260 UJ	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Hexachlorocyclopentadiene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Hexachloroethane	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Indeno(1,2,3-cd)pyrene	78 U	110 UL	150 UL	110 UL	62 J	1,500	31 U	26 J	520	42	28 J	24 J	40 J	190	44
Isophorone	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Naphthalene	78 U	110 UL	150 UL	110 UL	60 U	67	31 U	33 U	330 U	32 U	31 U	31 U	31 U	28 J	30 U
n-Nitroso-di-n-propylamine	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
n-Nitrosodiphenylamine	1,200 U	1,800 U	2,300 U	1,800 U	940 U	560 U	470 UL	510 U	520 U	250 U	250 UL	250 UL	500 UL	480 UL	480 UL
Nitrobenzene	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Pentachlorophenol	1,800 U	2,700 U	3,500 U	2,700 U	1,400 U	850 U	710 UL	770 U	790 U	380 U	380 UL	380 UL	740 UL	720 UL	720 UL
Phenanthrene	78 U	110 UL	150 UL	110 UL	300	2,200	22 J	130	2,900	32 U	54	50	180	700	110
Phenol	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Pyrene	97 J	150 L	150 UL	110 UL	400	4,500	31 J	130	2,600	79	85	77	200	890	150
Pesticide/Polychlorinated Biphenyls (UG/KG)															
4,4'-DDD	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UJ
4,4'-DDE	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
4,4'-DDT	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	20 J	12 UL
Aldrin	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
alpha-BHC	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
alpha-Chlordane	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Aroclor-1016	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1221	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1232	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1242	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1248	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1254	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1260	120 UL	180 R	240 UL	180 UL	53 J	55 U	48 U	51 U	26 U	25 UL	25 UL	25 UL	25 UL	26 L	24 UL
beta-BHC	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
delta-BHC	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Dieldrin	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

						York River Ditch	Northern Ditch								
Station ID	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012	CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12	10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Chemical Name															
Endosulfan I	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan II	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan sulfate	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin aldehyde	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin ketone	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-BHC (Lindane)	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-Chlordane	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Heptachlor	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Heptachlor epoxide	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Methoxychlor	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Toxaphene	610 R	910 UL	1,200 UL	900 UL	930 UL	550 UL	480 UL	510 UL	260 UL	250 UL	250 UL	250 UL	250 UL	240 UL	240 UL
Explosives (UG/KG)															
1,3,5-Trinitrobenzene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
1,3-Dinitrobenzene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2,4,6-Trinitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Amino-4,6-dinitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Nitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
3-Nitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Amino-2,6-dinitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Nitrotoluene	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
HMX	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 UJ	300 UJ	300 U
RDX	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Tetryl	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 UJ	300 UJ	300 U
Total Metals (MG/KG)															
Aluminum	15,000	19,200	14,100	12,000	11,700	1,780	1,580	1,820	5,330	11,000	6,840	6,900	5,710	4,460	2,560
Antimony	3.11 U	5.42 U	3.72 J	2.52 J	1.8 J	0.882 J	1.57 U	1.73 U	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	0.56 J	1.98 UL
Arsenic	14.7	20.4	14 J	13.7	191	3.79 J	2.07 J	1.46 J	3.79	4.72	7.69	7.54	4.86	6.08	3.65 J
Barium	101	108	75.3	64.3	79.5	12.8	9.34	13.3	37.4	32.3	41.2	41.2	35.4	25.5	20.6
Beryllium	0.978	1.26	1.09	0.922	0.826	0.17	0.26	0.185	0.337	0.309	0.748	0.726	0.491	0.315	0.297
Cadmium	0.495	1.13	0.356 J	0.63	0.985	0.101 J	0.153 J	0.204	0.581	0.0744 J	0.934	1.03	0.671	0.808	0.245
Calcium	6,950	8,800	16,700	15,800	34,200	5,310	232	634	1,920	1,770	1,570	1,600	1,260	1,150	484 K
Chromium	23.1	34.7	25.7	21.9	22.6	7.44	5.19	3.77	10.9	15.7	10.4	10.9	10.5	17.8	11.5
Chromium (hexavalent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.53	0.25 U	0.25 U	NA	NA	0.24 J
Cobalt	4.37	4.67	3.57 J	3.48	3.5	1.19	0.556 J	0.746 J	2.82	1.5	2.48	2.48	2.69	2.59	1.18
Copper	13.3	30.2	9.6	12.7	12.2	14.9	3.34	4.38	19.7	5.54	30.3	34.1	17.2	26.4	7.08
Cyanide	0.56 U	0.82 U	1.1 U	0.82 U	0.25 J	0.25 U	0.22 U	0.23 U	0.24 U	0.23 U	0.23 U	0.23 U	0.22 U	0.22 U	0.22 U
Iron	28,800 J	29,500 J	16,200	15,700	44,200	6,300	5,820	2,940	11,200	19,400	6,510	6,870	11,300	10,500	7,230
Lead	27.9	41.9	23.6	29	54.6	181	5.14	6.57	39.6	14.9	15.8	17.4	14.7	71.9	9.21
Magnesium	1,320	2,050	1,600	1,340	1,420	684	197	245	1,760	665	514	547	760	934	287 K
Manganese	135	127	69.8	76	338	52.8	19.7	12	177	52.8	217	205	189	88.3	28.9 K
Mercury	0.0873	0.12	0.0527 J	0.0673	0.116	0.028	0.00697 U	0.00743 U	0.0245	0.0656	0.0213	0.0221	0.00587 J	0.0352	0.00667 J
Nickel	7.27	9.84	7.71	6.84	6.55	4.79	1.19	1.41	4.75	2.47	5.24	5.6	5.57	4.64	2.13
Potassium	973	1,720	1,390	1,130	1,620	302	176	177	419	598	453	452	386	928	257
Selenium	3.11 U	2.53 J	6.48 J	2.31 J	3.44 U	2.24 U	1.57 U	1.73 U	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	0.663 J	1.98 U
Silver	0.778 U	1.36 U	2.54 U	1.46 U	0.861 U	0.56 U	0.393 U	0.434 U	0.426 U	0.526 U	0.592 U	0.49 U	0.387 U	0.299 U	0.494 U
Sodium	64.3 J	99 J	86.8 J	62 J	48.2 B	71.4	5.79 B	8.02 B	16.7 J	29.1 J	20.4 J	20.9 J	14.5 J	17 J	9.47 J
Thallium	1.1 J	5.42 U	10.1 U	5.83 U	3.44 U	2.24 U	1.57 U	1.73 U	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	1.2 U	1.98 U
Vanadium	37.2	52.2	35.8	31.4	35.2	7.19	6.41	4.62	13.5	27.4	11.9	12.2	10.4	14.9	8.33
Zinc	95.3	162	58 J	80.9 J	229	40.1	51.6	79.2	164	50.7	234	258	272	271	107 K
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)															
Zinc, SEM	1.12	1.3	2.1	NA	3.5 B	0.37 B	0.58 B	0.9 B	NA	NA	NA	NA	NA	NA	NA
Acid volatile sulfide, SEM	0.71	0.33 U	0.37 U	NA	1.54	0.13	0.11 U	0.12 U	NA	NA	NA	NA	NA	NA	NA
Cadmium, SEM	0.0239	0.0072	0.0061	NA	0.0346	5.70E-04 U	7.20E-04	0.00107	NA	NA	NA	NA	NA	NA	NA
Copper, SEM	0.0079 U	0.136	0.074	NA	0.0149	0.0819	0.0374	0.0508	NA	NA	NA	NA	NA	NA	NA
Lead, SEM	0.0864	0.107	0.159	NA	0.243	0.0218	0.0146	0.0229	NA	NA	NA	NA	NA	NA	NA
Mercury, SEM	0.0046 U	0.0066 U	0.0074 U	NA	3.40E-04 U	1.90E-04 U	1.80E-04 U	2.00E-04 U	NA	NA	NA	NA	NA	NA	NA
Nickel, SEM	0.034	0.049	0.046	NA	0.037	0.0754	0.0083 U	0.01	NA	NA	NA	NA	NA	NA	NA
Silver, SEM	0.023 U	0.0034 U	0.0038 U	NA	0.021 U	0.0012 U	0.0011 U	0.0012 U	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry															
Ammonia (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (ph)	6.5	6.5	6.8	NA	7	7.4	6.6	6.9	6.7	6.7	6.4	NA	6.9	6.3	6.7
Sulfide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (mg/kg)	80,000	120,000	180,000	NA	41,000	9,600	2,700	2,700	11,000	3,800	17,000	NA	7,100	11,000	4,100
Grain Size (PCT)															
Gravel (%)	0.2	0.1	0.4	NA	15.8	34.2	0.1	0.5	23	0.6	0.1	NA	6.4	0.5	6.9
Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE I-4

Raw Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

						York River Ditch	Northern Ditch								
Station ID	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11	CAYP-SD14	CAYP-SD15	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
Sample ID	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012	CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
Sample Date	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12	10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Chemical Name															
Coarse Sand (%)	0.3	0.2	0.8	NA	16.5	6.4	0.9	0.4	7.8	0.3	0.5	NA	9.9	1	1.9
Medium Sand (%)	1.1	0.9	1.5	NA	14.7	11	18.1	9.5	9.9	3.9	5.3	NA	20.1	7.9	12.8
Fine Sand (%)	1	1.5	1.5	NA	21.4	45.2	75.4	81.2	43.6	37.2	54.3	NA	40.4	61.8	67
Fines (%)	97.4	97.3	95.8	NA	31.6	3.2	5.5	8.4	15.7	58	39.8	NA	23.2	28.8	11.4
GRAINSIZE (PCT/P)															
GS03 Sieve 3" (75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS05 Sieve 2" (50 mm)	100	100	100	NA	100	100	100	100	100	100	100	NA	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	100	NA	100	100	100	100	100	100	100	NA	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	100	NA	100	100	100	100	100	100	100	NA	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	100	NA	100	100	100	100	100	100	100	NA	100	100	100
GS10 Sieve 0.375" (9.5 mm)	99.9	100	99.8	NA	100	71.9	99.9	100	88.8	100	100	NA	100	100	94.4
Sieve No. 004 (4.75 mm)	99.8	99.9	99.6	NA	84.2	65.8	99.9	99.5	77	99.4	99.9	NA	93.6	99.5	93.1
Sieve No. 010 (2.00 mm)	99.5	99.7	98.8	NA	67.7	59.4	99	99.1	69.2	99.1	99.4	NA	83.7	98.5	91.2
Sieve No. 020 (850 um)	98.8	99.2	97.9	NA	57	54.5	95.3	97.8	65.8	98.4	98.5	NA	74.2	96.5	87.7
Sieve No. 040 (425 um)	98.4	98.8	97.3	NA	53	48.4	80.9	89.6	59.3	95.2	94.1	NA	63.6	90.6	78.4
Sieve No. 060 (250 um)	98.1	98.3	96.7	NA	47.6	30.7	43.3	55.7	44.7	83	78.2	NA	46.8	72.3	51.1
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	97.5	97.4	96	NA	33.2	4.1	6.4	9.7	18.1	60.3	42.7	NA	24.6	32.3	12.9
Sieve No. 200 (75 um)	97.4	97.3	95.8	NA	31.6	3.2	5.5	8.4	15.7	58	39.8	NA	23.2	28.8	11.4

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
J - Analyte present, value may or may not be accurate or precise
K - Analyte present, value may be biased high, actual value may be lower
L - Analyte present, value may be biased low, actual value may be higher
NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond													Stream			
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07	
Sample ID	CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B	CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name																	
Volatile Organic Compounds (UG/KG)																	
1,1,1-Trichloroethane	8 U	9 UJ	7 U	8 UJ	16.9 U	14.9 U	13.9 U	16.0 U	7 U	7 U	8 UJ	8 U	8 UJ	8 UJ	8 UJ	8 U	7 U
1,1,2,2-Tetrachloroethane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 R	7 UJ	7 UJ	6 U	6 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	8 U	9 UJ	7 U	8 UJ	NA	NA	NA	NA	7 U	7 U	8 UJ	8 U	8 UJ	8 UJ	8 UJ	8 U	7 U
1,1,2-Trichloroethane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
1,1-Dichloroethane	8 UJ	9 UJ	7 U	8 UJ	16.9 U	14.9 U	13.9 U	16.0 U	7 U	7 U	8 UJ	8 UJ	8 UJ	8 UJ	8 UJ	8 U	7 U
1,1-Dichloroethene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	6 R	7 UJ	7 UJ	6 U	6 U
1,2-Dibromo-3-chloropropane	7 U	7 UJ	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 R	7 UJ	7 UJ	6 U	6 U
1,2-Dibromoethane	7 U	7 UJ	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
1,2-Dichlorobenzene	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	2 J	7 UJ	7 UJ	6 U	6 U
1,2-Dichloroethane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	16.9 U	14.9 U	13.9 U	16.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
1,3-Dichlorobenzene	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	6 R	7 UJ	7 UJ	6 U	6 U
1,4-Dichlorobenzene	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	6 J	7 UJ	7 UJ	6 U	6 U
2-Butanone	35 U	110 J	30 U	13 J	7 B	14.9 U	13.9 U	16.0 U	28 U	30 U	32 UJ	31 U	9 J	14 J	26 J	32 U	30 U
2-Hexanone	35 U	37 UJ	30 U	32 UJ	16.9 U	14.9 U	13.9 U	16.0 U	28 U	30 U	32 UJ	31 U	33 UJ	36 UJ	36 UJ	32 U	30 U
4-Methyl-2-pentanone	35 U	37 UJ	30 U	32 UJ	16.9 U	14.9 U	2 J	16.0 U	28 U	30 U	32 UJ	31 U	33 UJ	36 UJ	36 UJ	32 U	30 U
Acetone	12 B	420 J	60 B	88 J	26 B	27 B	24 B	22 B	190 J	27 B	21 B	11 B	64 B	87 J	130 J	22 B	19 B
Benzene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Bromoform	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Bromomethane	14 U	15 UJ	12 U	13 UJ	16.9 U	14.9 U	13.9 U	16.0 U	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
Carbon disulfide	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	1 J	6 U	6 U
Carbon tetrachloride	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Chlorobenzene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Chloroethane	14 U	15 UJ	12 U	13 UJ	16.9 U	14.9 U	13.9 U	16.0 U	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
Chloroform	8 U	9 UJ	7 U	8 UJ	16.9 U	14.9 U	13.9 U	16.0 U	7 U	7 U	8 UJ	8 U	8 UJ	8 UJ	8 UJ	8 U	7 U
Chloromethane	14 U	15 UJ	12 U	13 UJ	16.9 U	14.9 U	13.9 U	16.0 U	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
cis-1,2-Dichloroethene	8 U	9 UJ	7 U	8 UJ	NA	NA	NA	NA	7 U	7 U	8 UJ	8 U	8 UJ	8 UJ	8 UJ	8 U	7 U
cis-1,3-Dichloropropene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Cyclohexane	7 U	7 UJ	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Dibromochloromethane	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Dichlorodifluoromethane (Freon-12)	14 U	15 UJ	12 U	13 UJ	NA	NA	NA	NA	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
Ethylbenzene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Isopropylbenzene	7 U	7 UJ	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 R	7 UJ	7 UJ	6 U	6 U
m- and p-Xylene	15 U	16 UJ	13 U	14 UJ	NA	NA	NA	NA	12 U	13 U	14 UJ	14 U	14 UJ	16 UJ	16 UJ	14 U	13 U
Methyl acetate	12 U	13 UJ	11 U	4 J	NA	NA	NA	NA	10 U	11 U	12 UJ	11 U	12 UJ	13 UJ	13 UJ	12 U	11 U
Methylcyclohexane	7 U	2 J	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Methylene chloride	35 U	37 UJ	30 U	32 UJ	21 B	16 B	36 B	36 B	28 U	30 U	32 UJ	31 U	33 UJ	36 UJ	36 UJ	32 U	30 U
Methyl-tert-butyl ether (MTBE)	12 U	13 UJ	11 U	12 UJ	NA	NA	NA	NA	10 U	11 U	12 UJ	11 U	12 UJ	13 UJ	13 UJ	12 U	11 U
o-Xylene	7 U	7 UJ	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Styrene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
Tetrachloroethene	42	23 J	9	8 J	16.9 U	14.9 U	13.9 U	16.0 U	14	17	13 J	9	16 J	16 J	17 J	6 U	2 J
Toluene	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U
trans-1,2-Dichloroethene	10 U	10 UJ	8 U	9 UJ	NA	NA	NA	NA	8 U	8 U	9 UJ	9 U	9 UJ	10 UJ	10 UJ	9 U	8 U
trans-1,3-Dichloropropene	10 U	10 UJ	8 U	9 UJ	16.9 U	14.9 U	13.9 U	16.0 U	8 U	8 U	9 UJ	9 U	9 UJ	10 UJ	10 UJ	9 U	8 U
Trichloroethene	8 U	9 UJ	7 U	8 UJ	16.9 U	14.9 U	13.9 U	16.0 U	7 U	7 U	8 UJ	8 U	8 UJ	8 UJ	8 UJ	8 U	7 U
Trichlorofluoromethane (Freon-11)	14 U	15 UJ	12 U	13 UJ	NA	NA	NA	NA	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
Vinyl chloride	14 U	15 UJ	12 U	13 UJ	16.9 U	14.9 U	13.9 U	16.0 U	11 U	12 U	13 UJ	12 U	13 UJ	14 UJ	14 UJ	13 U	12 U
Xylene, total	21 U	22 UJ	18 U	19 UJ	16.9 U	14.9 U	13.9 U	16.0 U	17 U	18 U	20 UJ	19 U	20 UJ	21 UJ	21 UJ	19 U	18 U
Semivolatile Organic Compounds (UG/KG)																	
1,1-Biphenyl	450 U	510 U	390 U	400 U	NA	NA	NA	NA	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
1,2,4,5-Tetrachlorobenzene	570 U	650 U	490 U	510 U	NA	NA	NA	NA	480 U	500 U	590 U	520 U	480 U	640 U	630 U	530 U	540 U
2,2'-Oxybis(1-chloropropane)	450 U	510 U	390 U	400 U	NA	NA	NA	NA	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	1,100 U	1,300 U	960 U	1,000 U	1,500 U	1,200 U	1,000 U	1,200 U	940 U	980 U	1,200 U	1,000 U	940 U	1,200 U	1,200 U	1,000 U	1,000 U
2,4,6-Trichlorophenol	650 U	740 U	560 U	590 U	600 U	470 U	410 U	490 U	550 U	570 U	670 U	590 U	550 U	730 U	720 U	610 U	620 U
2,4-Dichlorophenol	610 U	700 U	530 U	550 U	600 U	470 U	410 U	490 U	520 U	540 U	630 U	560 U	520 U	680 U	680 U	570 U	580 U
2,4-Dimethylphenol	680 U	770 U	590 U	610 U	600 U	470 U	410 U	490 U	570 U	600 U	700 U	620 U	570 U	760 U	760 U	630 U	640 U
2,4-Dinitrophenol	1,500 U	1,800 U	1,300 U	1,400 U	1,500 U	1,200 U	1,000 U	1,200 U	1,300 U	1,400 U	1,600 U	1,400 U	1,300 U	1,700 U	1,700 U	1,400 U	1,500 U
2,4-Dinitrotoluene	450 U	510 U	390 U	400 U	430 U	430 U	410 U	450 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
2,6-Dinitrotoluene	450 U	510 U	390 U	400 U	430 U	430 U	410 U	450 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
2-Chloronaphthalene	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	30 U	30 U	25 U	26 U
2-Chlorophenol	680 U	770 U	590 U	610 U	600 U	470 U	410 U	490 U	570 U	600 U	700 U	620 U	570 U	760 U	760 U	630 U	640 U
2-Methylnaphthalene	27 UL	31 U	23 UL	24 UL	600 U	470 U	410 U	490 U	23 UL	24 UL	28 UL	25 UL	23 UL	30 U	30 U	25 U	26 U
2-Methylphenol	810 U	930 U	700 U	730 U	600 U	470 U	410 U	490 U	690 U	720 U	840 U	740 U	690 U	910 U	910 U	760 U	770 U
2-Nitroaniline	1,100 U	1,300 U	960 U	1,000 U	1,500 U	1,200 U	1,000 U	1,200 U	940 U	980 U	1,200 U	1,000 U	940 U	1,200 U	1,200 U	1,000 U	1,000 U
2-Nitrophenol	690 U	790 U	600 U	620 U	600 U	470 U	410 U	490 U	580 U	610 U	720 U	630 U	580 U	770 U	770 U	640 U	660 U
3- and 4-Methylphenol	770 U	880 U	670 U	700 U	NA	NA	NA	NA	650 U	680 U	800 U	700 U	650 U	860 U	860 U	720 U	730 U
3,3'-Dichlorobenzidine	470 U	540 U	410 U	430 U	600 U	470 U	410 U	490 U	400 U	420 U	490 U	430 U	400 R	530 U	530 U	440 U	450 U
3-Nitroaniline	1,100 U	1,300 U	960 U	1,000 U	1,500 U	1,200 U	1,000 U	1,200 U	940 U	980 U	1,200 U	1,000 U	940 U	1,200 U	1,200 U	1,000 U	1,000 U
4,6-Dinitro-2-methylphenol	1,500 U	1,700 U	1,300 U	1,300 U	1,500 U	1,200 U	1,000 U	1,200 U	1,300 U	1,300 U	1,500 U	1,400 U	1,300 U	1,700 U	1,700 U	1,400 U	1,400 U
4-Bromophenyl-phenylether	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
4-Chloro-3-methylphenol	680 U	770 U	590 U	610 U	600 U	470 U	410 U	490 U	570 U	600 U	700 U	620 U	570 U	760 U	760 U	630 U	640 U
4-Chloroaniline	490 U	560 U	420 U	440 U	600 U	470 U	410 U	490 U	410 U	430 U	500 U	440 U	410 U	540 U	540 U	460 U	460 U
4-Chlorophenyl-phenylether	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
4-Methylphenol	NA	NA	NA	NA	600 U	470 U	410 U	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,100 U	1,300 U	960 U	1,000 U	1,500 U	1,200 U	1,000 U	1,200 U	940 U	980 U	1,200 U	1,000 U	940 U	1,200 U	1,200 U	1,000 U	1,000 U
4-Nitrophenol	1,200 U	1,400 U	1,100 U	1,100 U	1,500 U	1,200 U	1,000 U	1,200 U	1,100 U	1,100 U	1,300 U	1,200 U	1,100 U	1,400 U	1,400 U	1,200 U	1,200 U
Acenaphthene	27 U	90	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	2.6 J	23 U	3.5 J	30 U	25 U	26 U
Acenaphthylene	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	15 J	8.9 J	10 J	30 U	25 U	26 U
Acetophenone	730 U	830 U	630 U	660 U	NA	NA	NA	NA	620 U	640 U	760 U	670 U	620 UL	820 UL	820 UL	680 UL	690 UL
Anthracene	4 J	33	2.2 J	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.3 J	30	8.3 J	11 J	30 U	25 U	26 U

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond													Stream			
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07	
Sample ID	CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B	CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name																	
Atrazine	450 U	510 U	390 U	400 U	NA	NA	NA	NA	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Benzaldehyde	490 UJ	560 U	420 UJ	440 UJ	NA	NA	NA	NA	410 UJ	430 UJ	500 UJ	440 UJ	410 UJ	540 U	540 U	460 U	460 U
Benzo(a)anthracene	28 B	120	15 B	24 U	150 J	230 J	410 U	110 J	23 U	2.7 B	12 B	180	120 L	130	21 B	25 U	26 U
Benzo(a)pyrene	28	110	16 B	24 U	110 J	240 J	410 U	130 J	23 U	24 U	12 B	220	100 L	130	9.7 J	25 U	26 U
Benzo(b)fluoranthene	46 B	200	32 B	24 U	100 J	330 J	57 J	210 J	23 U	24 U	26 B	510	23 U	220	30 B	25 U	26 U
Benzo(g,h,i)perylene	9.8 B	29 J	23 UL	24 UL	600 U	100 J	410 U	60 J	23 UL	24 UL	28 UL	93 L	23 UL	56 L	30 UL	25 UL	26 UL
Benzo(k)fluoranthene	18 B	52	12 B	24 U	86 J	280 J	410 U	130 J	23 U	24 U	9.9 B	140	23 U	46	5.6 J	25 U	26 U
bis(2-Chloroethoxy)methane	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
bis(2-Chloroethyl)ether	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	600 U	470 U	410 U	490 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	140 U	150 U	120 U	67 J	120 J	79 J	68 J	78 J	110 U	120 U	140 U	59 J	110 U	100 J	150 U	130 U	130 U
Butylbenzylphthalate	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	140 J	380 U	500 U	500 U	420 U	420 U
Caprolactam	600 R	680 R	520 R	540 R	NA	NA	NA	NA	500 R	520 R	620 R	540 R	500 R	670 R	660 R	560 R	560 R
Carbazole	4.8 B	12 B	2.7 B	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.4 B	7.6 B	23 U	9.6 J	7.5 J	25 U	26 U
Chrysene	34	130	17 J	24 U	180 J	330 J	52 J	160 J	23 U	3.3 J	13 J	310	100 L	130	5.5 J	25 U	26 U
Dibenz(a,h)anthracene	6.4 B	45 J	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	84	23 U	48	12 J	25 U	26 U
Dibenzofuran	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Diethylphthalate	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Dimethyl phthalate	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Di-n-butylphthalate	140 U	150 U	120 U	120 U	61 J	62 J	410 U	84 J	110 U	120 U	140 U	110 J	110 U	150 U	150 U	130 U	130 U
Di-n-octylphthalate	860 U	990 U	750 U	780 U	600 U	470 U	410 U	490 U	730 U	760 U	900 U	790 U	740 U	970 U	970 U	810 U	820 U
Fluoranthene	49	250	42	5 J	230 J	520	87 J	250 J	23 U	4.7 J	30	140	170 L	250	23 J	25 U	26 U
Fluorene	27 U	180	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	8.3 B	30 U	25 U	26 U
Hexachlorobenzene	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	30 U	30 U	25 U	26 U
Hexachlorobutadiene	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Hexachlorocyclopentadiene	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Hexachloroethane	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	30 U	30 U	25 U	26 U
Indeno(1,2,3-cd)pyrene	31 B	110	9.1 B	24 U	600 U	120 J	410 U	64 J	23 U	24 U	7.1 B	370	71	110	14 J	25 U	26 U
Isophorone	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Naphthalene	27 U	53	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	30 U	30 U	25 U	26 U
n-Nitroso-di-n-propylamine	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
n-Nitrosodiphenylamine	890 U	1,000 U	770 U	800 U	600 U	470 U	410 U	490 U	760 U	790 U	920 U	820 U	760 U	1,000 UL	1,000 UL	840 UL	850 UL
Nitrobenzene	450 U	510 U	390 U	400 U	430 U	430 U	410 U	450 U	380 U	390 U	460 U	410 U	380 U	500 U	500 U	420 U	420 U
Pentachlorophenol	140 UL	150 U	120 UL	120 UL	1,500 U	1,200 U	1,000 U	1,200 U	110 UL	120 UL	140 UL	120 UL	110 UL	150 UL	150 UL	130 UL	130 UL
Phenanthrene	34	210	18 J	5.7 J	100 J	240 J	410 U	140 J	23 U	2.4 J	14 J	38	11 J	100	7.5 J	25 U	26 U
Phenol	640 U	730 U	550 U	570 U	600 U	470 U	410 U	490 U	540 U	560 U	660 U	580 U	540 U	710 U	710 U	600 U	600 U
Pyrene	87	190	33	4.8 J	250 J	470	84 J	250 J	23 U	4.6 J	26 J	300	180 L	190	16 J	25 U	26 U
Pesticide/Polychlorinated Biphenyls (UG/KG)																	
4,4'-DDD	4.5 UJ	21 J	2 B	1.3 B	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.97 B	4.7 UJ	260 J	22 J	8.4 J	5 UJ	4.3 U	4.1 UJ
4,4'-DDE	1 B	4.8 J	1.3 B	1.3 B	6.6	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.73 B	0.97 B	270 J	4.4 J	3.3 J	5 UJ	4.3 U	4.1 UJ
4,4'-DDT	4.5 UJ	19 J	2.1 B	0.89 B	6 U	49 J	400 D	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	740 J	2.5 B	8.2 J	5 UJ	4.3 U	4.1 UJ
Aldrin	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
alpha-BHC	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
alpha-Chlordane	2.3 UJ	2.6 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	6 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
Aroclor-1016	25 UJ	28 U	23 UL	22 UJ	60 U	46 U	41 U	49 UL	23 UJ	21 UJ	25 UJ	120 UJ	22 UL	26 U	28 U	23 U	22 U
Aroclor-1221	58 UJ	65 U	53 UL	52 UJ	120 U	94 U	82 U	99 UL	53 UJ	50 UJ	59 UJ	270 UJ	51 UL	61 U	64 U	55 U	52 U
Aroclor-1232	38 UJ	43 U	35 UL	35 UJ	60 U	46 U	41 U	49 UL	35 UJ	33 UJ	40 UJ	180 UJ	34 UL	41 U	43 U	36 U	34 U
Aroclor-1242	25 UJ	28 U	23 UL	22 UJ	60 U	46 U	41 U	49 UL	23 UJ	21 UJ	25 UJ	120 UJ	22 UL	26 U	28 U	23 U	22 U
Aroclor-1248	26 UJ	29 U	24 UL	24 UJ	60 U	33 J	41 U	49 UL	24 UJ	22 UJ	27 UJ	120 UJ	23 UL	28 U	29 U	25 U	23 U
Aroclor-1254	23 UJ	26 U	21 UL	21 UJ	60 U	46 U	41 U	49 UL	21 UJ	20 UJ	24 UJ	8,900 J	20 UL	63	26 U	22 U	21 U
Aroclor-1260	72 J	580	16 L	22 UJ	60 U	210	170	18 JP	23 UJ	7.9 J	39 J	120 UJ	25 L	72	28 U	23 U	22 U
beta-BHC	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
delta-BHC	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
Dieldrin	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	600 J	3.4 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ
Endosulfan I	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	23 J	2 UJ	2.7 J	2.6 UJ	2.2 U	2.1 UJ
Endosulfan II	4.5 UJ	2.3 J	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	360 J	0.86 J	2.2 J	5 UJ	4.3 U	4.1 UJ
Endosulfan sulfate	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	4.3 UJ	3.2 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ
Endrin	39 J	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	43 J	520	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ
Endrin aldehyde	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	140 J	4 UJ	3.6 J	5 UJ	4.3 U	4.1 UJ
Endrin ketone	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	140 J	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ
gamma-BHC (Lindane)	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
gamma-Chlordane	2.3 UJ	3 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	340 J	0.75 J	2.8 J	2.6 UJ	2.2 U	2.1 UJ
Heptachlor	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	2.2 UJ	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
Heptachlor epoxide	2.3 UJ	2.5 UJ	0.71 J	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	230 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ
Methoxychlor	23 UJ	25 UJ	21 UJ	21 UJ	31 U	24 U	21 U	25 UL	21 UJ	20 UJ	24 UJ	230 J	20 UJ	25 UJ	26 UJ	22 U	21 UJ
Toxaphene	45 UJ	48 UJ	41 UJ	41 UJ	310 U	240 U	210 U	250 UL	42 UJ	39 UJ	47 UJ	43 UJ	40 UJ	48 UJ	50 UJ	43 U	41 UJ
Explosives (UG/KG)																	
1,3,5-Trinitrobenzene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NA	NA	NA	NA	430 U	430 U	450 U	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (MG/KG)																	
Aluminum	10,300	6,100	20,600	13,500	5,120 L	2,780 L	1,500 L	3,370 L	25,700	14,000	4,810	16,700	7,840	11,300	5,830	28,700 J	9,020 J
Antimony	0.14 L	0.76 B	0.66 L	0.72 UL	1 J	0.48 U	0.43 U	0.55 U	0.56 L	0.83 UL	0.91 UL	1.2 L	0.1 L	1 UL	0.89 UL	0.81 B	0.66 B
Arsenic	7.7 K	14 L	9.1 K	7.5 K	11.2	1.9 J	0.98 J	9.5	14.6 K	7.9 K	2.3 K	7.4 K	2.2 K	4.2 L	2.3 L	9 L	3.4 L
Barium	32.2	38.5	28.3	46.6	39.2 J	9.9 B	6.4 B	19.2 J	24.1	17.6	12.5	63.2	132	29.8	19.6	68.4 J	21.8 J
Beryllium	0.52 J	0.34 J	1	0.45 J	0.49 B	0.27 J	0.21 J	0.31 J	0.87	0.51 J	0.22 J	0.76	0.5	0.57 J	0.35 J	1.8 J	0.6 J
Cadmium	0.33	1.3	0.14	0.05 J	7.2	0.15 J	0.85 J	0.09 J	0.14	0.12	0.11	3.1	0.07 J	0.25	0.07 J	1.4 J	0.34 J
Calcium	3,750	4,120	1,740	1,180	7,010	1,670 J	1,360 J	15,200 J	5,970 J	1,820 J	2,920	6,900	1,000	7,550	4,950	4,670	1,720

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond													Stream			
Station ID	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07	
Sample ID	CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B	CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B
Sample Date	12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name																	
Chromium	23.6 K	11.3 L	42.1 K	17.8 K	25	9.3	7.7	7	49 K	26.4 K	8.1 K	37.8 K	8.2 K	19.8 L	10.6 L	71.8 L	25.5 L
Cobalt	2 J	1.2 J	3.9 J	3 J	3.1 J	1.3 U	1.2 U	1.5 U	4.1 J	2.1 J	0.76 J	4.1 J	1.6 J	2.7 J	1.2 J	6.8 J	1.9 J
Copper	5	20.5 J	17.2	4.5	10.1	3.8 B	7.3 B	5.1 B	4.4	3.7	2.8	63.9	3.8	5.9 J	2.5 J	3 J	2.9 J
Cyanide	0.84 U	0.98 U	0.77 U	0.91 U	0.04 UL	0.03 UL	0.02 UL	0.03 UL	0.84 U	0.77 U	0.98 U	0.84 U	0.84 U	1.1 U	1 U	0.84 U	0.84 U
Iron	14,000 J	7,220	34,000 J	16,500 J	9,040	7,840 L	4,540 L	4,950 L	32,900 J	17,800 J	5,200 J	23,200 J	5,260 J	12,300	5,740	28,200 J	8,850 J
Lead	27.9	16.4	14.3	18.6	59.8	4.2	5.4	10.9	11.2	6.8	9.2	235	136	13.2	4.6	14.3	4.8
Magnesium	1,450 K	739	3,170 K	894 K	2,000	859 J	597 J	410 J	2,730 K	1,390 K	434 K	1,860 K	584 K	1,330	775	4,050	1,360
Manganese	31.8 J	31.2	34.8 J	23.2 J	26.8	14.5	12.1	36	27.4 J	17.6 J	13.1 J	92.4 J	40.1 J	34.4	15.9	50.4	17.2
Mercury	0.03 J	0.06	0.02 J	0.02 J	0.04 U	0.02 UL	0.03 UL	0.03 UL	0.02 J	0.01 J	0.03 J	0.18	0.01 J	0.05	0.01 J	0.04 J	0.01 J
Nickel	5.9	4.5	9.4 J	5.4	18.3	1.7 J	2 J	2.3 J	10.2	5.4	1.9 J	22.9	3.3 J	6.3	2.7 J	20.9	7.2
Potassium	1,330 K	471 K	4,390 K	852 K	673 J	1,440	911 J	272 B	2,630 K	1,410 K	346 K	1,390 K	450 K	1,650 K	1,030 K	4,710 K	1,610 K
Selenium	0.39 B	0.85 U	1.1 B	0.25 B	1 U	0.65 U	0.59 U	0.75 U	0.59 B	0.38 B	0.35 B	0.98 U	0.85 U	0.4 J	1.1 U	2.2 U	1.1 U
Silver	0.12 J	1.3 U	0.31 J	0.15 J	2.1 B	2.3 B	1.5 B	0.97 U	2.1 U	0.14 J	1.7 U	3.1	0.07 J	0.14 B	1.7 U	3.4 U	1.6 U
Sodium	152 B	62.7 B	47.9 B	30.7 B	65.2 B	57 J	59.2 B	64.3 B	100 B	63.4 B	27.2 B	162 B	27.2 B	48 B	33.2 B	75.5 B	30.6 B
Thallium	1.8 U	1.3 U	0.39 J	1.3 U	0.81 UL	0.52 UL	0.47 UL	0.6 UL	0.52 J	1.6 U	1.7 U	1.5 U	1.3 U	1.9 U	1.7 U	3.4 U	1.6 U
Vanadium	30.4 K	14.7	51.4 K	28 K	25.4	9.6 J	6.8 J	9.8 J	64.3 K	34.2 K	11.4 K	35.5 K	10.6 K	24.4	12.1	82	29
Zinc	29 K	83.5	51.6 K	18.7 K	87.6 B	30.2 B	44.4 B	307	27.7 K	17.1 K	13.5 K	325 K	21.2 K	40.9	11.1	54.1 J	17.4 J
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																	
Zinc, SEM	0.0147 B	0.485	0.154 K	0.401 K	NA	NA	NA	NA	0.0095 B	NA	0.0256 K	0.608 K	0.0557 K	NA	NA	NA	NA
Acid volatile sulfide, SEM	0.14 U	0.16 U	0.13 U	0.84	NA	NA	NA	NA	0.13 U	NA	0.14 U	0.13 U	0.12 U	NA	NA	NA	NA
Cadmium, SEM	0.0011 J	0.0046	4.00E-04 J	0.0015 J	NA	NA	NA	NA	0.0013 J	NA	6.30E-04 J	0.00571	1.70E-04 J	NA	NA	NA	NA
Copper, SEM	0.0094 L	0.227	0.348 L	0.0185 L	NA	NA	NA	NA	0.0126 L	NA	0.011 L	0.218 L	0.0049 L	NA	NA	NA	NA
Lead, SEM	0.0149 J	0.0463	0.0197 J	0.621 J	NA	NA	NA	NA	0.00726 J	NA	0.0131 J	0.302 J	0.14 J	NA	NA	NA	NA
Mercury, SEM	3.10E-05 J	7.60E-05 U	6.30E-05 R	6.20E-05 R	NA	NA	NA	NA	6.30E-05 R	NA	7.10E-05 R	1.96E-04 J	6.10E-05 R	NA	NA	NA	NA
Nickel, SEM	0.0032 B	0.0239	0.0028 B	0.0053 B	NA	NA	NA	NA	0.0018 B	NA	0.003 B	0.011 B	0.0012 B	NA	NA	NA	NA
Silver, SEM	2.80E-04 J	0.0042 U	0.0035 UL	0.0035 UL	NA	NA	NA	NA	0.0035 UL	NA	0.004 UL	0.00398 J	0.0034 UL	NA	NA	NA	NA
Wet Chemistry																	
pH (ph)	7.1	6.5	6.1	6.9	NA	NA	NA	NA	7.5	7.6	7.8	8.2	7	7.8	7.9	8	NA
Total organic carbon (TOC) (mg/kg)	40,000	71,000	6,500	7,300	NA	NA	NA	NA	9,500	17,000	28,000	19,000	22,000	14,000	34,000	2,400	NA
Grain Size (PCT)																	
Gravel (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coarse Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fine Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fines (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAINSIZE (PCT/P)																	
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/26/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
D - Result of a dilution (unvalidated data)
J - Analyte present, value may or may not be accurate or precise

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

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

NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream		Youth Pond													
Station ID	CAS04-SD08	CAS04-SD09	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD11	CAYP-SD12	CAYP-SD13
Sample ID	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012	CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012	CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD11-1012	CAYP-SSD12-1012	CAYP-SSD13-1012
Sample Date	12/08/09	12/08/09	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/11/12	10/22/12	10/12/12
Chemical Name																
Volatile Organic Compounds (UG/KG)																
1,1,1-Trichloroethane	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,1,2,2-Tetrachloroethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,1,2-Trichloroethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,1-Dichloroethane	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,1-Dichloroethene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2,3-Trichlorobenzene	NA	NA	1 UL	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2,4-Trichlorobenzene	6 U	7 U	1 UL	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2-Dibromo-3-chloropropane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2-Dibromoethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2-Dichlorobenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2-Dichloroethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,3-Dichlorobenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
1,4-Dichlorobenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
2-Butanone	28 U	18 J	2 J	99	140	14	26	150	14	120	19	110	150	13	140	85
2-Hexanone	28 U	34 U	2.4 U	9.1 U	11 U	3.2 U	3.9 U	7.8 U	1.8 U	9.6 U	3 U	5.9 U	9.8 U	2.5 U	18 U	6.4 U
4-Methyl-2-pentanone	28 U	34 U	2.4 U	9.1 U	11 U	3.2 U	3.9 U	7.8 U	1.8 U	9.6 U	3 U	5.9 U	9.8 U	2.5 U	18 U	6.4 U
Acetone	8 B	110 K	24	380	530	49	83	480	52	530	89	420	560	57	600	320
Benzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Bromochloromethane	NA	NA	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Bromodichloromethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Bromoform	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Bromomethane	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Carbon disulfide	6 U	7 U	4.9 U	18 U	23 U	6.3 U	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	5 U	36 U	13 U
Carbon tetrachloride	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Chlorobenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Chloroethane	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Chloroform	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Chloromethane	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
cis-1,2-Dichloroethene	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
cis-1,3-Dichloropropene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Cyclohexane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Dibromochloromethane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Dichlorodifluoromethane (Freon-12)	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Ethylbenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Isopropylbenzene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
m- and p-Xylene	12 U	15 U	2 U	7.3 U	9.1 U	2.5 U	3.1 U	6.2 U	1.4 U	7.7 U	2.4 U	4.7 U	7.8 U	2 U	14 U	5.1 U
Methyl acetate	10 U	12 U	4.9 U	18 U	23 U	6.3 U	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	5 U	36 U	13 U
Methylcyclohexane	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	0.7 J	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Methylene chloride	28 U	34 U	4.9 U	18 U	23 U	6.3 U	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	5 U	36 U	13 U
Methyl-tert-butyl ether (MTBE)	10 U	12 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
o-Xylene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Styrene	6 U	7 U	1 UL	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Tetrachloroethene	2 J	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Toluene	6 U	7 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
trans-1,2-Dichloroethene	8 U	10 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
trans-1,3-Dichloropropene	8 U	10 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Trichloroethene	7 U	8 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Trichlorofluoromethane (Freon-11)	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Vinyl chloride	11 U	14 U	1 U	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	1 U	7.1 U	2.6 U
Xylene, total	17 U	21 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																
1,1-Biphenyl	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
1,2,4,5-Tetrachlorobenzene	500 U	560 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,2'-Oxybis(1-chloropropane)	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,3,4,6-Tetrachlorophenol	NA	NA	500 U	1,300 U	1,300 U	660 UL	680 UL	1,000 UL	530 UL	1,200 U	570 U	920 UJ	1,300 UJ	520 U	2,000 UJ	1,000 U
2,4,5-Trichlorophenol	990 U	1,100 U	250 UJ	630 UJ	650 UJ	330 UJ	340 UL	510 UL	270 UL	590 UJ	280 UJ	460 UJ	630 UJ	260 UJ	1,000 UJ	500 UJ
2,4,6-Trichlorophenol	580 U	640 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,4-Dichlorophenol	540 U	600 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,4-Dimethylphenol	600 U	670 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,4-Dinitrophenol	1,400 U	1,500 U	750 U	1,900 UL	1,900 UL	980 UL	1,000 UL	1,500 UL	800 UL	1,800 UL	850 U	1,400 UL	1,900 UL	780 U	3,100 UL	1,500 U
2,4-Dinitrotoluene	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2,6-Dinitrotoluene	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2-Chloronaphthalene	24 U	27 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2-Chlorophenol	600 U	670 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2-Methylnaphthalene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	33 U	130 UL	64 U
2-Methylphenol	720 U	810 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2-Nitroaniline	990 U	1,100 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
2-Nitrophenol	610 U	680 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
3- and 4-Methylphenol	680 U	760 U	500 U	1,300 U	1,300 U	660 UL	680 UL	1,000 UL	530 UL	1,200 U	570 U	920 U	1,300 U	520 U	2,000 U	1,000 U
3,3'-Dichlorobenzidine	420 U	470 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
3-Nitroaniline	990 U	1,100 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4,6-Dinitro-2-methylphenol	1,300 U	1,500 U	750 U	1,900 U	1,900 U	980 UL	1,000 UL	1,500 UL	800 UL	1,800 U	850 U	1,400 U	1,900 U	780 U	3,100 U	1,500 U
4-Bromophenyl-phenylether	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4-Chloro-3-methylphenol	600 U	670 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4-Chloroaniline	430 U	480 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4-Chlorophenyl-phenylether	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	990 U	1,100 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
4-Nitrophenol	1,100 U	1,200 U	250 U	630 U	650 U	330 UL	340 UJ	510 UJ	270 UJ	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Acenaphthene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	190	130 UL	64 U
Acenaphthylene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	94	130 UL	64 U
Acetophenone	650 UL	720 UL	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Anthracene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	450	130 UL	64 U

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream		Youth Pond													
Station ID	CAS04-SD08	CAS04-SD09	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD11	CAYP-SD12	CAYP-SD13
Sample ID	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012	CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012	CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD11-1012	CAYP-SSD12-1012	CAYP-SSD13-1012
Sample Date	12/08/09	12/08/09	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/11/12	10/22/12	10/12/12
Chemical Name																
Atrazine	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Benzaldehyde	430 U	480 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Benzo(a)anthracene	12 B	12 B	56	32 J	83 U	51 J	44 UL	47 L	29 J	82 L	36 U	59 U	79 U	1,300	130 UL	75 J
Benzo(a)pyrene	6.4 J	6 J	49	78 U	83 U	42 J	44 UL	33 L	19 J	67 L	36 U	59 U	79 U	1,400	130 UL	68 J
Benzo(b)fluoranthene	14 B	18 B	79	78 U	83 U	74	44 UL	54 L	32 J	120 L	36 U	59 U	79 U	1,800	130 UL	180
Benzo(g,h,i)perylene	8.6 L	27 UL	30 J	78 U	83 U	30 J	44 UL	64 UL	16 J	53 L	36 U	59 U	79 U	710	130 UL	38 J
Benzo(k)fluoranthene	4.2 J	27 U	31 J	78 U	83 U	29 J	44 UL	64 UL	33 U	48 L	36 U	59 U	79 U	490	130 UL	53 J
bis(2-Chloroethoxy)methane	400 U	440 U	250 U	630 UJ	650 UJ	330 UL	340 UL	510 UL	270 UL	590 UJ	280 U	460 U	630 U	260 U	1,000 U	500 U
bis(2-Chloroethyl)ether	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	89 J	130 U	250 UJ	630 U	650 U	330 UJ	340 UL	510 UL	270 UL	590 U	280 UJ	460 U	630 U	260 UJ	1,000 U	500 UJ
Butylbenzylphthalate	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Caprolactam	530 R	590 R	500 U	1,300 U	1,300 U	660 UL	680 UL	1,000 UL	530 UL	1,200 U	570 U	920 U	1,300 U	520 U	2,000 U	1,000 U
Carbazole	7.3 J	6.5 J	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Chrysene	24 U	27 U	60	78 U	83 U	53 J	44 UL	32 L	33 U	82 L	36 U	59 U	79 U	1,300	130 UL	160
Dibenz(a,h)anthracene	14 J	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	170	130 UL	64 U
Dibenzofuran	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Diethylphthalate	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Dimethyl phthalate	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Di-n-butylphthalate	120 U	130 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Di-n-octylphthalate	770 U	860 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Fluoranthene	10 J	14 J	140 L	78 U	83 U	110	44 UL	62 L	35 J	160 L	36 U	59 U	79 U	2,600	130 UL	250
Fluorene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130	130 UL	64 U
Hexachlorobenzene	24 U	27 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Hexachlorobutadiene	400 U	440 U	250 UJ	630 U	650 U	330 UJ	340 UL	510 UL	270 UL	590 U	280 UJ	460 U	630 U	260 UJ	1,000 U	500 UJ
Hexachlorocyclopentadiene	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Hexachloroethane	24 U	27 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Indeno(1,2,3-cd)pyrene	12 J	8.1 J	27 J	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	660	130 UL	39 J
Isophorone	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Naphthalene	24 U	27 U	32 U	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	36 J	130 UL	64 U
n-Nitroso-di-n-propylamine	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
n-Nitrosodiphenylamine	790 UL	890 UL	500 U	1,300 U	1,300 U	660 UL	680 UL	1,000 UL	530 UL	1,200 U	570 U	920 U	1,300 U	520 U	2,000 U	1,000 U
Nitrobenzene	400 U	440 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Pentachlorophenol	19 J	130 UL	750 U	1,900 U	1,900 U	980 UL	1,000 UL	1,500 UL	800 UL	1,800 U	850 U	1,400 U	1,900 U	780 U	3,100 U	1,500 U
Phenanthrene	5.2 J	9.6 J	110	78 U	83 U	70	44 UL	64 UL	33 U	70 L	36 U	59 U	79 U	1,700	130 UL	270
Phenol	560 U	630 U	250 U	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	260 U	1,000 U	500 U
Pyrene	5.3 J	14 J	110	78 U	83 U	87	44 UL	55 L	32 J	140 L	36 U	59 U	79 U	2,400	130 UL	260
Pesticide/Polychlorinated Biphenyls (UG/KG)																
4,4'-DDD	4.7 J	14	26 UL	30 UL	33 UL	33 UL	17 UL	20 J	13 UL	29 UL	8.1 L	23 UL	31 UL	26 UL	51 UL	51 UL
4,4'-DDE	2 J	5	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 L	23 UL	31 UL	26 UL	51 UL	51 UL
4,4'-DDT	120 J	1.3 J	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Aldrin	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
alpha-BHC	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
alpha-Chlordane	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Aroclor-1016	22 U	24 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1221	52 U	56 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1232	34 U	37 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1242	22 U	24 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1248	23 U	25 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1254	21 U	23 U	51 U	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
Aroclor-1260	30	24 U	51 U	120 UL	130 UL	94 J	69 U	100 UL	60 J	120 UL	58 U	91 UL	120 UL	51 U	210 UL	100 U
beta-BHC	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
delta-BHC	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Dieldrin	4 U	3.3 J	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan I	2.1 U	0.63 J	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan II	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endosulfan sulfate	2 J	4.4 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin aldehyde	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Endrin ketone	4 U	4.4 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
gamma-BHC (Lindane)	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
gamma-Chlordane	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Heptachlor	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Heptachlor epoxide	2.1 U	2.3 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Methoxychlor	21 U	23 U	26 UL	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	26 UL	51 UL	51 UL
Toxaphene	40 U	44 U	510 UL	610 UL	660 UL	670 UL	340 UL	510 UL	270 UL	590 UL	290 UL	460 UL	620 UL	510 UL	1,000 UL	1,000 UL
Explosives (UG/KG)																
1,3,5-Trinitrobenzene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
1,3-Dinitrobenzene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2,4,6-Trinitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Amino-4,6-dinitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
2-Nitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
3-Nitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Amino-2,6-dinitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
4-Nitrotoluene	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
HMX	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
RDX	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Tetryl	NA	NA	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Total Metals (MG/KG)																
Aluminum	3,170	6,900	1,140 K	14,300	15,400	3,690	3,490	11,100	2,250	9,750	6,840	16,700	20,200	3,460	13,800	13,000
Antimony	0.44 B	0.2 B	2.26 U	5.14 U	4.5 U	3.22 U	1.74 U	3.03 U	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	2.3 U	7.88 U	1.57 J
Arsenic	2.7 L	13.2 L	0.975 J	9.37 J	9.98	5.01 J	15.5	126	2.31 J	5.06 J	4.19 J	12	14.7	4.96	12.1 J	108
Barium	9.6	19.6	9.99	81.8	83.8	23.2	21.3	69.3	9.86	61.2	15.1	116	109	16	79.3	76.6
Beryllium	0.21 J	0.4 J	0.144	0.943	0.972	0.368	0.276	0.762	0.213	0.799	0.226	1.08	1.35	0.261	1.12	0.905
Cadmium	0.21	0.19	0.136 J	0.592	0.713	0.363	0.199	1.04	0.354	0.395	0.122 U	0.283 J	0.683	0.119 J	0.59 J	0.69
Calcium	19,800	2,600	233	5,480	5,700	1,910	3,940	6,960	1,350	6,500	1,060	7,620	10,400	6,830	17,200	22,200

TABLE I-5

Raw Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Stream		Youth Pond													
Station ID	CAS04-SD08	CAS04-SD09	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD11	CAYP-SD12	CAYP-SD13
Sample ID	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012	CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012	CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD11-1012	CAYP-SSD12-1012	CAYP-SSD13-1012
Sample Date	12/08/09	12/08/09	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/11/12	10/22/12	10/12/12
Chemical Name																
Chromium	13.3 L	14.5 L	3.14	21.2	22.8	8.73	6.91	20.3	7.15	15.6	12.1	24.5	35	9.39	24.3	22.7
Cobalt	0.8 J	2.2 J	0.682 J	3.22	3.83	1.63	0.942	2.82	0.955	2.03	0.969 J	4.04	4.68	2.51	3.64 J	3.79
Copper	3.1 J	2.8 J	2.59	10.6	10.8	12.6	3.43	10.5	7.67	9.18	2.25	7.7	12.6	8.49	12.4	9.31
Cyanide	0.84 U	0.91 U	0.23 U	0.56 U	0.59 U	0.3 U	0.31 U	0.46 U	0.24 U	0.53 U	0.26 U	0.25 J	0.57 U	0.24 U	0.94 U	0.46 U
Iron	4,260	7,550	2,060	16,000	16,600	6,240	6,680	23,500	6,070	10,900	9,120	36,300 J	29,200 J	9,000	18,100	26,500 J
Lead	3.4	7.2	4.21 J	26.5	27.2	15	7.44	34.9	4.59	19.3	7.03	25.4	32.3	13.8	32.5	54.4
Magnesium	777	861	178	1,050	1,130	535	468	1,250	592	758	472	1,440	2,100	1,100	1,480	1,410
Manganese	17	15.9	9.34	67.3	68.8	30.6	28.3	92.8	15.5	29.8	14.7	221	138	69.4	85.2	158
Mercury	0.04 U	0.01 J	0.00649 U	0.0402	0.0483	0.112	0.0156	0.444	0.00648 U	0.0492	0.00516 J	0.0734	0.0752	0.117	0.064	0.0899
Nickel	2.9	4.9	0.865 J	5.97	6.45	3.39	1.74	6.04	2.12	4.51	1.9	7.18	9.59	5.47	7.68	6.83
Potassium	844 K	839 K	172	846	884	523	543	1,280	722	497	535	1,070	1,790	571	1,270	1,460
Selenium	0.39 J	0.91 U	2.26 U	5.14 U	4.5 U	3.22 U	0.733 J	1.67 J	0.518 J	3.46 U	2.45 U	4.35 U	5.17 U	0.771 J	7.88 U	1.54 J
Silver	0.98 U	0.08 B	0.564 U	1.28 U	1.12 U	0.804 U	0.435 U	0.181 J	0.372 U	0.865 U	0.612 U	1.09 U	1.29 U	0.575 U	1.97 U	0.805 U
Sodium	210	26.3 B	28.2 U	47.4 J	53.2 J	16.1 J	24.4 J	41.7 J	14.5 J	37.3 J	18.5 J	65.7 J	110 J	48.7 J	68.7 J	53.5 J
Thallium	0.98 U	1.4 U	2.26 U	5.14 U	4.5 U	3.22 U	1.74 U	1.16 J	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	2.3 U	7.88 U	3.22 U
Vanadium	17.2	18.5	3.51	33.5	35.6	11.2	9.08	30.4	8.24	24.7	21	39.6	52	14.5	35.3	32.9
Zinc	14	24.6	38.4	89	90.4	57.3	30	187	36.1	77.6	11.2	63.6	93.5	33.3	84.2	191
Acid Volatile Sulfide/Simultaneously Extractable Metals (UMOL/G)																
Zinc, SEM	NA	NA	0.5 B	1.19	NA	0.65 B	0.304	2.27	0.54	1.7	0.126 B	0.448	0.55	0.52 B	1.24	2.1 B
Acid volatile sulfide, SEM	NA	NA	0.11 U	0.41	NA	0.13 U	0.15 U	0.55	0.74	0.92	0.12 U	0.39	0.32 U	0.15	0.51 U	1.07
Cadmium, SEM	NA	NA	6.60E-04	0.0039	NA	0.00154	7.60E-04 U	0.0051	0.00231	0.0049	5.80E-04 U	0.015	0.0051	5.70E-04 U	0.0052	0.00529
Copper, SEM	NA	NA	0.0318	0.105	NA	0.11	0.0319	0.0913	0.0713	0.119	0.0897	0.0087	0.063	0.0676	0.079	0.061
Lead, SEM	NA	NA	0.0113	0.0853	NA	0.057	0.0233	0.121	0.0191	0.0925	0.0119	0.0639	0.079	0.046	0.12	0.154
Mercury, SEM	NA	NA	1.80E-04 U	0.0055 U	NA	2.10E-04 U	0.0031 U	0.0044 U	0.0028 U	0.0054 U	1.90E-04 U	0.0039 U	0.0064 U	1.90E-04 U	0.011 U	3.10E-04 U
Nickel, SEM	NA	NA	0.0083 U	0.026	NA	0.0181	0.012 U	0.029	0.017	0.028	0.0088 U	0.03	0.043	0.0497	0.041	0.03
Silver, SEM	NA	NA	0.0011 U	0.0028 U	NA	0.0013 U	0.0016 U	0.0022 U	0.0014 U	0.0028 U	0.0012 U	0.02 U	0.0033 U	0.0012 U	0.0053 U	0.0019 U
Wet Chemistry																
pH (ph)	8.3	7.5	6.5	6.3	NA	6.6	6.7	6.6	7.2	6.4	6.2	6.2	6.4	7.5	6.8	7
Total organic carbon (TOC) (mg/kg)	2,500	16,000	3,200	73,000	NA	28,000	33,000	69,000	12,000	69,000	16,000	64,000	99,000	8,800	140,000	52,000
Grain Size (PCT)																
Gravel (%)	NA	NA	0.2	0.6	NA	1.4	0.2	0.2	14.8	0.4	0.1	0.2	2	17.7	1	27.4
Coarse Sand (%)	NA	NA	0.2	0.8	NA	1.8	0.8	0.9	3.2	1.2	0.2	0.9	0.5	7.4	0.4	7.5
Medium Sand (%)	NA	NA	4.9	2.2	NA	9.3	7.2	3.2	9.7	1.8	2.8	1.2	1.2	13.8	1.4	8.2
Fine Sand (%)	NA	NA	90.7	1.6	NA	65.5	74.4	24.7	56.6	1.3	70.3	0.9	1.6	50.9	2.6	14
Fines (%)	NA	NA	4	94.8	NA	22	17.4	71	15.7	95.3	26.6	96.8	94.7	10.2	94.6	42.9
GRAINSIZE (PCT/P)																
GS05 Sieve 2" (50 mm)	NA	NA	100	100	NA	100	100	100	100	100	100	100	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	NA	NA	100	100	NA	100	100	100	100	100	100	100	100	100	100	100
GS07 Sieve 1" (25.0 mm)	NA	NA	100	100	NA	100	100	100	100	100	100	100	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	NA	NA	100	100	NA	100	100	100	100	100	100	100	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	NA	NA	99.8	99.9	NA	100	100	100	89.1	100	100	100	98.9	90.8	99.6	92
Sieve No. 004 (4.75 mm)	NA	NA	99.8	99.4	NA	98.6	99.8	99.8	85.2	99.6	99.9	99.8	98	82.3	99	72.6
Sieve No. 010 (2.00 mm)	NA	NA	99.6	98.6	NA	96.8	99	98.9	82	98.4	99.7	98.9	97.5	74.9	98.6	65.1
Sieve No. 020 (850 um)	NA	NA	99.1	97.3	NA	94.1	97.7	97.3	76.7	97.4	99.1	98.1	96.8	67.9	97.7	60
Sieve No. 040 (425 um)	NA	NA	94.7	96.4	NA	87.5	91.8	95.7	72.3	96.6	96.9	97.7	96.3	61.1	97.2	56.9
Sieve No. 060 (250 um)	NA	NA	62.9	95.8	NA	63.1	67.1	90.7	59.8	96	71.9	97.5	95.8	49.3	96.7	53.2
Sieve No. 140 (106 um)	NA	NA	5.2	95	NA	24.4	19.4	72.7	18.2	95.4	27.4	97	94.9	13.3	94.9	43.7
Sieve No. 200 (75 um)	NA	NA	4	94.8	NA	22	17.4	71	15.7	95.3	26.6	96.8	94.7	10.2	94.6	42.9

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks
D - Result of a dilution (unvalidated data)
J - Analyte present, value may or may not be accurate or precise

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

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

NA - Not analyzed
P - Estimated value (unvalidated data)
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
MG/KG - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passing
PH - pH units
UG/KG - Micrograms per kilogram
UMOL/G - Micromoles per gram

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Stream					
Station ID	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07		CAS04-SW08	CAS04-SW09
Sample ID	CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209	CAS04-SW08-1209	CAS04-SW09-1209
Sample Date	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name															
Volatile Organic Compounds (µg/l)															
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dibromo-3-chloropropane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	7 U	7 U	3 B	7 U	3 B	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	7 U	4 B
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carbon disulfide	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane (Freon-12)	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl acetate	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylcyclohexane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl-tert-butyl ether (MTBE)	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane (Freon-11)	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vinyl chloride	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Semivolatile Organic Compounds (µg/l)															
1,1-Biphenyl	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
1,2,4,5-Tetrachlorobenzene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2,2'-Oxybis(1-chloropropane)	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2,3,4,6-Tetrachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
2,4,6-Trichlorophenol	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2,4-Dichlorophenol	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2,4-Dimethylphenol	13 U	13 U	13 U	14 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U
2,4-Dinitrophenol	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
2,4-Dinitrotoluene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2,6-Dinitrotoluene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Stream					
Station ID	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07		CAS04-SW08	CAS04-SW09
Sample ID	CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209	CAS04-SW08-1209	CAS04-SW09-1209
Sample Date	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name															
2-Chloronaphthalene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Chlorophenol	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
2-Methylnaphthalene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2-Methylphenol	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	11 U
2-Nitroaniline	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
2-Nitrophenol	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
3- and 4-Methylphenol	16 U	16 U	16 U	17 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U	16 U
3,3'-Dichlorobenzidine	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
3-Nitroaniline	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
4,6-Dinitro-2-methylphenol	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
4-Bromophenyl-phenylether	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
4-Chlorophenyl-phenylether	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
4-Nitroaniline	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
4-Nitrophenol	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U	24 U
Acenaphthene	0.19 U	0.19 U	0.069 J	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Acenaphthylene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Acetophenone	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	11 U
Anthracene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 UL	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Atrazine	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Benzaldehyde	9 U	9 UJ	9 U	1 B	9 U	10 U	9 U	9 UJ	9 U	9 UJ	10 UJ	10 UJ	10 UJ	9 UJ	9 UJ
Benzo(a)anthracene	0.19 U	0.19 U	0.14 B	0.2 U	0.19 U	0.19 U	0.19 U	0.19 B	0.34 B	0.17 B	0.19 U	0.19 U	0.19 U	0.19 U	0.16 B
Benzo(a)pyrene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.073 J	0.24 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(b)fluoranthene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.58 B	0.2 B	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(g,h,i)perylene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.16 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(k)fluoranthene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.15 J	0.069 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
bis(2-Chloroethoxy)methane	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
bis(2-Chloroethyl)ether	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
bis(2-Ethylhexyl)phthalate	0.94 U	0.94 U	0.94 U	1.1	0.94 U	0.86 J	0.85 L	1.3	0.75 J	0.94 U	0.96 U	0.96 U	1.5	1.5	0.48 J
Butylbenzylphthalate	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Caprolactam	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 UL	10 UL	10 UL	10 UL	9 UL	9 UL
Carbazole	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Chrysene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.08 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Dibenz(a,h)anthracene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Dibenzofuran	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Diethylphthalate	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Dimethyl phthalate	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Di-n-butylphthalate	0.94 U	0.94 U	0.94 U	0.98 U	0.94 U	0.95 U	0.94 U	0.94 U	0.94 U	0.94 U	0.96 U	0.96 U	0.95 U	0.94 U	0.94 U
Di-n-octylphthalate	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Fluoranthene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.13 J	0.32	0.18 J	0.19 U	0.19 U	0.19 U	0.19 U	0.11 J
Fluorene	0.19 U	0.19 U	0.063 B	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorobenzene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Hexachlorobutadiene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Hexachlorocyclopentadiene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Hexachloroethane	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Indeno(1,2,3-cd)pyrene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.24	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Isophorone	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Naphthalene	0.19 U	0.19 U	0.066 J	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
n-Nitroso-di-n-propylamine	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
n-Nitrosodiphenylamine	11 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	11 U
Nitrobenzene	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Pentachlorophenol	0.94 U	0.94 U	0.94 U	0.98 U	0.94 U	0.95 U	0.94 U	0.94 U	0.94 U	0.94 U	0.96 U	0.96 U	0.95 U	0.94 U	0.94 U
Phenanthrene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.068 J	0.074 J	0.088 J	0.19 U	0.19 U	0.19 U	0.19 U	0.069 J
Phenol	9 U	9 U	9 U	10 U	9 U	10 U	9 U	9 U	9 U	9 U	10 U	10 U	10 U	9 U	9 U
Pyrene	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.1 J	0.29	0.29 J	0.19 U	0.19 U	0.065 J	0.19 U	0.23 J
Pesticide/Polychlorinated Biphenyls (µg/l)															
4,4'-DDD	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
4,4'-DDE	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
4,4'-DDT	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Aldrin	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
alpha-BHC	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
alpha-Chlordane	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Aroclor-1016	0.48 U	0.48 U	0.6 U	0.47 U	0.49 U	0.47 U	0.47 U	0.47 U	0.48 U	0.67 U	0.63 U	0.62 U	0.6 U	0.57 U	0.47 UL
Aroclor-1221	0.67 U	0.67 U	0.84 U	0.66 U	0.69 U	0.66 U	0.66 U	0.66 U	0.67 U	0.93 U	0.89 U	0.86 U	0.84 U	0.8 U	0.66 UL
Aroclor-1232	0.48 U	0.48 U	0.6 U	0.47 U	0.49 U	0.47 U	0.47 U	0.47 U	0.48 U	0.67 U	0.63 U	0.62 U	0.6 U	0.57 U	0.47 UL

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Stream					
Station ID	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07		CAS04-SW08	CAS04-SW09
Sample ID	CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209	CAS04-SW08-1209	CAS04-SW09-1209
Sample Date	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name															
Aroclor-1242	0.57 U	0.58 U	0.72 U	0.57 U	0.59 U	0.57 U	0.57 U	0.57 U	0.58 U	0.8 U	0.76 U	0.74 U	0.72 U	0.69 U	0.57 UL
Aroclor-1248	0.67 U	0.67 U	0.84 U	0.66 U	0.69 U	0.66 U	0.66 U	0.66 U	0.67 U	0.93 U	0.89 U	0.86 U	0.84 U	0.8 U	0.66 UL
Aroclor-1254	0.48 U	0.48 U	0.6 U	0.47 U	0.49 U	0.47 U	0.47 U	0.47 U	0.48 U	0.67 U	0.63 U	0.62 U	0.6 U	0.57 U	0.47 UL
Aroclor-1260	0.57 U	0.58 U	0.72 U	0.57 U	0.59 U	0.57 U	0.57 U	0.57 U	0.58 U	0.8 U	0.76 U	0.74 U	0.72 U	0.69 U	0.57 UL
beta-BHC	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
delta-BHC	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Dieldrin	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Endosulfan I	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Endosulfan II	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Endosulfan sulfate	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Endrin	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Endrin aldehyde	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
Endrin ketone	0.095 U	0.096 U	0.094 U	0.094 U	0.098 U	0.094 U	0.094 U	0.094 U	0.096 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.094 UJ
gamma-BHC (Lindane)	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
gamma-Chlordane	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Heptachlor	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Heptachlor epoxide	0.048 U	0.048 U	0.047 U	0.047 U	0.049 U	0.047 U	0.047 U	0.047 U	0.048 U	0.067 U	0.063 U	0.062 U	0.06 U	0.057 U	0.047 UJ
Methoxychlor	0.48 U	0.48 U	0.47 U	0.47 U	0.49 U	0.47 U	0.47 U	0.47 U	0.48 U	0.67 U	0.63 U	0.62 U	0.6 U	0.57 U	0.47 UJ
Toxaphene	0.95 U	0.96 U	0.94 U	0.94 U	0.98 U	0.94 U	0.94 U	0.94 U	0.96 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	0.94 UJ
Explosives (µg/l)															
1,3,5-Trinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Amino-4,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HMX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetryl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)															
Aluminum	300 U	44.3 B	26.7 B	212 J	306	178 J	108 B	2,730	445	83.1 J	300 U	248 J	1,120	215 J	518
Antimony	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic	2.9 B	3.3 B	3.3 B	5.7 B	4.4 B	3.5 B	1.7 B	10.3	3.8 B	1.6 B	5 U	5 U	5 U	5 U	58
Barium	23.1	23.8	26.8	28.4	23	24.4	24.2	44.4	25.2	25.6	26.2	26.5	30.3	26.3	42.5
Beryllium	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U	0.12 J	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U
Cadmium	0.06 J	0.11 J	1 U	0.15 J	0.23 J	0.13 J	0.16 J	0.82 J	0.22 J	1 U	0.16 J	0.3 J	0.45 J	0.28 J	1 U
Calcium	75,300	80,400	68,200	64,800	64,900	63,500	80,300	106,000	69,400	132,000	129,000	131,000	132,000	125,000	114,000
Chromium	1.9 B	1.7 B	1.8 B	1.6 B	1.5 B	3.3 B	2 B	6.3 B	2 B	1.5 B	1.5 B	2 B	4.1 B	1.9 B	1.9 B
Cobalt	0.3 J	0.34 J	0.28 J	0.44 J	0.5 J	0.34 J	0.45 J	1.5	0.45 J	0.29 J	0.4 J	0.66 J	1.1	0.63 J	0.61 J
Copper	3	3	3	6.4	6.1	7.8	3.9	25.9	7.6	1.3	1.4	2.3	7	3.4	1.6
Cyanide	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U	12 U
Iron	1,070	1,010	1,970	2,410	1,550	1,310	1,480	19,000	2,200	682	339	353	1,800	424	30,300
Lead	0.32 B	0.26 B	0.28 B	1.3	0.98 J	0.93 J	0.56 J	5.9	1.4	0.36 B	0.18 B	0.67 J	2.6	1.2	1.5
Magnesium	1,900	1,910	2,230	1,970	1,820	1,830	1,990	3,040	1,890	2,200	2,040	2,000	2,160	2,000	2,660
Manganese	49	46.9	66.2	55.5	66.2	42.6	53.4	142	74.2	72.8	19.8	6.6	12.5	11.8	250
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	1.1 B	0.92 B	0.73 B	1.5 B	1.3 B	1 B	1.1 B	3.5 J	1.7 B	0.65 B	1.1 B	1.4 B	2 J	1.5 B	0.6 B
Potassium	1,600	1,560	1,570	1,810	1,600	1,460	1,560	1,930	1,590	1,380 B	1,680	2,010	2,230	2,180	1,440 B
Selenium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.86 J	0.82 J	1.3 J	1.3 J	1.1 J	1.2 J	5 U
Silver	1 U	1 U	1 U	0.06 J	0.07 J	1 U	0.05 J	0.06 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sodium	4,980	5,290	4,700	4,720	4,640	4,340	5,290	5,980	4,800	7,140	7,860	8,260	8,140	8,180	5,480
Thallium	2 U	2 U	2 U	0.35 B	2 U	0.13 B	2 U	2 U	0.15 B	0.19 B	2 U	2 U	2 U	2 U	2 U
Vanadium	1.7 B	0.9 B	1 B	1.4 B	1.3 B	2 B	1.4 B	8.3	1.7 B	0.72 B	1 B	1.3 B	4.6 J	1.8 B	2.1 B
Zinc	17.9 J	15.4 J	9.3 J	20.1 J	16.3 J	12.9 J	13.3 J	65.4	24.4 J	3.2 B	12.6 J	16.8 J	31.4	18.2 J	16.5 J
Dissolved Metals (µg/l)															
Aluminum, Dissolved	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U
Antimony, Dissolved	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic, Dissolved	5 U	5 U	5 U	2.2 B	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	16.6
Barium, Dissolved	24.4	23.3	25.5	21.4	21.6	19.8	20.8	24.2	22	23.8	24.3	24.4	25.4	23.9	23.8
Beryllium, Dissolved	1 U	1 U	1 U	1 U	1 U	0.06 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium, Dissolved	1 U	1 U	0.05 J	1 U	0.05 J	0.18 J	0.06 J	1 U	1 U	1 U	0.14 J	0.18 J	0.18 J	0.19 J	1 U
Calcium, Dissolved	77,200	78,200	68,800	61,400	66,800	61,400	73,400	99,900	66,300	128,000	128,000	120,000	128,000	122,000	114,000

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Upstream Pond									Stream					
Station ID	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07		CAS04-SW08	CAS04-SW09
Sample ID	CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209	CAS04-SW08-1209	CAS04-SW09-1209
Sample Date	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09
Chemical Name															
Chromium, Dissolved	2.1 B	1.8 B	1.6 B	0.74 B	0.56 B	1.9 B	1.6 B	1.5 B	0.72 B	1.4 B	1.1 B	1.3 B	1.5 B	1.4 B	1 B
Cobalt, Dissolved	0.29 J	0.27 J	0.28 J	0.13 J	0.26 J	0.45 J	0.26 J	0.41 J	0.27 J	0.2 J	0.53 J	0.43 J	0.49 J	0.56 J	0.67 J
Copper, Dissolved	4.2 B	2.4 B	3 B	3.6 B	3.5 B	4.3 B	2.5 B	1.9 B	3.2 B	2.2 B	1.6 B	2.6 B	3 B	2.2 B	3 B
Iron, Dissolved	30.4 J	29.8 J	30.1 J	54.3 J	55.8 J	96.6 J	50.9 J	17.5 J	119	8.7 B	5.2 B	13.3 B	100 U	7.9 B	5,680
Lead, Dissolved	0.5 B	0.22 B	0.19 B	0.08 B	0.24 B	0.25 B	0.26 B	0.32 B	0.66 B	0.35 B	0.15 B	0.3 B	0.27 B	0.28 B	0.22 B
Magnesium, Dissolved	1,880	1,880	2,300	1,920	1,810	1,750	1,880	2,180	1,800	2,150	2,030	1,780	1,910	1,860	3,110
Manganese, Dissolved	41.5	38.9	55.9	11.4	45.6	40.3	43.9	91.5	91.9	49.6	18.8	4.4 J	5.3	6.2	268
Mercury, Dissolved	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel, Dissolved	0.83 J	1.1 J	0.97 J	0.73 J	0.88 J	1 J	1 J	1.1 J	1.3 J	0.54 B	0.89 B	1.2 B	0.95 B	0.95 B	0.98 B
Potassium, Dissolved	1,510	1,500	1,600	1,600	1,550	1,460	1,440	1,380	1,540	1,320 B	1,680	1,850	1,930	2,150	1,380 B
Selenium, Dissolved	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.84 J	1.6 J	5 U
Silver, Dissolved	1 U	1 U	1 U	1 U	1 U	0.1 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sodium, Dissolved	5,150	5,160	5,020	4,520	4,940	4,580	5,040	5,910	4,740	7,120	7,840	7,410	8,030	8,020	5,550
Thallium, Dissolved	2 U	2 U	0.16 B	0.23 B	2 U	0.21 B	2 U	2 U	0.11 B	0.11 B	2 U	2 U	2 U	2 U	2 U
Vanadium, Dissolved	0.92 B	0.91 B	5 U	0.72 J	5 U	0.86 B	0.92 B	5 U	5 U	5 U	5 U	1.2 J	1.2 J	1.1 J	5 U
Zinc, Dissolved	10.6 B	8.4 B	7.8 B	9 B	10.1 B	10.5 B	7.5 B	6.5 B	10 B	5.2 B	11.9 B	14.8 B	16 B	12.8 B	19.8 J
Wet Chemistry (mg/l)															
Hardness	196	NA	179	170	169	166	209	276	181	338	330	335	NA	321	297

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 04/25/2013

Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks

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

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Youth Pond						
Station ID	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
Sample ID	CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
Sample Date	10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Chemical Name							
Volatile Organic Compounds (µg/l)							
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	12 U	12 U	12 U	12 U	12 U	12 U	12 U
2-Hexanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	12 U	12 U	12 U	12 U	12 U	12 U	12 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Carbon tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cyclohexane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorodifluoromethane (Freon-12)	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl acetate	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylcyclohexane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl-tert-butyl ether (MTBE)	1 U	1 U	1 U	1 U	1 U	1 U	1 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane (Freon-11)	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/l)							
1,1-Biphenyl	9 U	9 U	9 U	9 U	9 U	9 U	9 U
1,2,4,5-Tetrachlorobenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,2'-Oxybis(1-chloropropane)	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,3,4,6-Tetrachlorophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4,5-Trichlorophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4,6-Trichlorophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4-Dichlorophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4-Dimethylphenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4-Dinitrophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2,4-Dinitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
2,6-Dinitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Youth Pond						
Station ID	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
Sample ID	CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
Sample Date	10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Chemical Name							
2-Chloronaphthalene	3 U	3 U	3 U	3 U	3 U	3 U	3 U
2-Chlorophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Methylnaphthalene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
2-Methylphenol	3 U	3 U	3 U	3 U	3 U	3 U	3 U
2-Nitroaniline	3 U	3 U	3 U	3 U	3 U	3 U	3 U
2-Nitrophenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
3- and 4-Methylphenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
3,3'-Dichlorobenzidine	6 U	6 U	6 U	6 U	6 U	6 U	6 U
3-Nitroaniline	3 U	3 U	3 U	3 U	3 U	3 U	3 U
4,6-Dinitro-2-methylphenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Bromophenyl-phenylether	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Chloro-3-methylphenol	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Chloroaniline	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Chlorophenyl-phenylether	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Nitroaniline	3 U	3 U	3 U	3 U	3 U	3 U	3 U
4-Nitrophenol	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Acenaphthene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Acenaphthylene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Acetophenone	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Anthracene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Atrazine	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Benzaldehyde	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Benzo(a)anthracene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(a)pyrene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(b)fluoranthene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(g,h,i)perylene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(k)fluoranthene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
bis(2-Chloroethoxy)methane	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 U	6 U
bis(2-Chloroethyl)ether	6 U	6 U	6 U	6 U	6 U	6 U	6 U
bis(2-Ethylhexyl)phthalate	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Butylbenzylphthalate	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Caprolactam	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Carbazole	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Chrysene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Dibenz(a,h)anthracene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Dibenzofuran	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Diethylphthalate	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Dimethyl phthalate	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Di-n-butylphthalate	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Di-n-octylphthalate	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Fluoranthene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Fluorene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Hexachlorobenzene	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Hexachlorobutadiene	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Hexachlorocyclopentadiene	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 U	6 U
Hexachloroethane	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Indeno(1,2,3-cd)pyrene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Isophorone	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Naphthalene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
n-Nitroso-di-n-propylamine	6 U	6 U	6 U	6 U	6 U	6 U	6 U
n-Nitrosodiphenylamine	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Nitrobenzene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
Pentachlorophenol	9 U	9 U	9 U	9 U	9 U	9 U	9 U
Phenanthrene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Phenol	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Pyrene	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Pesticide/Polychlorinated Biphenyls (µg/l)							
4,4'-DDD	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDT	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor-1016	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1221	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1232	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Youth Pond						
Station ID	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
Sample ID	CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
Sample Date	10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Chemical Name							
Aroclor-1242	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1248	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1254	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1260	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan II	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endrin aldehyde	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endrin ketone	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Methoxychlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Toxaphene	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U
Explosives (µg/l)							
1,3,5-Trinitrobenzene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
1,3-Dinitrobenzene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
2,4,6-Trinitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
2-Amino-4,6-dinitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
2-Nitrotoluene	0.168 U	0.169 U	0.167 U	0.178 U	0.173 U	0.167 U	0.167 U
3-Nitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
4-Amino-2,6-dinitrotoluene	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
4-Nitrotoluene	0.308 U	0.309 U	0.306 U	0.326 U	0.316 U	0.306 U	0.306 U
HMX	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
RDX	0.164 U	0.165 U	0.163 U	0.174 U	0.168 U	0.163 U	0.163 U
Tetryl	0.164 U	0.165 U	0.163 UL	0.174 U	0.168 U	0.163 U	0.163 U
Total Metals (µg/l)							
Aluminum	58.8	38.1 J	25 U	9.35 J	21.5 J	15.7 J	29.5 J
Antimony	0.116 J	0.44 U	0.44 U	0.44 U	0.44 U	0.206 J	0.155 J
Arsenic	1.5 J	1.62 J	1.55 J	1.55 J	1.4 J	1.45 J	1.15 J
Barium	17.1	16.3	14.5	17	16.5	9.5 J	30
Beryllium	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium	0.177 J	0.115 J	4 U	4 U	0.292 J	4 U	4 U
Calcium	32,400	31,200	33,000	34,800	34,500	24,400	95,100
Chromium	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Cobalt	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.294 J
Copper	1	0.838 J	0.627 J	0.286 J	0.236 J	1.2	0.663 J
Cyanide	11 U	11 U	11 U	11 U	11 U	11 U	11 U
Iron	928	868	1,200	1,040	891	349	716
Lead	0.886 J	0.582 J	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Magnesium	987	964	991	995	995	895	2,180
Manganese	63.2	64	64.1	78.6	59.9	12.9	48.7
Mercury	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U
Nickel	0.944 J	0.859 J	1.14 J	0.903 J	0.864 J	0.527 J	2.15 J
Potassium	2,430 J	2,420 J	2,350 J	2,320 J	2,310 J	1,920 J	2,230 J
Selenium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.12 U	0.12 U	0.12 U	0.12 U	0.0418 J	0.12 U	0.12 U
Sodium	3,030	2,970	2,890	3,210	3,200	1,910	6,250
Thallium	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
Vanadium	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc	10.9 J	7.98 J	12.9 L	6 U	6 U	6.94 J	3.9 J
Dissolved Metals (µg/l)							
Aluminum, Dissolved	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Antimony, Dissolved	0.12 J	0.111 J	0.44 U	0.44 U	0.44 U	0.218 J	0.163 J
Arsenic, Dissolved	0.873 J	0.84 J	0.936 J	0.87 J	0.896 J	0.92 J	1.07 J
Barium, Dissolved	14.1	14.6	12.8	16	15.7	8.21 J	28.6
Beryllium, Dissolved	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium, Dissolved	4 U	0.11 J	4 U	4 U	4 U	4 U	4 U
Calcium, Dissolved	29,900	30,200	32,800	33,700	34,300	23,400 J	91,400

TABLE I-6

Raw Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Youth Pond						
Station ID	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
Sample ID	CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
Sample Date	10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Chemical Name							
Chromium, Dissolved	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Cobalt, Dissolved	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.255 J
Copper, Dissolved	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.758 J	0.431 J
Iron, Dissolved	119	153	68	62.1	72.7	48.6	406
Lead, Dissolved	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Magnesium, Dissolved	929	949	998	969	982	858	2,090
Manganese, Dissolved	48.3	49.7	57.7	72.7	53.1	3.58	45.6
Mercury, Dissolved	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U	0.069 U
Nickel, Dissolved	0.812 J	0.816 J	0.77 J	0.826 J	0.844 J	0.484 J	1.97 J
Potassium, Dissolved	2,300 J	2,280 J	2,220 J	2,270 J	2,260 J	1,790 J	2,160 J
Selenium, Dissolved	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver, Dissolved	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Sodium, Dissolved	2,680	2,740	2,750	2,950	3,080	1,870	5,860
Thallium, Dissolved	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
Vanadium, Dissolved	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc, Dissolved	6 U	6 U	6 U	6 U	6 U	4.48 J	2.97 J
Wet Chemistry (mg/l)							
Hardness	80	NA	84	88	90	62	240

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Notes:

Shading indicates detections

B - Analyte not detected above the level reported in blanks

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

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE I-7

Raw Biota Tissue Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, Virginia

	Site 04														Youth Pond			
Station ID	CAS04-TS01	CAS04-TS02	CAS04-TS03	CAS04-TS04	CAS04-TS05	CAS04-TS06	CAS04-TS07	CAS04-TS08	CAS04-TS09	CAS04-TS10	CAS04-TS11	CAS04-TS12	CAS04-TS13		CAYP-TS01	CAYP-TS02	CAYP-TS03	CAYP-TS04
Sample ID	CAS04-TS01-1012	CAS04-TS02-1012	CAS04-TS03-1012	CAS04-TS04-1012	CAS04-TS05-1012	CAS04-TS06-1012	CAS04-TS07-WB-1012	CAS04-TS08-WB-1012	CAS04-TS09-WB-1012	CAS04-TS10-WB-1012	CAS04-TS11-WB-1012	CAS04-TS12-WB-1012	CAS04-TS13-F-1012	CAS04-TS13-O-1012	CAYP-TS01-1012	CAYP-TS02-1012	CAYP-TS03-1012	CAYP-TS04-WB-1012
Sample Date	10/11/12	10/04/12	10/24/12	10/26/12	10/26/12	10/11/12	10/04/12	10/05/12	10/05/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/05/12	10/26/12	10/26/12	10/05/12
Chemical Name																		
Pesticide/Polychlorinated Biphenyls (UG/KG)																		
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25 U	26 UL	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25 U	26 UL	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	29 U	30 UL	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25 U	26 UL	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25 U	26 UL	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	82 J	180 L	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	420	980 L	NA	NA	NA	NA
Polychlorinated Biphenyl Congeners (PG/G)																		
3,3',4,4'-Tetrachlorobiphenyl (77)	300	37 J	140	13 X	17 X	310	1,600	690	930	53 J	800	270	240 X	1,800	97 U	98 U	8.2 X	84 J
3,4,4',5-Tetrachlorobiphenyl (81)	16 J	24 X	33 X	5.4 X	95 U	8.3 X	53 X	59 X	52 X	18 X	31 X	18 X	20 X	76 X	97 U	98 U	100 U	96 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	1,500	1,500	4,200	200	390	2,100	10,000	15,000 K	18,000	20,000	15,000	5,400	3,200	22,000	300	150	81 J	1,000
2,3,4,4',5-Pentachlorobiphenyl (114)	82 J	110 X	500 X	12 X	51 X	62 X	440	350 X	590	570 X	630	240	110 X	840	21 X	62 J	12 X	54 J
2,3',4,4',5-Pentachlorobiphenyl (118)	4,100	7,000	31,000	1,300	2,500	6,200	29,000	49,000 K	55,000	56,000	48,000	18,000	10,000	68,000	1,700	3,300	460	3,700
2,3',4,4',5'-Pentachlorobiphenyl (123)	97 J	150 X	760	31 J	68 X	97 J	640	820 X	1,000	830	910	330	150 X	1,300	27 J	46 J	13 X	45 X
3,3',4,4',5-Pentachlorobiphenyl (126)	140	49 X	93 J	43 J	48 J	62 X	380	140	190	230	210 X	170 X	63 J	530	57 X	31 X	19 X	70 X
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	1,600	1,600	2,600	860	740	890	4,200	6,500 K	7,400	8,500	8,100	2,800	1,400	10,000	900	830	360	930
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	56 X	46 X	46 X	24 X	19 X	50 X	170	140	98 U	49 X	96 U	110	42 X	62 X	10 X	43 X	8.8 X	24 X
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	800	420	440	360	260	420	1,800	410	490	1,800	2,700	920	370	2,600	350	330	160	390
Decachlorobiphenyl (209)	160 X	49 J	81 X	26 X	33 X	100 X	310	130 X	160 X	320	390 X	100 J	76 J	480	16 J	29 X	41 X	6.7 X
Congeners (156/157)	1,800	1,500	5,400	960	1,100	1,400	6,400	1,900	2,500	6,700	11,000	4,000	1,300	9,900	1,100	1,400	480	1,700
Total Dichlorobiphenyls	680 J	350 J	300 J	200 J	180 J	2,800 J	17,000 J	33,000 J	34,000 J	4,200 J	6,600 J	20,000 J	7,000 J	43,000 J	210 J	95 J	30 J	1,300 J
Total Heptachlorobiphenyls	150,000	83,000 J	67,000 J	43,000 J	38,000 J	120,000 J	530,000 J	590,000 J	620,000 J	780,000	770,000 J	260,000 J	140,000 J	1,000,000 J	60,000 J	44,000 J	21,000 J	95,000 J
Total Hexachlorobiphenyls	160,000 J	81,000 J	110,000 J	28,000 J	26,000 J	140,000 J	670,000 J	870,000	980,000 J	1,100,000 J	1,000,000 J	370,000 J	210,000 J	1,400,000 J	42,000 J	32,000 J	12,000 J	120,000 J
Total Monochlorobiphenyls	110 U	97 U	3.6 B	97 U	95 U	61 J	310	720 J	720	99	140	370	130	810 J	97 U	98 U	100 U	96 U
Total Nonachlorobiphenyls	1,500	850	740 J	520 J	490 J	1,500	5,200	2,100	2,500	5,000	6,500	1,900	1,100 J	8,200	600 J	620 J	290 J	580 J
Total Octachlorobiphenyls	27,000 J	18,000	12,000 J	9,200 J	8,700 J	30,000 J	110,000	93,000	110,000	150,000	160,000 J	46,000 J	28,000	220,000	14,000 J	10,000 J	4,400 J	17,000 J
Total Pentachlorobiphenyls	32,000 J	18,000 J	49,000 J	2,400 J	4,300 J	53,000 J	300,000 J	380,000 J	480,000 J	350,000 J	340,000 J	150,000 J	84,000 J	550,000	3,100 J	4,200 J	970 J	26,000 J
Total Tetrachlorobiphenyls	17,000 J	8,000 J	7,700 J	740 J	1,500 J	36,000 J	200,000 J	280,000 J	330,000 J	190,000 J	150,000 J	110,000 J	54,000 J	360,000 J	470 B	710 J	180 B	8,900 J
Total Trichlorobiphenyls	6,000 J	4,300 J	2,000 J	520 J	940 J	13,000 J	120,000 J	100,000 J	120,000 J	46,000 J	32,000 J	45,000 J	20,000 J	130,000 J	510 J	320 J	88 B	4,100 J
Total Metals (MG/KG)																		
Aluminum	1,490	24.5	51.8	121	60.3	274	36.4	11.4 J	15.2 J	7.4 J	8.5 J	53.7	1.1 J	4.7 J	10.6 J	58.4	91.8	9.4 J
Antimony	0.11 J	0.28 U	0.26 U	0.48 U	0.42 U	0.27 U	0.36 U	0.39 U	0.47 U	0.27 U	0.32 U	0.34 U	0.32 U	0.26 U	0.038 U	0.01 B	0.01 B	0.026 U
Arsenic	2.2	0.04 J	0.08 J	0.18 J	0.12 J	1.8	0.09 J	0.06 J	0.11 J	0.27 U	0.12 J	0.2 J	0.32 U	0.26 U	0.31 U	0.12 J	0.2 J	0.21 U
Barium	8.4	1.6	2.4	2.5	3.2	6.5	1.6	3.7	4.4	0.38	0.71	1.1	0.04 B	0.68	2.6	2.9	4.5	0.8
Beryllium	0.1 J	0.028 U	0.026 U	0.048 U	0.042 U	0.01 J	0.036 U	0.039 U	0.047 U	0.027 U	0.032 U	0.034 U	0.032 U	0.026 U	0.015 U	0.003 B	0.005 B	0.01 U
Cadmium	7.6	0.02 J	0.22 J	0.22 J	0.1 J	0.11 J	0.02 B	0.24 U	0.28 U	0.02 J	0.006 J	0.007 J	0.19 U	0.15 U	0.04 J	0.17	0.2	0.01 U
Calcium	1,800	12,200	7,400	8,280	11,100	4,290	9,550	12,200	13,600	5,260	23,200	18,800	615	25,600	11,000	5,680	7,150	13,400
Chromium	3.7	0.26 B	0.35 B	0.8 J	0.37 B	0.7	0.27 B	0.28 B	0.27 B	0.15 B	0.33 B	0.37 B	0.07 B	0.35 B	0.13 J	0.34 J	0.32	0.14 J
Cobalt	0.77 J	0.02 J	0.05 J	0.08 J	0.04 J	0.13 J	0.06 J	0.02 J	0.03 J	0.03 J	0.05 J	0.05 J	0.25 U	0.03 J	0.02 B	0.04 B	0.05 B	0.02 B
Copper	13.2	1.1 J	4.1	2.3 J	2 J	4.5	1 J	1.4 J	1.4 J	0.66 J	0.62 J	1.2 J	0.64 U	0.75 J	1.5	2.3	2.4	0.46
Iron	2,730	52.9	108	225	116	1,590	119	43.5	110	79.1	56.3	183	1.6 J	21.9	57.3	81.8	123	67.8
Lead	3.5	0.09 J	0.4	0.2 J	0.18 J	0.77	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.17 J	0.25 U	0.21 U	0.1 B	0.18	0.4	0.05 B
Magnesium	475	326	278	311	350	199	401	449	474	272	602	477	314	561	318	259	268	464
Manganese	27.6	1.9	2.4	2.1	2.8	34.5	3.5	5.7	7.9	0.87	6.9	2.3	0.25 U	2.2	1.8 B	2.2 B	2.5 B	3.7
Mercury	0.04	0.02 J	0.028 B	0.02 B	0.02 B	0.006 J	0.01 J	0.02 J	0.01 J	0.03	0.03	0.01 J	0.03	0.03	0.01 J	0.03 B	0.04 B	0.009 J
Nickel	1.7	0.23 U	0.08 J	0.22 J	0.05 J	0.29 J	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.27 U	0.25 U	0.21 U	0.02 B	0.33 B	0.09 B	0.062 U
Potassium	1,340	2,510	2,310	2,280	2,410	1,400	2,920	2,560 K	2,490	2,670	2,720	2,820	3,640	2,570	2,320	2,220	2,140	2,780
Selenium	0.94 B	0.41 B	0.44 B	0.54	0.49 B	0.42 B	0.61 B	0.36 B	0.56 B	0.59 B	0.48 B	0.57 B	0.31 B	0.53 B	0.22 J	0.26 J	0.36	0.19 J
Silver	0.08 J	0.23 U	0.21 U	0.38 U	0.33 U	0.06 J	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	0.27 U	0.25 U	0.21 U	0.031 U	0.005 B	0.005 B	0.021 U
Sodium	548	1,060	881	981	936	1,080	945	866	708	922	1,360	1,120	582	1,460	977	838	856	912
Thallium	0.45 U	0.28 U	0.26 U	0.48 U	0.42 U	0.27 U	0.36 U	0.39 U	0.47 U	0.27 U	0.32 U	0.34 U	0.32 U	0.26 U	0.031 U	0.03 U	0.021 U	0.021 U
Vanadium	4.3	0.06 J	0.15 J	0.35 J	0.19 J	0.97	0.11 J	0.31 U	0.06 J	0.03 J	0.05 J	0.17 J	0.25 U	0.05 J	0.31 U	0.1 J	0.17 J	0.21 U
Zinc	57.8	16.9	17.4	17.6	16.8	24.3	30.9	57.8	65.1	23	27.3	19.7	4.4	17.9	17.9	19.2	25.2	25.8
Wet Chemistry (PCT)																		
% Solids	29	20	22	21	20	14	25	25	26	30	24	22	22	26	23	22	21	27
Lipids (%)	NA	0.67	0.87	0.46	0.26	0.59	1.6	4.1	3.6	8.8	0.95	NA	0.22	3.7	1.2	0.76	0.6	3.9

\\VBOFFP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[1 - Combined Laboratory Raw Data Tables.xls], jdean6, 08/01/2013

Notes:

Shading indicates detections

B - Analyte not detected significantly above the level reported in an associated blank

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

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

NA - Not analyzed

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

U - The material was analyzed for, but not detected

X - PCB congeners only: Estimated Maximum Possible Concentration (EMPC)

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

All sample results are reported wet-weight; results are not adjusted for percent moisture or percent lipids

TABLE I-7

Raw Biota Tissue Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburn, Virginia

	Youth Pond				
Station ID	CAYP-TS05	CAYP-TS06	CAYP-TS07	CAYP-TS08	
Sample ID	CAYP-TS05-WB-1012	CAYP-TS06-WB-1012	CAYP-TS07-WB-1012	CAYP-TS08-F-1012	CAYP-TS08-O-1012
Sample Date	10/05/12	10/09/12	10/05/12	10/05/12	10/05/12
Chemical Name					
Pesticide/Polychlorinated Biphenyls (UG/KG)					
Aroclor-1016	NA	NA	NA	24 U	23 UL
Aroclor-1221	NA	NA	NA	24 U	23 UL
Aroclor-1232	NA	NA	NA	28 U	27 UL
Aroclor-1242	NA	NA	NA	24 U	23 UL
Aroclor-1248	NA	NA	NA	24 U	23 UL
Aroclor-1254	NA	NA	NA	24 U	23 UL
Aroclor-1260	NA	NA	NA	58	250 L
Polychlorinated Biphenyl Congeners (PG/G)					
3,3',4,4'-Tetrachlorobiphenyl (77)	95 J	62 J	99 U	10 X	94 X
3,4,4',5-Tetrachlorobiphenyl (81)	5.6 J	100 U	99 U	100 U	99 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	1,900 K	1,200	2,400	210	1,800
2,3,4,4',5-Pentachlorobiphenyl (114)	91 X	23 X	110 X	9.5 X	130
2,3',4,4',5-Pentachlorobiphenyl (118)	7,200 K	4,800	8,200	770	7,500
2,3',4,4',5'-Pentachlorobiphenyl (123)	86 J	39 X	74 X	6.4 X	99 J
3,3',4,4',5-Pentachlorobiphenyl (126)	110	15 X	84 X	16 X	200
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	2,500 K	1,300	1,500	330	3,500
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	150 X	100 U	67 X	9.8 X	140
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	580 K	63 J	610	150	1,600
Decachlorobiphenyl (209)	25 X	100 U	34 X	100 U	67 X
Congeners (156/157)	2,200 K	270	2,700	530	4,700
Total Dichlorobiphenyls	650 J	920 J	650 J	110 J	750
Total Heptachlorobiphenyls	220,000 J	110,000 J	150,000 J	29,000 J	310,000 J
Total Hexachlorobiphenyls	240,000 J	140,000 J	190,000 J	30,000 J	310,000 J
Total Monochlorobiphenyls	96 U	100 U	99 U	100 U	3.3 B
Total Nonachlorobiphenyls	1,000 J	240	970 J	230 J	2,300
Total Octachlorobiphenyls	37,000	15,000	25,000 J	5,800 J	65,000
Total Pentachlorobiphenyls	41,000 J	33,000 J	47,000 J	4,100 J	45,000 J
Total Tetrachlorobiphenyls	11,000 J	12,000 J	15,000 J	900 J	10,000 J
Total Trichlorobiphenyls	3,800 J	4,600 J	4,600 J	230 J	3,800 J
Total Metals (MG/KG)					
Aluminum	3.3 B	3.4 B	7.2 B	1.1 B	2.7 B
Antimony	0.034 U	0.045 U	0.049 U	0.048 U	0.032 U
Arsenic	0.28 U	0.16 J	0.39 U	0.39 U	0.25 U
Barium	0.49	3.1	0.54	0.05 J	0.97
Beryllium	0.014 U	0.018 U	0.004 B	0.019 U	0.013 U
Cadmium	0.03 J	0.018 U	0.02 J	0.019 U	0.013 U
Calcium	9,000 J	13,400	6,920	282	44,800
Chromium	0.14 J	0.11 J	0.18 J	0.14 J	0.21 J
Cobalt	0.04 B	0.02 B	0.03 B	0.006 B	0.05 B
Copper	0.72	1.2	0.55	0.22 J	0.36
Iron	50.1 L	86.2	37.7	5.8 U	126
Lead	0.05 B	0.05 B	0.05 B	0.008 B	0.06 B
Magnesium	393 K	422	286	266	928
Manganese	1.3 B	11	1.9 B	0.23 B	2.6
Mercury	0.02 J	0.009 J	0.01 J	0.09	0.04
Nickel	0.083 U	0.11 U	0.1 B	0.1 B	0.076 U
Potassium	2,820	2,210	2,230	3,380	2,350
Selenium	0.26 J	0.19 J	0.19 J	0.15 J	0.25 J
Silver	0.028 U	0.036 U	0.039 U	0.039 U	0.025 U
Sodium	942	786	864	629	1,600
Thallium	0.028 U	0.036 U	0.039 U	0.039 U	0.025 U
Vanadium	0.28 U	0.36 U	0.39 U	0.39 U	0.25 U
Zinc	16.9	67.8	23.3	4.6	33.4
Wet Chemistry (PCT)					
% Solids	24	25	29	19	26
Lipids (%)	2.2	4.2	11	0.1 U	2.2

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MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

All sample results are reported wet-weight; results are not adjusted for percent moisture or percent lipids

TABLE I-8

Raw Ref Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012	CAREFYP-SD01-1012	CAREFYP-SD02-1012	CAREFYP-SD02P-1012	CAREFYP-SD03-1012	CAREFS04-SD01-1012	CAREFS04-SD01P-1012	CAREFS04-SD02-1012	CAREFS04-SD03-1012	CAREFS04-SD04-1012	CAREFS04-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
Volatile Organic Compounds (µg/kg)																
1,1,1-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,1,2,2-Tetrachloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,1,2-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,1-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,1-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,2,3-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 J	16 UJ
1,2,4-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
1,2-Dibromo-3-chloropropane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
1,2-Dibromoethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,2-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
1,2-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,2-Dichloropropane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
1,3-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
1,4-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
2-Butanone	32.2	169	129	31	42.4	109	310	86	120	170	290 J	190 J	240 J	76 K	340 J	430 J
2-Hexanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	17 U	7.6 U	11 U	14 UL	120 UL	98 UL	95 UL	35 U	71 UL	79 UL
4-Methyl-2-pentanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	17 U	7.6 U	11 U	14 U	120 UL	98 UL	95 UL	35 U	71 UL	79 UL
Acetone	114 J	563 J	424 J	99.8 J	148 J	629 J	1,400	450	680	790	1,200 J	1,000 J	1,200 J	370 K	1,500 J	1,700 J
Benzene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Bromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	NA	NA	NA	NA	NA	NA
Bromodichloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Bromoform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Bromomethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL
Carbon disulfide	4.54 UJ	15 UJ	7.06 J	4.26 UJ	7.55 UJ	13.8 UJ	15 J	15 U	22 U	28 U	18 L	13 L	16 L	7.2 K	11 L	15 L
Carbon tetrachloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Chlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Chloroethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL
Chloroform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Chloromethane	9.07 UJ	30 UJ	28.2 UJ	8.51 UJ	15.1 UJ	27.6 UJ	6.9 U	3 U	4.4 U	5.6 UL	46 UL	39 UL	38 UL	14 U	28 UL	32 UL
cis-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
cis-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Cyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Dibromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Dichlorodifluoromethane (Freon-12)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 U	46 UL	39 UL	38 UL	14 UJ	28 UL	32 UL
Ethylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Isopropylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ
m- and p-Xylene	NA	NA	NA	NA	NA	NA	14 U	6.1 U	8.8 U	11 UL	46 UL	39 UL	38 UL	14 UJ	28 UL	32 UL
Methyl acetate	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	34 U	15 U	22 U	28 U	28 UJ	23 UJ	23 UJ	8.4 U	17 UJ	19 UJ
Methylcyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Methylene chloride	5.21 J	16.9 J	17.1 J	8.51 U	8.18 J	27.6 U	34 U	15 U	22 U	28 UL	120 UL	98 UL	95 UL	35 U	71 UL	79 UL
Methyl-tert-butyl ether (MTBE)	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
o-Xylene	NA	NA	NA	NA	NA	NA	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Styrene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Tetrachloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Toluene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
trans-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
trans-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Trichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	23 UL	20 UL	19 UL	7 U	14 UL	16 UL
Trichlorofluoromethane (Freon-11)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	6.9 U	3 U	4.4 U	5.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL
Vinyl chloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	6.9 U	3 U	4.4 U	5.6 UL	46 UL	39 UL	38 UL	14 U	28 UL	32 UL
Xylene, total	13.6 U	45 U	42.3 U	12.8 U	22.6 UL	41.4 U	NA	NA	NA	NA	69 UL	58 UL	57 UL	21 U	43 UL	47 UL
Semivolatile Organic Compounds (µg/kg)																
1,1-Biphenyl	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
1,2,4,5-Tetrachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 UL	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2,2'-Oxybis(1-chloropropane)	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ
2,3,4,6-Tetrachlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	940 U	1,700 U	880 U	1,700 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2,4,5-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
2,4,6-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2,4-Dichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2,4-Dimethylphenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2,4-Dinitrophenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 R	8,120 U	1,400 U	2,500 U	1,300 U	2,600 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
2,4-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
2,6-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
2-Chloronaphthalene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
2-Chlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2-Methylnaphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U
2-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
2-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	470 U	830 U	440 U	870 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
2-Nitrophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	940 U	1,700 U	880 U	1,700 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
3,3'-Dichlorobenzidine	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
3-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	470 U	830 U	440 U	870 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
4,6-Dinitro-2-methylphenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 U	8,120 U	1,400 U	2,500 U	1,300 U	2,600 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
4-Bromophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
4-Chloro-3-methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
4-Chloroaniline	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
4-Chlorophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
4-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	470 U	830 U	440 U	870 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
4-Nitrophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	470 U	830 U	440 U	870 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
Acenaphthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U
Acenaphthylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U
Acetophenone	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	67 J	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U

TABLE I-8

Raw Ref Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012	CAREFYP-SD01-1012	CAREFYP-SD02-1012	CAREFYP-SD02P-1012	CAREFYP-SD03-1012	CAREFS04-SD01-1012	CAREFS04-SD01P-1012	CAREFS04-SD02-1012	CAREFS04-SD03-1012	CAREFS04-SD04-1012	CAREFS04-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
Atrazine	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ
Benzaldehyde	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 UL	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ
Benzo(a)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	150 J	290	270	130 J	16 J	12 J	64 U	26 U	9.9 L	55 U
Benzo(a)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	170	340	310	120 J	75 UL	60 UL	64 UL	26 U	44 UL	55 UL
Benzo(b)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	300	580	520	190	28 J	20 J	22 J	26 U	20 L	15 J
Benzo(g,h,i)perylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	96 J	160	130 J	78 J	25 J	60 U	64 U	26 UL	44 UL	55 U
Benzo(k)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	100 J	220	200	67 J	75 U	60 U	64 U	26 U	44 UL	55 U
bis(2-Chloroethoxy)methane	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
bis(2-Chloroethyl)ether	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
bis(2-Ethylhexyl)phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	860 B	1,300 U	1,600 U	320 B	640 B	1,400 U
Butylbenzylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
Caprolactam	324 U	1,130 U	966 U	367 U	480 U	812 U	940 U	1,700 U	880 U	1,700 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Carbazole	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Chrysene	8.69 J	22.4 U	19.3 U	7.33 U	9.57 U	17.3 J	190	380	340	120 J	75 U	60 U	64 U	26 U	44 U	55 U
Dibenz(a,h)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 UL	55 U
Dibenzofuran	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Diethylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Dimethyl phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Di-n-butylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
Di-n-octylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Fluoranthene	8.77 J	22.4 U	31.4 J	7.33 U	12.3 J	19 J	370	710	650	250	17 J	17 J	14 J	26 U	13 J	12 J
Fluorene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U
Hexachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Hexachlorobutadiene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 UL	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
Hexachlorocyclopentadiene	324 U	1,130 U	966 U	367 U	480 R	812 U	470 U	830 U	440 U	870 R	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 R	1,400 UJ
Hexachloroethane	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 UL	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
Indeno(1,2,3-cd)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	130 J	110 J	62 J	75 U	60 U	64 U	26 U	44 U	55 U
Isophorone	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Naphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	120 U	110 U	110 U	110 U	75 U	60 U	64 U	26 U	44 U	55 U
n-Nitroso-di-n-propylamine	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
n-Nitrosodiphenylamine	324 U	1,130 U	966 U	367 U	480 U	812 U	940 U	1,700 U	880 U	1,700 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U
Nitrobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
Pentachlorophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	1,400 U	2,500 U	1,300 U	2,600 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U
Phenanthrene	6.45 U	22.4 U	27.5 J	7.33 U	9.57 U	16.2 U	180	360	310	150	75 U	60 U	64 U	26 U	11 J	55 U
Phenol	324 U	1,130 U	966 U	367 U	480 U	812 U	470 U	830 U	440 U	870 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U
Pyrene	7.57 J	25.1 J	27.4 J	7.33 U	12.5 J	21.8 J	330	630	590	230	75 U	60 U	64 U	26 U	12 J	55 U
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	0.571 J	2.32 L	7.97 L	4.51 L	2.3 L	154 L	46 UL	79 L	160 L	87 J	3.7 J	10 UL	10 UL	1.5 L	2.3 J	3 L
4,4'-DDE	0.945 L	3.27 L	9.3 J	3.75 J	1.5 L	26.2 J	46 UL	45 L	47 J	17 UL	26 J	16 J	12 L	7 L	28	18 L
4,4'-DDT	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.45 L	46 UL	41 UL	44 UL	17 UJ	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL
Aldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
alpha-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.813 L	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
alpha-Chlordane	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL
Aroclor-1016	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	54 U	53 U	51 U	18 U	40 U	47 U
Aroclor-1221	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	54 U	53 U	51 U	18 U	40 U	47 U
Aroclor-1232	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	64 U	62 U	60 U	21 U	47 U	55 U
Aroclor-1242	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	54 U	53 U	51 U	18 U	40 U	47 U
Aroclor-1248	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	54 U	53 U	51 U	18 U	40 U	47 U
Aroclor-1254	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	160 U	88 U	170 U	54 U	53 U	51 U	18 U	40 U	47 U
Aroclor-1260	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	190 UL	300 J	160 J	170 U	54 U	53 U	51 U	18 U	40 U	47 U
beta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UJ	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
delta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UJ	4 U	4.7 UL
Dieldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	0.948 J	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 UL	9.1 UL
Endosulfan I	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
Endosulfan II	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL
Endosulfan sulfate	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL
Endrin	0.663 UL	2.25 UL	2.27 J	0.763 UL	0.933 UL	7.36 J	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 UL	9.1 UL
Endrin aldehyde	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL
Endrin ketone	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL
gamma-BHC (Lindane)	0.295 J	2.25 UL	2.03 UL	0.316 J	0.933 UL	2.22 J	46 UL	41 UL	44 UL	17 UJ	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
gamma-Chlordane	0.663 UL	1.1 L	2.56 B	1.27 B	0.933 UL	1.32 B	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL
Heptachlor	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UJ	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL
Heptachlor epoxide	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	46 UL	41 UL	44 UL	17 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL
Methoxychlor	0.663 UJ	2.25 UJ	2.03 UJ	0.763 UJ	0.933 UJ	1.62 UJ	46 UL	41 UL	44 UL	17 UL	54 U	53 UL	51 UL	18 UL	40 U	47 UL
Toxaphene	42.9 UL	145 UL	131 UL	49.3 UL	60.4 UL	105 UL	930 UL	820 UL	880 UL	350 UL	100 U	100 UL	100 UL	34 UL	78 U	91 UL
Explosives (µg/kg)																
1,3,5-Trinitrobenzene	160 U	160 U	167 U	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
1,3-Dinitrobenzene	160 U	278 J	279 J	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
2,4,6-Trinitrotoluene	160 U	160 U	436 J	160 U	141 J	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
2-Amino-4,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
2-Nitrotoluene	160 U	101 J	167 U	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
3,5-Dinitroaniline	160 U	160 U	167 U	160 U	167 U	167 U	600 U	600 U	600 U	600 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
3-Nitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
4-Amino-2,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
4-Nitrotoluene	160 U	160 U	167 U	160 U	348	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
HMX	160 U	160 U	167 U	174 J	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
Nitroglycerin	400 U	384 J	417 U	400 U	417 U	417 U	1,000 U	1,000 U	1,000 U	1,000 U	2,600 UL	2,100 UL	2,400 UL	840 UL	2,000 UL	2,100 UL
Nitroguanidine	105 U	95.2 U	105 U	90.9 U	105 U	100 U	100 U	100 U	105 U	105 U	1,200	1,200	40 U	40 U	360	900
PETN	400 U	400 U	417 U	400 U	417 U	417 U	500 UJ	500 UJ	500 UJ	500 UJ	2,600 UL	2,100 UL	2,400 UL	840 UL	2,000 UL	2,100 UL
RDX	160 U	160 U	297 J	160 U	167 U	167 U	300 U	300 U	300 U	300 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL
Tetryl	160 U	160 U	106 J	160 U	167 U	167 U	300 U	300 U	300 U	300 UL	320 UL	270 UL	290 UL	100 UL	250 R	270 UL
Total Metals (mg/kg)																
Aluminum	2,880	5,320	4,460	6,450	1,730	24,200	10,700	10,900	12,000	8,460 K	17,700 J	12,200 J	16,100	7,480	8,560	9,060
Antimony	1.63 UL	5.45 U	4.98 U	4.82 U	0.726 J	10.6 U	6.56 U	3.53 J	5.22 U	5.93 UL	0.53 B	0.41 B	0.74 B	0.51 B	1.7 L	0.58 B
Arsenic	11.1	147	140	16.3	43.1	43	60.6	52.4	50.8	63.8	106	85.8	46.1	38.9	72	69.3

TABLE I-8

Raw Ref Surface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012	CAREFYP-SD01-1012	CAREFYP-SD02-1012	CAREFYP-SD02P-1012	CAREFYP-SD03-1012	CAREFS04-SD01-1012	CAREFS04-SD01P-1012	CAREFS04-SD02-1012	CAREFS04-SD03-1012	CAREFS04-SD04-1012	CAREFS04-SD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
Barium	23.5	31.7	25.7	34.3	9.62	75	72	69.5	75.7	64.8	64.7 J	44.2 J	72.2	20.7	62	50.7
Beryllium	0.45 J	1.36 U	1.24 U	0.74 J	0.287 U	1.39 J	0.911	0.913	0.996	0.75	1.1 J	0.75 J	1.1 J	0.46 J	0.37 J	0.47 J
Cadmium	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U	1.4	1.48	1.62	0.953	0.45 J	0.4 J	0.4 J	0.11 J	0.95 U	0.09 J
Calcium	2,960	23,000	20,800	3,780	5,490	8,540	111,000 J	85,600	98,800	64,200	40,100	29,900	29,800	7,710	215,000	142,000
Chromium	7.19	18.9	16.8	13.7	5.67	46.2	143	123	137	135	40.2 J	26.6 J	34.7	17	13.1	14.1
Cobalt	1.5 J	6.82 U	6.22 U	6.02 U	1.44 U	13.2 U	4.3	5.01	4.37	3.49	5.4 J	3.6 J	5.4	1.8	2.7 J	3 J
Copper	2.18	10	9.16	2.57 J	3.38	8.72 J	89.7	97.5	111	41.9	16.7	12.5	13.3	4.6	10.1	9.3
Cyanide	0.502 U	1.71 U	1.52 U	0.555 U	0.718 U	1.21 U	0.85 U	0.76 U	0.79 U	0.79 U	2.7 U	1.8 U	2.4 U	0.92 U	2 U	2.1 U
Iron	5,420	13,500	11,400	16,100	5,730	38,900	40,400 J	43,800 J	41,200 J	33,000 J	26,900 J	19,800 J	27,800	12,300	27,500	23,300
Lead	4.46	19	16.6	8.33	6.09	22.2	55.6	57.6	76	36	24 J	16.6 J	22	6.8	12.2	13.3
Magnesium	482 J	716 J	1,870 U	1,100 J	255 J	3,470 J	1,450	1,550	1,620	1,090	2,540 J	1,720 J	2,270	1,130	1,060	955
Manganese	28	69	56.3	54.9	21.9	74.6	195	176	180	186	62.8 J	44.6 J	95.8	30.6	254 L	154
Mercury	0.0307 J	0.224 U	0.16 U	0.0327 J	0.0665 U	0.0811 J	0.117	0.111	0.112	0.154	0.12 J	0.1 J	0.11 J	0.03 J	0.08 J	0.08 J
Nickel	2.57	4.91 J	4.04 J	4.48 J	1.3 J	13.4	7.7	7.91	8.31	6.08	12.6 J	8.7 J	11.6	4.6	5.1	5.8
Potassium	530 J	2,040 U	1,870 U	1,180 J	248 J	3,740 J	1,400	1,530	1,710	1,030	2,860 J	1,900 J	2,420	1,280	892	870
Selenium	1.02 U	3.41 U	3.11 U	3.01 U	0.718 U	6.61 U	2.6 J	3.69 J	3.08 J	2.53 J	2.2 J	1 J	2 J	0.93 U	2.2 U	0.78 J
Silver	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U	1.64 U	1.67 U	0.38 J	0.349 J	0.81 B	0.58 B	0.83 B	0.28 B	0.28 B	0.48 B
Sodium	612 U	2,040 U	1,870 U	1,810 U	431 U	3,960 U	138 B	94 B	102 B	154 B	146 B	100 B	124 B	52.9 B	141 B	125 B
Thallium	0.816 U	2.73 U	2.49 U	2.41 U	0.575 U	5.29 U	6.56 U	6.67 U	5.22 U	5.93 U	2.6 U	1.6 U	2.3 U	0.66 U	0.44 B	0.54 B
Vanadium	7.47	18.4	16.8	16.3	8.64	58.3	35.4	35.5	37.6	25.7	48 J	32.8 J	40.1	22.1	22.7	24.9
Zinc	14	60.1	50.8	19.9	14.2	58.5	766	920	991	460 K	81.4 J	53 J	69.2	23.3	29.9	37.1
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)																
Acid volatile sulfide, SEM	1.98 J	12.1	NA	4.5	2.62 J	9.62	14.8	13	NA	20.5	7.5	NA	57	11	34	100
Cadmium, SEM	0.000822 J	0.00181 J	NA	0.000987 U	0.00085 U	0.00201 U	0.0131	0.0145	NA	0.0114	0.00204 J	NA	0.00385 J	0.00033 J	0.00084	0.0011 J
Copper, SEM	0.0112 J	0.0145 J	NA	0.0104 J	0.0114 J	0.0163 J	0.361	0.193	NA	0.134	0.0325 J	NA	0.0557	0.0053 J	0.103	0.063
Lead, SEM	0.0138	0.0528	NA	0.0192	0.0103	0.0464	0.19	0.228	NA	0.179	0.0384	NA	0.0749	0.00875	0.048	0.049
Mercury, SEM	0.0000569 NU	0.000147 NU	NA	0.0000551 NU	0.0000484 NU	0.000115 NU	0.00063 U	0.00061 U	NA	0.00082 U	0.00013 U	NA	0.000114 U	0.000043 U	0.000088	0.00011 U
Nickel, SEM	0.00813 J	0.0167 J	NA	0.00989 J	0.00373 J	0.0145 J	0.039	0.044	NA	0.042	0.013 J	NA	0.0205 J	0.0047 J	0.0159	0.019 J
Silver, SEM	0.00277 U	0.0071 U	NA	0.00269 U	0.00232 U	0.00547 U	0.0078 U	0.0075 U	NA	0.0051 U	0.0009 J	NA	0.00222 J	0.0018 U	0.0036	0.0045 U
Zinc, SEM	0.0881	0.505	NA	0.0653	0.0717	0.247	9.5	12.5	NA	8.2	0.333	NA	0.555	0.0595	0.29	0.28
Wet Chemistry																
Ammonia (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	380	NA	270	NA
pH (pH units)	6.86 H3	6.54 H3	NA	6.91 H3	6.75 H3	6.72 H3	7.2	6.9	NA	7.1	6.9	NA	6.6	6.9	6.9	6.9
Sulfide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	720 H	NA	880 H	NA
Total organic carbon (TOC) (mg/kg)	56,100 N	97,200 N	NA	37,600 N	51,700 N	57,100 N	96,000	86,000	NA	82,000	170,000	NA	150,000	57,000	100,000	110,000
Grain Size (PCT)																
Coarse Sand (%)	1.8	7.8	NA	3.9	3.9	5.6	3.3	0.7	NA	1	4.1	NA	5.2	3.2	0.8	1.4
Fine Sand (%)	81.1	47	NA	61.8	69	65.3	14.5	5.4	NA	5.4	26.5	NA	33.6	74.7	19.5	14.8
Fines (%)	10.7	35.2	NA	26.2	16.2	20.6	71	91.6	NA	92.1	50.9	NA	34.5	15.8	76.1	74.5
Gravel (%)	0	0	NA	0	1.6	0	0.2	0.5	NA	0	0	NA	0	0	0	0
Medium Sand (%)	6.4	10	NA	8.1	9.3	8.5	11	1.8	NA	1.5	18.5	NA	26.7	6.3	3.6	9.3
Sand (%)	89.3	64.8	NA	73.8	82.2	79.4	NA	NA	NA	NA	49.1	NA	65.5	84.2	23.9	25.5
Grain Size (PCT/P)																
GS03 Sieve 3" (75 mm)	100	100	NA	100	100	100	NA	NA	NA	NA	100	NA	100	100	100	100
GS05 Sieve 2" (50 mm)	100	100	NA	100	100	100	100	100	NA	100	100	NA	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	100	100	NA	100	100	100	100	100	NA	100	100	NA	100	100	100	100
GS07 Sieve 1" (25.0 mm)	100	100	NA	100	100	100	100	100	NA	100	100	NA	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	100	100	NA	100	100	100	100	100	NA	100	100	NA	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	100	100	NA	100	100	100	100	100	NA	100	100	NA	100	100	100	100
Sieve No. 004 (4.75 mm)	100	100	NA	100	98.4	100	99.8	99.5	NA	100	100	NA	100	100	100	100
Sieve No. 010 (2.00 mm)	98.2	92.2	NA	96.1	94.5	94.4	96.5	98.8	NA	99	95.9	NA	94.8	96.8	99.2	98.6
Sieve No. 020 (850 um)	96.3	88.6	NA	93.9	93.4	91.9	90.9	97.8	NA	98.2	87	NA	81.3	94.2	98.8	94.5
Sieve No. 040 (425 um)	91.8	82.2	NA	88	85.2	85.9	85.5	97	NA	97.5	77.4	NA	68.1	90.5	95.6	89.3
Sieve No. 060 (250 um)	66.2	69.4	NA	67.3	67.7	67	81.4	96.3	NA	96.5	69.3	NA	56.4	77.6	90.7	84.6
Sieve No. 080 (180 um)	40.1	56.2	NA	48.4	49.6	47.6	NA	NA	NA	NA	62.8	NA	48.4	56.7	86.5	81.4
Sieve No. 100 (150 um)	26.3	47.6	NA	39.7	35.6	37.4	NA	NA	NA	NA	58.8	NA	43.6	37.7	83.9	79.4
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	73	92.6	NA	92.9	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	10.7	35.2	NA	26.2	16.2	20.6	71	91.6	NA	92.1	50.9	NA	34.5	15.8	76.1	74.5

\\VBOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[2 - Combined Reference Laboratory Raw Data Tables.xls], ccampbe6, 03/20/2013

Notes:

Shading indicates detections

B - Analyte not detected significantly above the level reported in an associated blank

H - Hold time was exceeded

H3 - Unvalidated data; result estimated; sample received outside the recommended holding time for this analyte

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

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

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

N - Unvalidated data; one or more quality control criteria was not met.

NA - Not analyzed

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/kg - Milligrams per kilogram

PCT - Percent

PCT/P - Percent passed

µg/kg - Micrograms per kilogram

µmol/g - Micromoles per gram

TABLE I-9

Raw Ref Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Williamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFYP-SSD01-1012	CAREFYP-SSD02-1012	CAREFYP-SSD02P-1012	CAREFYP-SSD03-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
Volatile Organic Compounds (µg/kg)																
1,1,1-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1,2,2-Tetrachloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 U	8 U	8.5 UL	12 UL
1,1,2-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1-Dichloroethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1-Dichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2,3-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2,4-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dibromo-3-chloropropane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dibromoethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2-Dichloropropane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,3-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,4-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
2-Butanone	19	40.9	11.8	43.9	13.3 J	17.5 J	140	260	210	200 L	85 J	72 J	180 J	160	190 J	340 J
2-Hexanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	9.1 U	14 U	13 U	10 UL	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
4-Methyl-2-pentanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	9.1 U	14 U	13 U	10 U	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
Acetone	70.5 J	137 J	43.4 J	157 J	57.6 J	77.4 J	650	1,400	1,200	900	460 J	500 J	660 J	730	820 J	1,400 J
Benzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	NA	NA	NA	NA	NA	NA
Bromodichloromethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromoform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromomethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Carbon disulfide	4.56 UJ	4.21 UJ	2.26 UJ	6.46 UJ	3.47 UJ	4.57 UJ	18 U	28 U	25 U	20 U	5.5 L	6.7 L	4.4 L	11 J	4.5 L	9 L
Carbon tetrachloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chloroethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Chloroform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chloromethane	9.13 UJ	8.42 UJ	4.53 UJ	12.9 UJ	6.94 UJ	9.15 UJ	3.7 U	5.5 U	5.1 U	4.1 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
cis-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
cis-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Cyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Dibromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Dichlorodifluoromethane (Freon-12)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 U	16 UL	18 UL	13 UL	16 UJ	17 UL	24 UL
Ethylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Isopropylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
m- and p-Xylene	NA	NA	NA	NA	NA	NA	7.3 U	11 U	10 U	8.1 UL	16 UL	18 UL	13 UL	16 UJ	17 UL	24 UL
Methyl acetate	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	18 U	28 U	25 U	20 U	9.6 UJ	11 UJ	7.8 UJ	9.6 U	10 UJ	14 UJ
Methylcyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Methylene chloride	8.03 J	6.33 B	3.93 B	7.11 J	4.33 B	6.31 B	18 U	28 U	25 U	20 U	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
Methyl-tert-butyl ether (MTBE)	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
o-Xylene	NA	NA	NA	NA	NA	NA	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Styrene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Tetrachloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Toluene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
trans-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
trans-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Trichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Trichlorofluoromethane (Freon-11)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	3.7 U	5.5 U	5.1 U	4.1 U	16 UL	18 UL	13 U	16 U	17 UL	24 UL
Vinyl chloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	3.7 U	5.5 U	5.1 U	4.1 UL	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Xylene, total	13.7 UL	12.6 U	6.79 U	19.4 U	10.4 U	13.7 U	NA	NA	NA	NA	24 UL	27 UL	20 UL	24 U	26 UL	35 UL
Semivolatile Organic Compounds (µg/kg)																
1,1-Biphenyl	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
1,2,4,5-Tetrachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2,2'-Oxybis(1-chloropropane)	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
2,3,4,6-Tetrachlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	1,400 U	1,600 U	1,500 U	1,200 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4,5-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2,4,6-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dimethylphenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dinitrophenol	3,520 R	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U	2,200 U	2,400 U	2,300 U	1,800 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2,4-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2,6-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
2-Chloronaphthalene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Chlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Methylnaphthalene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	38 U	33 U
2-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	720 U	800 U	770 U	600 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2-Nitrophenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	1,400 U	1,600 U	1,500 U	1,200 U	820 U	620 U	640 U	650 U	950 U	820 U
3,3'-Dichlorobenzidine	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
3-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	720 U	800 U	770 U	600 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
4,6-Dinitro-2-methylphenol	3,520 U	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U	2,200 U	2,400 U	2,300 U	1,800 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
4-Bromophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chloro-3-methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chloroaniline	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chlorophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	720 U	800 U	770 U	600 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
4-Nitrophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	720 U	800 U	770 U	600 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
Acenaphthene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	38 U	33 U
Acenaphthylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	38 U	33 U
Acetophenone	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	59 J	98 U	75 U	33 U	25 U	26 U	26 U	4.6 J	33 U
Atrazine	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
Benzaldehyde	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
Benzo(a)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	120	160	100 J	55 J	33 U	25 U	26 U	26 U	14 J	9.2 J
Benzo(a)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	13.6	14.5	130	170	110 J	41 J	33 UL	25 UL	26 UL	26 U	15 L	33 UL
Benzo(b)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	17.7	16.3	270	310	230	84 J	10 J	8.7 J	9.2 J	26 U	25 J	33 U
Benzo(g,h,i)perylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	73 J	80 J	55 J	75 U	33 U	25 U	26 U	26 UL	12 L	8.2 J
Benzo(k)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	12.6	8.37 J	99 J	120 J	68 J	75 U	33 U	25 U	26 U	26 U	16 J	33 U
bis(2-Chloroethoxy)methane	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U

TABLE I-9

Raw Ref Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFYP-SSD01-1012	CAREFYP-SSD02-1012	CAREFYP-SSD02P-1012	CAREFYP-SSD03-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
bis(2-Chloroethyl)ether	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
bis(2-Ethylhexyl)phthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	330 B	620 U	640 U	350 B	950 U	820 U
Butylbenzylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Caprolactam	352 U	326 U	230 U	526 U	274 U	296 U	1,400 U	1,600 U	1,500 U	1,200 U	820 U	620 U	640 U	650 U	950 U	820 U
Carbazole	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Chrysene	7.01 U	6.5 U	4.59 U	10.5 U	19.6	5.91 U	160	210	150	49 J	33 U	25 U	26 U	26 U	38 U	33 U
Dibenz(a,h)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	8.6 L	33 U
Dibenzofuran	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Diethylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Dimethyl phthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Di-n-butylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Di-n-octylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Fluoranthene	8.1 J	11.4 J	4.59 U	11 J	21.2	20	290	390	250	90 J	33 U	25 U	26 U	26 U	16 J	15 J
Fluorene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	38 U	33 U
Hexachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Hexachlorobutadiene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Hexachlorocyclopentadiene	352 R	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 R	820 UJ	620 UJ	640 UJ	650 UJ	950 R	820 UJ
Hexachloroethane	352 UL	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Indeno(1,2,3-cd)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	60 J	64 J	48 J	75 U	33 U	25 U	26 U	26 U	8.4 J	33 U
Isophorone	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Naphthalene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	91 U	100 U	98 U	75 U	33 U	25 U	26 U	26 U	38 U	33 U
n-Nitroso-di-n-propylamine	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
n-Nitrosodiphenylamine	352 U	326 U	230 U	526 U	274 U	296 U	1,400 U	1,600 U	1,500 U	1,200 U	820 U	620 U	640 U	650 U	950 U	820 U
Nitrobenzene	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	160 U	150 U	120 U	120 U	200 UL	170 UL
Pentachlorophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,200 U	2,400 U	2,300 U	1,800 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
Phenanthrene	8.42 J	7.31 J	4.59 U	10.5 J	16.7	15.4	150	220	150	64 J	33 U	25 U	26 U	26 U	10 J	7.5 J
Phenol	352 U	326 U	230 U	526 U	274 U	296 U	720 U	800 U	770 U	600 U	820 U	620 U	640 U	650 U	950 U	820 U
Pyrene	9.75 J	9.86 J	4.59 U	11.1 J	21.5	20.7	270	360	240	86 J	33 U	25 U	26 U	26 U	16 J	14 J
Pesticide/Polychlorinated Biphenyls (µg/kg)																
4,4'-DDD	0.739 UL	1.13 J	1.37 L	18.4 J	13.4 L	11.6 L	85 L	120 L	150 L	24 J	0.66 L	5.2 U	1.3 J	4.2 J	1.4 L	1.2 L
4,4'-DDE	0.683 J	1.3 L	0.345 L	8.98 J	7.53 J	6.82 J	45 L	77 J	79 J	30 UL	4.9 L	3.6 J	7.1 J	13	14 L	3.8 L
4,4'-DDT	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 R	5.8 UL
Aldrin	0.739 UL	0.668 UL	0.478 UL	0.91 J	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
alpha-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.322 J	0.318 L	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
alpha-Chlordane	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Aroclor-1016	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1221	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1232	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	32 U	32 U	27 U	24 U	39 U	35 U
Aroclor-1242	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1248	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1254	14.5 L	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	73 U	160 U	160 U	120 U	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1260	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	48 J	250 J	89 J	120 U	28 U	27 U	23 U	21 U	33 U	30 U
beta-BHC	0.739 UL	0.668 UL	0.478 UL	2.21 J	0.465 J	0.364 L	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
delta-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.294 J	0.264 J	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 UJ	3.3 U	3 UL
Dieldrin	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endosulfan I	0.739 UL	0.668 UL	0.478 UL	0.805 J	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
Endosulfan II	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 U	5.8 UL
Endosulfan sulfate	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endrin	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.64 J	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 R	5.8 UL
Endrin aldehyde	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endrin ketone	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
gamma-BHC (Lindane)	0.739 UL	0.668 UL	0.218 J	1.04 U	0.285 J	0.48 J	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
gamma-Chlordane	0.739 UL	0.668 UL	0.226 B	0.896 B	0.304 B	0.453 B	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Heptachlor	0.739 UL	0.668 UL	0.478 UL	1.35 B	0.316 B	0.619 UL	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 R	3 UL
Heptachlor epoxide	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	37 UL	41 UL	39 UL	30 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Methoxychlor	0.739 UJ	0.668 UJ	0.478 UJ	1.04 UL	0.568 UJ	0.619 UJ	37 UL	41 UL	39 UL	30 R	28 UL	27 U	23 U	21 U	33 U	30 UL
Toxaphene	47.8 UL	43.2 UL	30.9 UL	67.1 U	36.7 UL	40.1 UL	730 UL	810 UL	780 UL	590 UL	54 UL	52 U	45 U	40 U	64 U	58 UL
Explosives (µg/kg)																
1,3,5-Trinitrobenzene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
1,3-Dinitrobenzene	190 U	160 U	190 U	174 U	182 U	217 J	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2,4,6-Trinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2-Amino-4,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
3,5-Dinitroaniline	190 U	160 U	190 U	174 U	182 U	200 U	600 U	600 U	600 U	600 U	160 U	150 U	120 U	120 U	200 UL	170 UL
3-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
4-Amino-2,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
4-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
HMX	190 U	160 U	190 U	812 J	182 U	200 U	300 U	300 U	300 U	300 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
Nitroglycerin	476 U	400 U	476 U	435 U	455 U	500 U	1,000 U	1,000 U	1,000 U	1,000 U	1,200 U	1,200 U	990 U	930 U	1,600 UL	1,400 UL
Nitroguanidine	90.9 U	105 U	95.2 U	95.2 U	110 J	105 J	105 U	105 U	95.2 U	105 U	40 U	39 U	40 U	39 U	180 J	40 U
PETN	476 U	400 U	476 U	435 U	455 U	500 U	500 UJ	500 UJ	500 UJ	500 UJ	1,200 U	1,200 U	990 U	930 U	1,600 UL	1,400 UL
RDX	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
Tetryl	190 U	160 U	190 U	174 U	182 U	200 U	300 U	300 U	300 U	300 U	160 U	150 U	120 U	120 U	200 UL	170 UL
Total Metals (mg/kg)																
Aluminum	3,110	1,510	3,500	2,570	7,950 J	10,200 J	11,900	15,200	13,900	12,000	9,600	8,180	11,500	9,540	19,400	18,900
Antimony	0.888 U	1.54 U	2.83 U	6.58 U	3.65 U	3.56 U	5.3 U	6.54 U	5.04 U	3.63 UL	0.17 B	0.81 UJ	0.92 UJ	26.7	0.32 L	0.18 B
Arsenic	8.08	16.5	3.39 J	57.2	7.85	6.96	106	73.7	72.9	26.9	19	20.7	12.6	51.1	48.6	38.1
Barium	27.7	10.5	17.6	13 J	28.2	36.5	75.8	83.4	78.7	92.2	34	29.4	61.5	30.7	98.1	72.3
Beryllium	0.492 J	0.386 U	0.448 J	1.65 U	0.914 U	0.599 J	0.906	1.19	1.12	1.01	0.64 J	0.56 J	0.94	0.63 J	0.96 J	0.93 J
Cadmium	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U	1.1	1.58	1.31	0.499	0.18 J	0.18 J	0.11 J	0.11 J	0.03 J	0.12 J
Calcium	3,240	5,050	1,120 J	7,430	2,800	3,160	104,000 J	66,900	63,700	15,200	11,300	10,800	6,620	12,100	89,600	40,000
Chromium	7.29	4	8.9	6.22 J	11.9	15.9	179	298	283	96.9	23.1	19.4	23.1	21.3	25.8	25.3
Cobalt	1.69	1.93 U	3.53 U	8.23 U	4.57 U	2.47 J	4.93	5.22	5.48	4.42	2.4	2.2	3.5	2.3	5.3	4.8
Copper	2.64	2.09	2.83 U	3.67 J	2.31 J	2.78 J	74.7	80.6	77.1	16.7	5.8	5.3	5.3	5.2	8.9	7.2
Cyanide	0.558 U	0.477 U	0.355 U	0.783 U	0.421 U	0.437 U	0.66 U	0.74 U	0.71 U	0.54 U	1.2 U	1.2 U	1 U	0.88 U	1.8 U	1.2 U
Iron	5,310	2,840	8,940	6,300	8,740 J	11,300 J	32,100 J	36,000 J	34,200 J	44,000	10,800	10,400	16,600	16,000	43,800	26,600
Lead	4.05	3.77	3.58	8.98	9.5	12.1	50.2	57	52.5	27.4	9.7	8.6	11.2	9.2	17.2	16.6
Magnesium	479 J	197 J	802 J	2,470 U	861 J	1,130 J	1,340 B	1,760 B	1,660 B	1,180 B	1,340	1,160	1,590	1,440	1,580 J	1,440
Manganese	28.9	18.6	13.6	22.6	21.6	25.1	139	138	135	207	24.7	23.4	56.5	39.7	310 L	84.2
Mercury	0.0258 J	0.0541 U	0.043 U	0.0499 J	0.047 J	0.0519 J	0.128	0.24	0.154	0.0963	0.05 J	0.06 J	0.06 J	0.04 J	0.09 J	0.08 J
Nickel	2.75	1.24 J	2.48 J	4.94 U	4.39 J	5.63	8.17	9.95	9.49	6.89	6.1	5.4	7.2	5.8	9.1	8.8
Potassium	558	578 U	1,120 J	2,470 U	777 J	1,010 J	1,200	1,690	1,640	1,130	1,500	1,300	1,580	1,610	1,550 K	1,440
Selenium	0.555 U	0.964 U	1.77 U	4.12 U	2.28 U	2.23 U	2.02 J	2.48 J	1.73 J	3.63 U	2.5	2.1	1.3 U	0.42 J	0.6 J	1.5 U

TABLE I-9

Raw Ref Subsurface Sediment Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFYP-SSD01-1012	CAREFYP-SSD02-1012	CAREFYP-SSD02P-1012	CAREFYP-SSD03-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Sample Date	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/05/12	10/05/12	10/05/12	10/05/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Chemical Name																
Silver	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U	1.32 U	1.63 U	0.319 J	0.908 U	0.3 B	0.28 B	0.4 B	0.42 B	0.25 B	0.31 B
Sodium	333 U	578 U	1,060 U	2,470 U	1,370 U	1,340 U	120 B	119 B	92.3 B	72.7 B	56.5 B	53.3 B	54.5 B	52.2 B	111 B	94.5 B
Thallium	0.444 U	0.771 U	1.41 U	3.29 U	1.83 U	1.78 U	1.66 J	2.32 J	5.04 U	1.23 J	1 U	0.81 U	0.92 U	0.81 U	0.45 B	1.1 U
Vanadium	7.65	5.09	10.3	8.57 J	15.8	20.4	35.5	41.1	39.6	32	24.2	21.4	27.5	27.8	40.8	38.6
Zinc	13.3	10.8	8.81	22.3	18.9	22.6	526	674	636	190	41	35.1	32.8	28.6	45.3	52.8
Acid Volatile Sulfide/Simultaneously Extractable Metals (µmol/g)																
Acid volatile sulfide, SEM	NA	NA	NA	NA	NA	NA	56	10.3	NA	3.6	2.9	NA	2.2	11	39	1.1
Cadmium, SEM	NA	NA	NA	NA	NA	NA	0.0103	0.0105	NA	0.0123	6.40E-04 J	NA	2.60E-04 J	3.20E-04 J	0.0022 J	1.70E-04 J
Copper, SEM	NA	NA	NA	NA	NA	NA	0.091	0.158	NA	0.0325	0.0113 J	NA	0.0032 J	0.0043 J	0.091	0.0042 J
Lead, SEM	NA	NA	NA	NA	NA	NA	0.189	0.173	NA	0.0874	0.0104	NA	0.0052	0.0065	0.062	0.013
Mercury, SEM	NA	NA	NA	NA	NA	NA	5.80E-04 U	5.10E-04 U	NA	4.20E-04 U	6.10E-05 U	NA	3.80E-05 U	4.60E-05 U	4.20E-05 U	4.10E-05 U
Nickel, SEM	NA	NA	NA	NA	NA	NA	0.056	0.053	NA	0.03	0.006 J	NA	0.0035 J	0.005 J	0.03	0.0063 J
Silver, SEM	NA	NA	NA	NA	NA	NA	0.0071 U	0.0031 U	NA	0.0052 U	0.0025 U	NA	2.80E-04 J	0.0019 U	0.0034 U	6.80E-04 J
Zinc, SEM	NA	NA	NA	NA	NA	NA	7.7	7.5	NA	2.03	0.113	NA	0.034	0.0478	0.166	0.0645
Wet Chemistry																
pH (pH units)	6.87 H3	6.89 H3	6.77 H3	6.79 H3	6.94 H3	NA	7	7	NA	6.9	7.2	NA	6.8	6.9	6.9	6.8
Total organic carbon (TOC) (mg/kg)	26,500 N	42,500 N	19,600 N	67,800 N	43,400 N	NA	72,000	88,000	NA	70,000	130,000	NA	83,000	72,000	100,000	92,000
Grain Size (PCT)																
Coarse Sand (%)	NA	NA	NA	NA	NA	NA	0.3	0.7	NA	0.9	1.8	NA	1.6	1.4	1.6	2.6
Fine Sand (%)	NA	NA	NA	NA	NA	NA	2.1	5.4	NA	10.3	56	NA	46.9	64.2	12.3	8.3
Fines (%)	NA	NA	NA	NA	NA	NA	95.9	91.8	NA	86.3	29.2	NA	43	30	82.3	85.2
Gravel (%)	NA	NA	NA	NA	NA	NA	0.3	0.3	NA	0.1	0	NA	0	0	0	0
Medium Sand (%)	NA	NA	NA	NA	NA	NA	1.4	1.8	NA	2.4	13	NA	8.5	4.4	3.8	3.9
Sand (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	70.8	NA	57	70	17.7	14.8
Grain Size (PCT/P)																
GS03 SIEVE 3" (75 mm)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	100	100	100	100
GS05 Sieve 2" (50 mm)	NA	NA	NA	NA	NA	NA	100	100	NA	100	100	NA	100	100	100	100
GS06 Sieve 1.5" (37.5 mm)	NA	NA	NA	NA	NA	NA	100	100	NA	100	100	NA	100	100	100	100
GS07 Sieve 1" (25.0 mm)	NA	NA	NA	NA	NA	NA	100	100	NA	100	100	NA	100	100	100	100
GS08 Sieve 0.75" (19.0 mm)	NA	NA	NA	NA	NA	NA	100	100	NA	100	100	NA	100	100	100	100
GS10 Sieve 0.375" (9.5 mm)	NA	NA	NA	NA	NA	NA	100	100	NA	100	100	NA	100	100	100	100
Sieve No. 004 (4.75 mm)	NA	NA	NA	NA	NA	NA	99.7	99.7	NA	99.9	100	NA	100	100	100	100
Sieve No. 010 (2.00 mm)	NA	NA	NA	NA	NA	NA	99.4	99	NA	99	98.2	NA	98.4	98.6	98.4	97.4
Sieve No. 020 (850 um)	NA	NA	NA	NA	NA	NA	98.5	98	NA	97.4	92.1	NA	95.5	97	97.3	96.2
Sieve No. 040 (425 um)	NA	NA	NA	NA	NA	NA	98	97.2	NA	96.6	85.2	NA	89.9	94.2	94.6	93.5
Sieve No. 060 (250 um)	NA	NA	NA	NA	NA	NA	97.6	96.6	NA	94.8	65.5	NA	74.6	80.1	91.1	90.8
Sieve No. 080 (180 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46.9	NA	59.7	60.9	88.5	89
Sieve No. 100 (150 um)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37.3	NA	51.3	45.7	86.8	88
Sieve No. 140 (106 um)	NA	NA	NA	NA	NA	NA	96.9	92.6	NA	87.5	NA	NA	NA	NA	NA	NA
Sieve No. 200 (75 um)	NA	NA	NA	NA	NA	NA	95.9	91.8	NA	86.3	29.2	NA	43	30	82.3	85.2

\\\BOFPP01\Proj\CLEANII\BASES\CAX\CAX Site 4\Reports\RI Report\Pre-Draft\Appendices\Appendix I - Laboratory Analytical Data\[2 - Combined Reference Laboratory Raw Data Tables.xls], ccampbe6, 03/20/2013

Notes:

Shading indicates detections

B - Analyte not detected significantly above the level reported in an associated blank

H3 - Unvalidated data; result estimated; sample received outside the recommended holding time for this analyte

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

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

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

N - Unvalidated data; one or more quality control criteria was not met.

NA - Not analyzed
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UL - Analyte not detected, quantitation limit is probably higher
mg/kg - Milligrams per kilogram
PCT - Percent
PCT/P - Percent passed
µg/kg - Micrograms per kilogram
µmol/g - Micromoles per gram

TABLE I-10

Raw Ref Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name																
Volatile Organic Compounds (µg/l)																
1,1,1-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	2.5 UJ	2.5 UJ	0.5 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	25 U	25 U	5 U	10 U	10 U	10 U	12 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	49.5 J	68.4	5 U	65.3	60.5	76.8	12 U	12 U	12 U	12 U	4.3 B	4.3 B	4.6 B	2.7 B	5.4 B	5.8 B
Benzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA
Bromodichloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl acetate	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methylcyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	5 U	5 U	1 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl-tert-butyl ether (MTBE)	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	7.5 U	7.5 U	1.5 U	3 U	3 U	3 U	NA	NA	NA	NA	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (µg/l)																
1,1-Biphenyl	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	9 U	9 U	9 U	9 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
1,2,4,5-Tetrachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,2'-Oxybis(1-chloropropane)	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
2,3,4,6-Tetrachlorophenol	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4,5-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	18 U	19 U	19 U	18 U	19 U	18 U
2,4,6-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4-Dichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dimethylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dinitrophenol	23.6 U	24 U	23.1 UL	23.6 U	24 U	24 U	6 U	6 U	6 U	6 U	18 U	19 U	19 U	18 UL	19 U	18 U
2,4-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,6-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Chloronaphthalene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Chlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Methylnaphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
2-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U	19 U	19 U	18 U	19 U	18 U
2-Nitrophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3,3'-Dichlorobenzidine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U	19 U	19 U	18 U	19 U	18 U
4,6-Dinitro-2-methylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	6 U	6 U	6 U	6 U	18 U	19 U	19 U	18 UL	19 U	18 U
4-Bromophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloro-3-methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloroaniline	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chlorophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U	19 U	19 U	18 U	19 U	18 U
4-Nitrophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	3 U	3 U	3 U	3 U	18 U	19 U	19 U	18 U	19 U	18 U
Acenaphthene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U

TABLE I-10

Raw Ref Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name																
Acenaphthylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Acetophenone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Atrazine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzaldehyde	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzo(a)anthracene	0.0943 U	0.0515 L	0.0926 UL	0.0943 U	0.0962 U	0.0666 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(a)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(b)fluoranthene	0.0943 U	0.0627 J	0.0926 UL	0.0943 U	0.0962 U	0.0629 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Benzo(g,h,i)perylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(k)fluoranthene	0.0943 U	0.0575 J	0.0926 UL	0.0943 U	0.0962 U	0.0627 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
bis(2-Chloroethoxy)methane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Chloroethyl)ether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Ethylhexyl)phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	3 B	7.5 U	9.7 B	7.3 U	7.4 U	7.2 U
Butylbenzylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Caprolactam	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Carbazole	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Chrysene	0.0943 U	0.0542 J	0.0926 UL	0.0943 U	0.0962 U	0.0799 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Dibenz(a,h)anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Dibenzofuran	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Diethylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Dimethyl phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-butylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-octylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Fluoranthene	0.0943 U	0.0901 J	0.0622 L	0.0855 J	0.0962 U	0.177 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Fluorene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Hexachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorobutadiene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorocyclopentadiene	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	6 U	6 U	6 U	6 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Hexachloroethane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Indeno(1,2,3-cd)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Isophorone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 UL	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Naphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
n-Nitroso-di-n-propylamine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
n-Nitrosodiphenylamine	2.36 U	2.4 UL	2.31 UL	2.36 U	2.4 U	2.4 U	6 U	6 U	6 U	6 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Nitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Pentachlorophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	9 U	9 U	9 U	9 U	18 U	19 U	19 U	18 UL	19 U	18 U
Phenanthrene	0.189 U	0.192 U	0.185 UL	0.0988 J	0.192 U	0.124 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.065 J	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Phenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 U	3 U	3 U	3 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Pyrene	0.0943 U	0.0742 J	0.0926 UL	0.0591 J	0.0962 U	0.125 J	0.08 UL	0.08 U	0.08 U	0.08 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Pesticide/Polychlorinated Biphenyls (µg/l)																
4,4'-DDD	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDE	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDT	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Aldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
alpha-BHC	0.00432 J	0.00943 UL	0.00943 UL	0.0404 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
alpha-Chlordane	0.00943 UL	0.00943 UL	0.00943 UL	0.0172 J	0.00943 U	0.0082 J	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Aroclor-1016	0.236 UL	0.236 UJ	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1221	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1232	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1242	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1248	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1254	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 UL
Aroclor-1260	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
beta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
delta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
Dieldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endosulfan I	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Endosulfan II	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endosulfan sulfate	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin aldehyde	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin ketone	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 UL	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
gamma-BHC (Lindane)	0.00401 J	0.00943 UL	0.00943 UL	0.0124 J	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
gamma-Chlordane	0.0119 B	0.0109 B	0.00612 B	0.0159 B	0.0213	0.00943 UL	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor epoxide	0.00383 B	0.00943 UL	0.00943 UL	0.0055 B	0.00943 UL	0.00746 J	0.05 U	0.05 U	0.05 U	0.05 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Methoxychlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.05 U	0.05 U	0.05 U	0.05 U	0.24 U	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U
Toxaphene	0.629 UL	0.629 UL	0.629 UL	0.629 UL	0.629 U	0.629 U	0.64 U	0.64 U	0.64 U	0.64 U	0.48 U	0.5 U	0.5 U	0.5 UL	0.47 U	0.48 U
Explosives (µg/l)																
1,3,5-Trinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL
1,3-Dinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,4,6-Trinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Amino-4,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Nitrotoluene	0.15 U	0.148 U	0.154 UJ	0.814 J	0.152 U	0.148 U	0.168 UL	0.168 U	0.167 UL	0.166 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3,5-Dinitroaniline	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.615 UL	0.615 U	0.612 UL	0.606 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Amino-2,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.308 UL	0.308 U	0.306 UL	0.303 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
HMX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Nitroglycerin	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	0.341 UL	0.341 U	0.339 UL	0.335 UL	2 UL	2 UL	2 UL	2 U	2 UL	2 UL
Nitroguanidine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6 U	6 U	6 U	6 U	6 U	6 U
PETN	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	0.205 UL	0.205 U	0.204 UL	0.202 UL	2 UL	2 UL	2 UL	2 U	2 UL	2 UL
RDX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 U	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL

TABLE I-10

Raw Ref Surface Water Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFYP-SWSD01	CAREFYP-SWSD02		CAREFYP-SWSD03	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
Sample ID	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFYP-SW01-1012	CAREFYP-SW02-1012	CAREFYP-SW02P-1012	CAREFYP-SW03-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Sample Date	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/04/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12	10/03/12
Chemical Name																
Tetryl	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.164 UL	0.164 UL	0.163 UL	0.162 UL	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Total Metals (µg/l)																
Aluminum	61	61.3	52.1	49.8 J	55.6	55.2	614	116 J	92.7 J	112 K	286 J	97.5 J	141 J	77.9 J	149 J	90.8 J
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	0.2 J	0.161 J	0.164 J	0.171 J	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	6.07	6.19	5.28	5.13	5.2	5.3	6.14 J	5.8 J	5.63 J	6.19 J	7.9 J	5.3 J	7.3 J	6.6 J	6.3 J	6.4 J
Barium	20.7	20	18.6	18.7	19	19.1	26.1	35	32.9	33.1	23.1	20 J	21.3	19.5	24.6	22.3
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.37 U	0.37 U	0.37 U	0.37 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	4 U	4 U	3 U	3 U	3 U	3 U	3 U	0.08 J
Calcium	35,300	36,000	32,300	31,800	32,800	32,400	67,100	89,700	85,600	77,100	39,400	40,700 J	43,400	31,900	57,700	44,100
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	0.932 J	1.52 J	1.14 J	1.45 J	0.96 J	4 U	0.57 J	0.37 J	0.53 J	0.47 J
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.84 U	0.84 U	0.84 U	0.84 U	4 U	4 U	4 U	4 U	4 U	4 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	0.967 J	1.15	1.13	0.922 J	1.7 B	1.3 B	1.2 B	1.3 B	1.7 B	2.1 B
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	11 U	11 U	11 U	11 U	8 U	8 U	8 U	8 U	8 U	8 U
Iron	1,260	1,220	994	1,010	996	996	2,160	2,480	2,440	2,340	2,030	1,080 J	1,630 J	1,410	2,050	1,710
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.444 J	0.51 J	0.49 J	0.511 J	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	1,920	1,940	1,910	1,930	1,980	2,000	1,960 J	2,020 J	2,040 J	2,070 K	2,330	2,180	2,260	2,190	2,180	2,160
Manganese	142	133	98.5	99.2	102	100	108	133	144	153	120	79.2 J	98.8 J	86.3	114	115
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.069 U	0.069 U	0.069 U	0.069 U	0.1 U	0.04 B	0.02 B	0.02 B	0.1 U	0.02 B
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.27 J	1.75 J	1.94 J	1.47 J	0.55 B	4 U	0.63 B	0.7 B	0.57 B	0.57 B
Potassium	2,600	2,690	2,580	2,590	2,650	2,700	2,310 J	2,010 J	1,990 J	2,100 K	2,960	2,860 J	2,990	2,750	2,480	2,630
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U	2.5 J	7 U	7 U	7 U	7 U	7 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.12 U	0.12 U	0.12 U	0.12 U	4 U	4 U	4 U	4 U	4 U	4 U
Sodium	13,200	13,200	13,300	13,400	13,700	14,000	12,200	12,200	12,000	12,000	13,900	13,200	13,500	14,100	12,300	12,600
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	0.23 U	0.23 U	0.23 U	0.23 U	5 U	5 U	5 U	5 U	5 U	5 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.636 J	0.428 J	0.397 J	0.449 J	1.1 J	0.44 J	0.88 J	0.47 J	0.57 J	0.4 J
Zinc	1.38 J	1.31 J	2.5 U	2.5 U	1.64 J	1.29 J	12.9	25.2	17.7	15	4.3 B	3.1 B	3.4 B	15.5 B	3.4 B	3.4 B
Dissolved Metals (µg/l)																
Aluminum, Dissolved	49.3 B	61.8 B	38.8 B	41.5 B	28.4 B	46.4 B	250 U	25 U	250 U	100 K	158 J	295 J	106 J	69.1 J	113 J	138 J
Antimony, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	0.192 B	0.125 B	0.128 B	0.17 B	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic, Dissolved	4.33 B	5.62 B	4.08 B	4.59 B	3.81 B	4.52 B	4.09 B	2.43 B	2.77 B	4.15 B	5 J	6.1 J	4.2 J	5.2 J	5.9 J	5.6 J
Barium, Dissolved	18.6 B	19.8 B	17.5 B	17.7 B	16.3 B	17.4 B	26.1 B	30.6 B	30.7 B	33 B	16.8	23 J	20.1	17.5	24.5	22.9
Beryllium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.37 U	0.37 U	0.37 U	0.37 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	0.186 J	0.226 J	3 U	3 U	0.05 J	3 U	3 U	3 U
Calcium, Dissolved	36,200 B	36,100 B	32,800 B	32,200 B	33,000 B	31,100 B	68,600 B	94,300 B	93,400 B	86,200 B	33,900	46,600 J	41,000	32,500	58,100	48,500
Chromium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.966 J	3 U	3 U	1.26 J	0.65 J	1.2 B	0.7 B	0.74 B	0.58 B	0.53 B
Cobalt, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.84 U	0.84 U	0.84 U	0.84 U	4 U	4 U	4 U	4 U	4 U	4 U
Copper, Dissolved	2 U	2 U	2 U	2 U	2 U	2 U	0.82 J	0.88 U	0.374 J	0.934 J	1.2 B	2 B	1.3 B	0.83 B	1.1 B	1.1 B
Iron, Dissolved	613	1,030	634	688	364	707	979	97.2	362	1,550	544	1,660 J	954 J	934 K	1,800	1,420
Lead, Dissolved	0.75 U	0.75 U	0.523 J	0.75 U	0.75 U	0.75 U	0.29 J	0.6 U	0.6 U	0.489 J	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium, Dissolved	1,940 B	1,970 B	1,960 B	1,960 B	1,990 B	1,960 B	1,800 B	2,100 B	2,080 B	1,950 B	2,090	2,280	2,170	2,160	2,200	2,200
Manganese, Dissolved	70.9	116	64.2	67.6	35.7 B	71.5	99.3	110 B	110 B	136 B	34.8	81.4	72.8	65.4	104	107
Mercury, Dissolved	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.069 U	0.069 U	0.069 U	0.069 U	0.04 J	0.04 J	0.1 U	0.02 J	0.04 J	0.01 J
Nickel, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.32 B	1.93 B	1.79 B	1.71 B	0.37 B	0.52 B	4 U	4 U	0.37 B	4 U
Potassium, Dissolved	2,580 B	2,690 B	2,620 B	2,590 B	2,590 B	2,590 B	1,980 B	1,680 B	1,740 B	2,020 B	2,630	3,200 J	2,810	2,620	2,540	2,710
Selenium, Dissolved	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.6 U	2.6 U	2.6 U	2.6 U	7 U	7 U	2.8 J	7 U	7 U	7 U
Silver, Dissolved	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.12 U	0.12 U	0.12 U	0.12 U	4 U	4 U	4 U	4 U	4 U	4 U
Sodium, Dissolved	13,400 B	13,500 B	13,700 B	13,700 B	13,900 B	13,700 B	11,700	11,600 B	11,000 B	11,600 B	13,300	13,200	13,300	13,500	12,600	13,400
Thallium, Dissolved	1 U	1 U	1 U	1 U	1 U	1 U	0.23 U	0.23 U	0.23 U	0.23 U	5 U	5 U	5 U	1.4 J	1.2 J	5 U
Vanadium, Dissolved	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.308 B	0.8 U	0.8 U	0.326 B	0.75 J	0.96 J	0.43 J	0.51 J	0.72 J	0.96 J
Zinc, Dissolved	1.48 B	2.09 B	2.5 U	2.5 U	2.5 U	2.5 U	16.9	9.91 J	15	15.8	2.9 B	5.5 B	3.4 B	3 B	3.2 B	3.3 B
Wet Chemistry (MG/L)																
Hardness	107 N	98 N	85.5 N	NA	96.3	97.3	160	220	NA	210 Q	94	98	NA	76	160	120

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Notes:

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

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

N - Unvalidated data; one or more quality control criteria was not met.

NA - Not analyzed

Q - Unvalidated data; one or more quality control criteria was not met.

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

UL - Analyte not detected, quantitation limit is probably higher

mg/l - Milligrams per liter

µg/l - Micrograms per liter

TABLE I-11

Raw Reference Biota Tissue Analytical Data

Site 4 and Youth Pond Remedial Investigation

Cheatham Annex, Wiliamsburg, VA

Station ID	CAREFS04-TS01	CAREFS04-TS02	CAREFS04-TS03	CAREFS04-TS04	CAREFS04-TS05	CAREFS04-TS06	CAREFS04-TS07		CAREFS04-TS08	
Sample ID	CAREFS04-TS01-1012	CAREFS04-TS02-1012	CAREFS04-TS03-WB-1012	CAREFS04-TS04-WB-1012	CAREFS04-TS05-WB-1012	CAREFS04-TS06-WB-1012	CAREFS04-TS07-F-1012	CAREFS04-TS07-O-1012	CAREFS04-TS08-F-1012	CAREFS04-TS08-O-1012
Sample Date	10/24/12	10/24/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12
Chemical Name										
Pesticide/Polychlorinated Biphenyls (UG/KG)										
Aroclor-1016	NA	NA	NA	NA	NA	NA	23 U	25 U	25 UL	25 UL
Aroclor-1221	NA	NA	NA	NA	NA	NA	23 U	25 U	25 UL	25 UL
Aroclor-1232	NA	NA	NA	NA	NA	NA	27 U	29 U	29 UL	29 UL
Aroclor-1242	NA	NA	NA	NA	NA	NA	23 U	25 U	25 UL	25 UL
Aroclor-1248	NA	NA	NA	NA	NA	NA	23 U	25 U	25 UL	25 UL
Aroclor-1254	NA	NA	NA	NA	NA	NA	23 U	25 U	25 UL	25 UL
Aroclor-1260	NA	NA	NA	NA	NA	NA	23 U	98 L	25 UL	58 L
Polychlorinated Biphenyl Congeners (PG/G)										
3,3',4,4'-Tetrachlorobiphenyl (77)	97 U	96 U	98 U	13 X	9.3 X	5.9 X	2.8 X	24 J	3.3 X	17 J
3,4,4',5-Tetrachlorobiphenyl (81)	97 U	96 U	98 U	9.7 U	9.9 U	9.9 U	9.8 U	98 U	9.9 U	98 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	49 X	57 X	240	110	92	79	38	370	38	190
2,3,4,4',5-Pentachlorobiphenyl (114)	17 X	16 J	15 X	7.4 X	7.7 J	5 X	1.3 X	9.5 X	2 J	8.7 X
2,3',4,4',5-Pentachlorobiphenyl (118)	2,200	640	870	450	350	320	130	1,400	110	680
2,3',4,4',5'-Pentachlorobiphenyl (123)	26 X	11 J	12 X	7.7 X	6.8 J	3.8 X	2.6 J	18 X	2 X	17 X
3,3',4,4',5-Pentachlorobiphenyl (126)	77 J	40 J	6.7 X	5.6 X	3.2 X	3.1 X	1.2 J	12 X	0.97 J	98 U
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	2,100	790	270	110	91	100	36	550	29	220 X
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	120	24 X	98 U	9.1 X	9 X	7.7 X	1.4 X	24 J	9.9 U	98 U
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	980	310	88 X	48 K	48 J	44 J	13	260	10	86 J
Decachlorobiphenyl (209)	18 X	9.2 X	18 X	8.7 X	9.2 X	6.7 J	2.7 J	17 X	3.1 X	24 X
Congeners (156/157)	3,600	960	350	160	120	140	54	810	41	310
Total Dichlorobiphenyls	210 J	170 J	460 J	160 J	95 J	180 J	49 J	380 J	50 J	300 J
Total Heptachlorobiphenyls	160,000 J	44,000 J	22,000 J	11,000 J	9,100 J	10,000 J	3,800 J	55,000 J	2,600 J	23,000 J
Total Hexachlorobiphenyls	110,000 J	28,000 J	27,000 J	16,000 J	12,000 J	11,000 J	4,800 J	63,000 J	3,400 J	27,000 J
Total Monochlorobiphenyls	97 U	96 U	98 U	2.8 J	3.5 J	1.4 J	1.9 J	98 U	1.1 J	98 U
Total Nonachlorobiphenyls	1,500	420 J	260 J	100 J	70 J	92 J	34 J	450 J	29	270 J
Total Octachlorobiphenyls	34,000 J	9,000 J	4,600 J	4,300 J	2,600 J	2,000	750 J	11,000 J	510 J	4,300 J
Total Pentachlorobiphenyls	3,000 J	1,400 J	4,500 J	3,600 J	2,400 J	2,100 J	960 J	9,300 J	840 J	4,100 J
Total Tetrachlorobiphenyls	970 J	650 J	2,600 J	1,100 J	700 J	880 J	260 J	1,500 J	300 J	1,200 J
Total Trichlorobiphenyls	1,100 J	880 J	2,400 J	870 J	470 J	1,100 J	170 J	970 J	180 J	1,000 J
Total Metals (MG/KG)										
Aluminum	15.7 J	34.4	2.2 B	7.7 B	7.1 B	1.1 B	8.6 U	4.7 J	1.1 J	6.1 J
Antimony	0.034 U	0.043 U	0.042 U	0.028 U	0.01 B	0.04 U	0.43 U	0.24 U	0.43 U	0.38 U
Arsenic	0.27 U	0.34 U	0.33 U	0.2 J	0.15 J	0.32 U	0.43 U	0.24 U	0.43 U	0.38 U
Barium	2.2	2.9	0.18	1.2	0.7	0.09 J	0.26 U	0.6	0.26 U	0.4
Beryllium	0.014 U	0.017 U	0.017 U	0.011 U	0.014 U	0.016 U	0.043 U	0.024 U	0.043 U	0.038 U
Cadmium	0.06 J	0.07 J	0.017 U	0.011 U	0.014 U	0.016 U	0.26 U	0.14 U	0.26 U	0.23 U
Calcium	8,440	11,700	2,070	18,800 J	10,900	6,650	170	16,100	314	19,500
Chromium	0.11 J	0.14 J	0.12 J	0.12 J	0.1 J	0.15 J	0.06 B	0.22 B	0.06 B	0.28 B
Cobalt	0.02 J	0.03 J	0.005 J	0.03 J	0.03 J	0.01 J	0.34 U	0.03 J	0.34 U	0.04 J
Copper	1.8	2	0.38	0.35	0.31	0.31	0.86 U	0.85 J	0.85 U	0.56 J
Iron	76.1	135	23.8	91.4 L	63.1	20.8	1.5 J	26.2	1.7 J	18.8
Lead	0.06 B	0.1 B	0.01 B	0.02 B	0.02 B	0.01 B	0.34 U	0.19 U	0.34 U	0.3 U
Magnesium	285	331	215	518 L	422	376	302	459	302	530
Manganese	1.7 B	2 B	0.89 B	5.3	3.3	0.61 B	0.34 U	2	0.34 U	1.5
Mercury	0.02 B	0.02 B	0.04 B	0.02 L	0.03 J	0.04	0.14	0.07	0.08	0.05
Nickel	0.02 B	0.03 B	0.1 U	0.067 U	0.086 U	0.05 B	0.34 U	0.19 U	0.34 U	0.3 U
Potassium	2,240	2,240	2,740	2,660	2,660	3,110	3,620	2,610	3,490	2,710
Selenium	0.21 J	0.24 J	0.09 J	0.13 J	0.09 J	0.18 J	0.16 B	0.3 B	0.6 U	0.25 B
Silver	0.006 J	0.007 J	0.033 U	0.022 U	0.028 U	0.032 U	0.02 J	0.19 U	0.02 J	0.3 U
Sodium	893	938	807	981 L	945	969	562	1,370	625	1,340
Thallium	0.027 U	0.034 U	0.033 U	0.022 U	0.028 U	0.032 U	0.43 U	0.24 U	0.43 U	0.38 U
Vanadium	0.27 U	0.34 U	0.33 U	0.22 U	0.28 U	0.32 U	0.34 U	0.03 J	0.34 U	0.03 J
Zinc	15.2	17.5	19.8	28.8	25.9	16.7	3.8	16.1	5.5	19.5
Wet Chemistry (PCT)										
% Solids	22	21	28	24	25	25	21	33	20	26
Lipids (%)	0.13	0.48	6.5	1.4	1.6	0.76	0.1 U	1.4	0.1 U	0.33

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

NA - Not analyzed

U - The material was analyzed for, but not detected

UL - Analyte not detected, quantitation limit is probably higher

X - PCB congeners only: Estimated Maximum Possible Concentration (EMPC)

MG/KG - Milligrams per kilogram

PCT - Percent

PG/G - Picograms per gram

UG/KG - Micrograms per kilogram

All sample results are reported wet-weight; results are not adjusted for percent moisture or percent lipids

Appendix J
Human Health Risk Assessment Tables

APPENDIX J

Baseline Human Health Risk Assessment

J.1 Introduction

Appendix J is the baseline human health risk assessment (HHRA) for Cheatham Annex (CAX) Site 4 and Youth Pond. The baseline HHRA was conducted to assess the nature, magnitude, and probability of potential harm to public health posed by site-related contaminants in site media (surface water, sediment, fish, soil, and groundwater). The data evaluated in the HHRA are presented in **Appendix I** of the Remedial Investigation (RI) report and discussed in **Section 4** of the RI report. The HHRA incorporates the general methodology described in the following documents:

- *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A* (U.S. Environmental Protection Agency [USEPA], 1989)
- *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part D* (USEPA, 2001)
- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* (USEPA, 2004)
- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment)* (USEPA, 2009a)
- USEPA Region III technical guidance manuals for risk assessment (USEPA, 1992, 1993, 1995)
- *PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures* (USEPA, 1996a)
- World Health Organization (WHO) toxicity equivalency factor (TEF) approach (Van den Berg et al., 2006)
- *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds* (USEPA, 2010a)

The HHRA consists of the following components:

- Human health conceptual site model (CSM)
- Identification of chemicals of potential concern (COPCs)
- Exposure assessment
- Toxicity assessment
- Risk characterization
- Uncertainty assessment

Risk calculation spreadsheets were prepared in accordance with *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part D* (USEPA, 2001) to screen for COPCs and to calculate risks estimates associated with the COPCs. These spreadsheets, and supporting tables and calculations, are presented in **Appendix K** of the RI report.

J.2 Human Health Conceptual Site Model

The human health CSM showing potential human health exposure scenarios for current and potential future site use is provided in **Table 1** of **Appendix K** and graphically on **Figure J-1**. The CSM provides a current understanding of the source(s) of contamination, release and transport mechanisms, current and potential future land use, and identifies potentially complete human exposure pathways for Site 4 and Youth Pond.

Site 4, the Outdated Medical Supply Disposal Area (which includes Cheatham Annex Depot [CAD] 11/12 Pond Bank), is comprised of two burial investigation areas (Burial Investigations Areas 1 and 2) covering approximately 4 acres west of D Street, between CAD Buildings 11 and 12. Upstream Pond lies within the boundaries of Site 4. The history of Burial Investigation Area 1 (formerly identified as Area of Concern [AOC] 3) is unknown. It was

originally identified as a surface debris pile of metal banding, a few empty drums, and charred wood with approximate dimensions of 20 feet by 20 feet by 10 feet high, located in the southwest corner of Burial Investigation Area 1 and adjacent to the Upstream Pond. The 1984 Initial Assessment Study report noted that in 1968/1969, out-of-date medical supplies, including intravenous injection sets with syringes wrapped in aluminum foil or plastic; empty intravenous bottles; numerous sharps, both metal and plastic; and 1- inch metal banding were disposed within Burial Investigation Area 2 (formerly identified as Site 4) on the bank of the Upstream Pond and covered with soil. After heavy rains, syringes and tubing were sometimes seen floating in Upstream Pond and Youth Pond, located across D Street.

Youth Pond is a freshwater, surface water body covering approximately 2.5 acres in the northeast portion of CAX. Several drainage pathways from the surrounding area combine into two separate drainages that ultimately discharge into Youth Pond. One drainage pathway flows under D Street and connects Site 4 (including Upstream Pond) to Youth Pond, and the other pathway receives combined drainage from stormwater drains within the CAD area, Outfall #34, and an unnamed drainage channel. Surface water within Youth Pond discharges through a culvert into the York River. The historical use of Youth Pond is unknown; however, it is currently used by military personnel and their families for recreational activities (primarily fishing), although it is not open to the general public. Following identification of polychlorinated biphenyls (PCBs) within pond sediment during the 2000 Pond Study, as a conservative measure, catch-and-release fishing restrictions were implemented for the pond in 2000.

Although Site 4 and Youth Pond are within the restricted CAD area, access to these sites is not restricted to CAX visitors. Future land use at Site 4 and Youth Pond is not expected to change and will likely continue as a wooded area in the foreseeable future.

Based on the various media and areas evaluated in the RI, and the various potential exposures to the media within these areas, the data were evaluated in the HHRA in the following exposure groups:

- Surface soil within the fenced area of Youth Pond/Site 4; includes the surface soil samples collected closest to the CAD Building 12 within the fence line surrounding the CAD area buildings
- Surface soil outside the fenced area of Site 4; includes the surface soil samples collected outside the fence line surrounding the CAD area buildings in the wooded area of Site 4 around Upstream Pond
- Upstream Pond surface water
- Upstream Pond sediment
- Surface water in drainage channel to Upstream Pond
- Sediment in drainage channel to Upstream Pond
- Youth Pond surface water
- Youth Pond sediment
- Sediment and surface soil in drainage ditch to Youth Pond outside fence line surrounding the CAD area buildings
- Fish from Youth Pond and Upstream Pond
- Surface and subsurface soil across the Site 4 and Youth Pond area
- Surface and subsurface soil within fenced area of Youth Pond/Site 4; includes the surface and subsurface soil samples collected closest to the CAD Building 12 within the fence line surrounding the CAD area buildings
- Shallow aquifer groundwater

The samples associated with each of these exposure groupings are identified in **Table J-1**.

Potential current human receptors include industrial workers in the CAD area, and maintenance workers and visitors/recreational users in the wooded areas around Youth Pond and Upstream Pond. The industrial workers

could be exposed to the surface soil within the fenced area of the site. The maintenance workers and visitors/recreational users may be exposed to surface soil in the wooded area outside the fence line, and also the surface water and sediment in the ponds and the drainage ditches that discharge to the ponds. Additionally, the recreational users may ingest fish caught in the ponds, primarily Youth Pond (however, fish from both ponds were combined for the HHRA because a fish may reside in both ponds at different times). However, it is noted that catch-and-release fishing restrictions were implemented for Youth Pond in 2000.

Future receptors and exposures are most likely the same as the current receptors and exposures; however, future unrestricted use of the site was evaluated. Therefore, future receptors evaluated in the HHRA include future residents and construction workers, in addition to the current receptors. The future scenario assumes that construction or excavation activities may take place anywhere at the site, resulting in exposure to both surface and subsurface soil. Therefore, future exposure to soil includes exposure to surface and subsurface soil across the site. It was also assumed that a construction worker may perform activities only within the fenced area of the site, and therefore exposure to surface and subsurface soil in this area alone was also evaluated for a construction worker.

Although groundwater beneath the site is not currently used as a potable water supply, it was conservatively assumed that shallow groundwater could be used as a residential potable water supply. Therefore, future residential potable use of groundwater was considered a potential future exposure pathway. Due to the shallow depth to groundwater, future construction workers may also be exposed to groundwater during excavation activities.

There is the potential for vapor intrusion (VI) of volatile constituents in groundwater and soil into site buildings. Current and future industrial workers and future residents could be exposed to volatile constituents in groundwater and soil through VI into a building and inhalation of indoor air.

J.3 Data Evaluation and Identification of COPCs

COPCs were identified via data collection, data evaluation, and data screening. The data collection and evaluation involved gathering and reviewing the available site data and identifying a set of data for the risk assessment that meets project-specific data quality objectives. This data set was then further screened against concentrations that are protective of human health to reduce the data set to those constituents and media of potential concern to human receptors.

J.3.1 Data Summary

The purpose of the HHRA was to evaluate the potential human health risks associated with contamination in site media (surface water, sediment, fish, soil, and groundwater) at Youth Pond and Site 4 (including Upstream Pond). Surface water samples collected from Youth Pond, Upstream Pond, and the drainage channels to Upstream Pond; sediment samples collected from Youth Pond, the drainage ditch to Youth Pond, Upstream Pond, and the drainage channels to Upstream Pond; fish tissue samples collected from Youth Pond and Upstream Pond; and groundwater and soil samples collected across the site were evaluated in the baseline HHRA. All of the analytical data are presented in **Appendix I** of the RI report. The samples evaluated in the baseline HHRA for each data group and the laboratory analysis performed for these samples are identified in **Table J-1**. All data used in the HHRA were validated in accordance with USEPA Region III data validation requirements and meet the project quality requirements.

Groundwater samples were analyzed for both total and dissolved metals. The total and dissolved concentrations of aluminum, iron, and manganese were compared for each monitoring well to find out if there were significant differences (greater than one order of magnitude) between the two in any of the wells, following USEPA guidance (USEPA, 1992). Because no significant differences were noted between total and dissolved concentrations for all three of these indicator metals in any of the wells, the total metals data were used to evaluate risks associated with exposure to groundwater.

Surface water samples were also analyzed for total and dissolved metals. Because exposure to surface water is expected to occur directly in the surface water body, the total metals data were used to evaluate risks associated with exposure to surface water.

One composite largemouth bass fish tissue sample was collected from Youth Pond and one from Upstream Pond. The sample from Youth Pond consisted of five individual fish and the sample from Upstream Pond consisted of three fish. Analytical results for the fish tissue samples were reported on a wet weight basis as appropriate for use in the HHRA (the exposure parameters, such as fish ingestion rate, are based on wet weight). Information on the fish sampling can be found in **Section 2** of the RI. The skinless fillet samples were included in the HHRA (the offal was also sampled and analyzed by the laboratory for use in the ecological risk assessment) because the fillets are the part of the largemouth bass most likely ingested by humans. The fish tissue samples were analyzed for the 12 dioxin-like PCBs, Aroclors, and metals. The 12 dioxin-like PCB congeners data were used to calculate the dioxin-like toxicity equivalent (TEQ) concentrations for each sample, and the Aroclor data were used to represent the total PCB concentrations to evaluate the non-dioxin-like PCB risks.

The data collected during the site investigations were evaluated to assess their reliability for use in the quantitative risk assessments. The following criteria were used to assess data usability:

- Estimated values flagged with a J, K, L, or X qualifier were treated as unqualified detected concentrations.
- Data qualified with an R (rejected) were not used.
- Data qualified with a B (blank contamination) were used as if the constituents were not detected.
- For duplicate samples, the maximum concentration between the two samples was used as the sample concentration.
- Non-detected values were included and exposure point concentration (EPC) calculations at the detection limit using ProUCL (USEPA, 2011).
- For PCB congeners (which were analyzed in fish tissue samples), only the detected congeners were used to calculate the dioxin-like TEQ concentrations for each sample used in the risk calculations. Undetected congeners were not included in the calculations (see Section J.4.2). The uncertainty associated with not including the non-detected congeners in the risk calculations is discussed in the uncertainty assessment (Section J.7.2).

Detailed results for sampling that was performed at Site 4 and Youth Pond are presented in **Section 2** of the RI report.

J.3.2 Selection of COPCs

The detected constituents were screened following the procedures described below. The selection of COPCs was based on the criteria presented in the USEPA Region III technical guidance manual (USEPA, 1993) and *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part D* (USEPA, 2001).

The maximum detected concentration of each constituent for each data group (for example, surface soil outside fenced area of Site 4) was compared to the criteria discussed below to select the COPCs. If the maximum concentration exceeded the criteria, the constituent was selected as a COPC. Constituents that were not detected in any of the samples or were detected at concentrations less than the criteria were not identified as COPCs. The COPC screening is presented in **Tables 2.1** through **2.20** of **Appendix K**.

Background concentrations were not used to identify/eliminate any of the COPCs. However, background concentrations are included in the screening tables, if available, and are discussed in the risk characterization, if applicable (that is, constituents resulting in risks above target risk levels may be associated with background conditions). Background concentrations for surface soil are the 95 percent upper tolerance level (95% UTL) from the CAX/Yorktown background surface soil samples, and background concentrations for the combined surface and subsurface soil are the lower of the 95% UTL from the CAX/Yorktown background surface soil samples and subsurface soil samples (CH2M HILL, 2011). Background values for the groundwater are the 95% UTLs from the

CAX/Yorktown background groundwater samples (CH2M HILL, 2011). Background values for surface water and surface sediment are the 95% UTLs calculated using the pooled data from the Upstream Pond and Penniman Lake background samples collected from Cheatham Pond (the reference pond). Background values for the combined surface and subsurface sediment are the lower of the surface sediment and Site 4/Youth Pond subsurface sediment background 95% UTLs.

Some of the constituents detected in the site media are not included on the USEPA regional screening level (RSL) table because toxicity values are not available. When possible, appropriate surrogate constituents were selected and their RSLs were used as the screening values, as noted in **Appendix K**, **Tables 2.1** through **2.20**.

J.3.2.1 Soil

Soil data were compared to the USEPA residential soil RSLs (USEPA, 2013a). RSLs for noncarcinogenic effects were based on a hazard quotient (HQ) of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. RSLs based on carcinogenic effects were based on a $1x10^{-6}$ carcinogenic risk, as presented in the RSL table. Lead concentrations in soil were compared to 400 milligrams per kilogram (mg/kg), as included in the *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994a).

J.3.2.2 Groundwater

Groundwater data were compared to the USEPA RSLs for tap water (USEPA, 2013a). RSLs for noncarcinogenic effects were based on a HQ of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. RSLs based on carcinogenic effects were based on a $1x10^{-6}$ carcinogenic risk as presented in the RSL table. Lead concentrations in groundwater were compared to the federal action level of 15 micrograms per liter (μg/L) (USEPA, 2012).

J.3.2.3 Surface Water

Surface water data were compared to 10 times the USEPA tap water RSLs (USEPA, 2013a) following standard USEPA Region III practice because exposure to surface water is much less than exposure to groundwater used as a potable water supply. RSLs for noncarcinogenic effects were based on a HQ of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. RSLs based on carcinogenic effects were based on a $1x10^{-6}$ carcinogenic risk, as presented in the RSL table. Lead concentrations in surface water were compared to the federal action level of 15 μg/L (USEPA, 2012).

J.3.2.4 Sediment

Sediment data were compared to 10 times the USEPA residential soil RSLs (USEPA, 2013a) following standard USEPA Region III practice because exposure to sediment is much less than exposure to soil. RSLs for noncarcinogenic effects were based on a HQ of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. RSLs based on carcinogenic effects were based on a $1x10^{-6}$ carcinogenic risk, as presented in the RSL table. Lead concentrations in sediment were compared to 400 mg/kg, as included in the *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994a).

J.3.2.5 Fish Tissue

Fish tissue data were compared to fish ingestion screening levels calculated using the RSL calculator tool for fish and the default exposure assumptions included in the RSL calculator tool (USEPA, 2013a). RSLs for noncarcinogenic effects were based on a HQ of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. RSLs based on carcinogenic effects were based on a $1x10^{-6}$ carcinogenic risk. Screening for dioxin-like PCB congeners was performed using the maximum dioxin-like PCB TEQ concentration, calculated as discussed in Section J.4.2. Total PCB concentrations were represented by the Aroclor concentrations measured in the same samples. The total PCB concentrations were not calculated using the PCB congener data because only the dioxin-like PCB congeners were analyzed in the fish tissue samples.

J.3.2.6 Essential Human Nutrients

Constituents that are considered essential nutrients and are toxic only at very high doses were eliminated from the quantitative risk analysis. These constituents are calcium, magnesium, potassium, and sodium. Although iron

and manganese are also considered essential nutrients and are only toxic at very high doses, iron and manganese were included in the HHRA because toxicity values are available for these two nutrients.

J.3.2.7 Vapor Intrusion

Potential VI COPCs were evaluated using a multiple lines of evidence (MLE) approach. First, groundwater data from the shallow aquifer were compared to residential and industrial screening levels for protection of indoor air based on VI from groundwater, obtained from the USEPA's (2013b) Vapor Intrusion Screening Level (VISL) Calculator. VISLs based on non-carcinogenic effects were based on a target HQ of 0.1 to account for exposure to multiple constituents with the same target organ or target effect. VISLs based on carcinogenic effects were based on a target carcinogenic risk of $1x10^{-6}$. A site-specific groundwater temperature of 17.58 degrees Fahrenheit was used to calculate the VISLs. The MLE evaluation was then conducted for the chemicals exceeding the VISLs. Screening criteria are not available to evaluate VI from the soil impacts. Therefore, soil impacts were evaluated qualitatively and semi-quantitatively as part of the MLE. Uncertainties in the lines of evidence are discussed in **Section J.7**.

In one location, within Burial Area 1, benzene and naphthalene exceeded the groundwater VISLs for the industrial scenario. Benzene, ethylbenzene, and naphthalene exceeded the groundwater VISLs for the residential scenario in the same location. Because constituents identified in groundwater are likely a result of releases to soil and soil VI screening criteria are not available, the qualitative/semi-quantitative soil evaluation focused on benzene, ethylbenzene, and naphthalene. These compounds were further evaluated, as discussed below, for current industrial workers, future industrial workers, and future residents.

Current Industrial Indoor Workers

The following lines of evidence suggests there are no significant impacts to current industrial indoor workers from the VI pathway. Therefore, no COPCs were retained for this scenario.

- The groundwater concentrations detected above the VISLs are located more than 100 feet from CAD Buildings 11 and 12, and the groundwater flow direction in the vicinity of these detections is to the northeast, toward Youth Pond. CAD Buildings 11 and 12 are located upgradient to cross-gradient of these detections, indicating groundwater concentrations exceeding the VISLs are unlikely to migrate toward the existing buildings (**Figure J-2**).
- The default attenuation factor (AF) (0.001) used to calculate the VISLs is not based on site-specific subsurface data and is conservative, particularly for industrial buildings. The screening levels for groundwater and soil gas (either sub-slab gas or soil gas collected exterior to buildings) were calculated from the target indoor air concentrations using empirically-based conservative "generic" AFs that reflect generally reasonable worst-case conditions (that is, residential structures) as described in USEPA's draft VI guidance (USEPA 2002a). Additionally, evaluation of empirical data collected at other Department of Defense facilities support the conclusion that there is generally two orders of magnitude or more attenuation for VI into industrial buildings compared with residential structures.
- Benzene and naphthalene are readily biodegraded, consistent with the USEPA 2013 Draft Petroleum Vapor Intrusion Guidance (released for public comment). Biodegradation is not accounted for in the VISL calculation using the default AF. Therefore, the calculated VISLs are overly conservative.
- The release history and test pit investigations suggest soil beneath the CAD buildings 11 and 12 is unlikely to have been significantly contaminated by Site 4 releases because these releases occurred exterior to the buildings. Based on information collected during the RI, two sources of contamination are present at Site 4: 1) debris burial between the CAD building 12 and Upstream Pond, and 2) releases associated with outdoor storage of equipment and other materials south of the CAD building 12.
- The high naphthalene concentration (26,000J micrograms per kilogram [µg/kg]) in detected in the surface soil sample collected from CAA03-SS06 (**Figure J-3**) appears to be limited in extent. The subsurface soil sample collected directly below the surface soil sample (0.5 to 2 feet below ground surface) contained 28 µg/kg of naphthalene (**Figure J-4**), indicating limited vertical migration. Therefore, it was reasonable to assume lateral migration of naphthalene would also be limited. This assumption was further supported by analytical results

from the surface soil sample collected at CAS04-SS08, located approximately 20 feet from CAA03-SS06, which indicated a naphthalene concentration of 6.6 J µg/kg. Therefore, naphthalene contamination from Site 4 is unlikely to extend laterally any significant distance beneath CAD Buildings 11 and 12. Benzene was not detected in either of these soil samples.

- Although soil VI screening criteria are not available, soil data were used to provide a semi-quantitative estimate of soil–to-soil vapor partitioning based on the algorithm in the Johnson & Ettinger (J&E) model (http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm). Based on the site history, a release directly beneath CAD Building 12 is unlikely. The results of the model indicated that the naphthalene soil concentration of 28 µg/kg (the second-highest concentration adjacent to the building) would not significantly contribute to potential VI.
- CAD Buildings 11 and 12 are large warehouse buildings with large bay doors and are used for general warehousing and storage. Therefore, these buildings would be expected to have a large indoor air volume that likely results in significant indoor-to-outdoor air exchange, mixing, and attenuation of indoor air concentrations.

Future Industrial Indoor Workers

Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out. COPCs were not identified and future risks were not quantified because defensible methods for quantifying VI risks using soil data are not available.

Future Residents

Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out should building additions or new buildings be constructed. COPCs were not identified and future risks were not quantified because defensible methods for quantifying VI risks using soil data are not available.

J.3.3 COPCs

Table J-2 lists the constituents identified as COPCs for each of the data groups. The COPCs for the various groups are summarized as follows:

Surface soil within fenced area of Youth Pond/Site 4:

- Polycyclic aromatic hydrocarbons (PAHs): benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene
- Additional semivolatile organic constituents (SVOCs): carbazole, dibenzofuran
- Pesticides: dieldrin, gamma-BHC (lindane)
- Metals: aluminum, arsenic, hexavalent chromium, cobalt, iron, lead, manganese

Surface soil outside fenced area of Site 4:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene
- Pesticides: aldrin
- PCBs: Aroclor-1242, Aroclor-1260
- Metals: aluminum, arsenic, cobalt, iron, manganese, thallium, vanadium

Surface and subsurface soil across Site 4 and Youth Pond area:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene

- Additional SVOCs: bis(2-ethylhexyl)phthalate, carbazole, dibenzofuran
- Pesticides: aldrin, dieldrin, gamma-BHC (lindane)
- PCBs: Aroclor-1242, Aroclor-1260
- Metals: aluminum, arsenic, hexavalent chromium, cobalt, iron, lead, manganese, thallium, vanadium

Surface and subsurface soil within fenced area of Site 4 and Youth Pond area:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene
- Additional SVOCs: carbazole, dibenzofuran
- Pesticides: dieldrin, gamma-BHC (lindane)
- PCBs: Aroclor-1242, Aroclor-1260
- Metals: aluminum, arsenic, hexavalent chromium, cobalt, iron, lead, manganese

Shallow groundwater:

- Volatile organic constituents (VOCs): 1,4-dichlorobenzene, benzene, ethylbenzene, m- and p-xylene, trichloroethene, xylene
- PAHs: 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, ,benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene
- SVOCs: 1,1-biphenyl, 2,4-dimethylphenol, dibenzofuran
- Pesticides: dieldrin
- Metals: aluminum, antimony, arsenic, barium, chromium (assuming all chromium hexavalent chromium), cobalt, iron, lead, manganese, mercury, thallium, vanadium

Upstream Pond surface water:

- PAHs: benzo(a)pyrene
- Metals: arsenic, iron

Drainage channel to Upstream Pond surface water:

- Metals: arsenic, iron

Upstream Pond sediment:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene
- Pesticides: dieldrin, heptachlor epoxide
- PCBs: Aroclor-1254, Aroclor-1260
- Metals: arsenic, chromium (assuming all chromium hexavalent chromium), lead

Drainage channel to Upstream Pond sediment:

- PAHs: benzo(a)pyrene
- Metals: arsenic, chromium (assuming all chromium hexavalent chromium)

Youth Pond surface water:

- Metals: arsenic

Youth Pond sediment:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene
- Metals: arsenic, chromium (assuming all chromium hexavalent chromium), thallium

Drainage ditches to Youth Pond surface soil and sediment:

- PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene
- Metals: arsenic, cobalt, iron, manganese

Fish in Youth Pond and Upstream Pond:

- PCBs: Aroclor-1254, Aroclor-1260, dioxin-like PCB congeners
- Metals: chromium (assuming all chromium hexavalent chromium), mercury

J.3.4 Outlier/Hotspot Evaluation

The COPCs for each of the data groups were evaluated to identify any hotspots or outliers within the data set. ProUCL software Version 4.1.01 (USEPA, 2011) was used for the outlier evaluation. Dioxin's Outlier test was used for data sets with less than 20 samples, and Rosner's Outlier test for data sets with 20 or more samples. The results of the outlier/hotspot evaluation is discussed in **Section J.6.2** when applicable (for example, hotspots or outliers may be present that are influencing the results of the HHRA). The summary tables of potential outliers for each data grouping are presented as **Tables 12.1** through **12.13** in **Appendix K**.

J.4 Exposure Assessment

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

The components of exposure assessment include the following:

- Development of the conceptual site model for human health
- Calculation of EPCs
- Development of exposure assumptions for potentially complete exposure pathways
- Calculation of intake for COPCs using calculated EPCs and exposure assumptions.

J.4.1 Conceptual Site Model for Human Health

The CSM for human health is presented in **Section J.2** and **Figure J-1**.

The potentially exposed populations evaluated in the risk assessment are shown in **Figure J-1** and **Appendix K**, **Table 1**. Potential current receptors consist of maintenance workers (including landscape workers) and recreators and visitors to the Site 4 and Youth Pond area. These maintenance workers and recreators/visitors may be exposed to the surface water and sediment in Youth Pond, Upstream Pond, and the drainage channels and ditches around the ponds, and to surface soil surrounding Youth Pond and Upstream Pond outside the fenced area of Site 4 and Youth Pond. Although Upstream Pond is not used recreationally, recreational exposure to Upstream Pond media was evaluated in the HHRA. The primary recreational use of Youth Pond is fishing; the pond is not used for swimming. The recreators may ingest fish they catch while fishing at Youth Pond, and less likely (because it is not generally used recreationally or for fishing) at Upstream Pond. In addition to the maintenance workers and recreators/visitors, current receptors include current industrial workers who work at the buildings within the fenced area of the site and may contact surface soil within this area. Industrial workers may also be exposed to inhalation of VOCs in indoor air from VI related to shallow soil and groundwater.

Future site use and future receptors will most likely remain the same as the current site use and receptors. However, future unrestricted use of the site was evaluated, and therefore it was assumed future residents could

be exposed to site media. For future exposure scenarios, it was assumed that excavation and construction activities could take place at the site that would result in the surface and subsurface soil being mixed and exposed. Therefore, it was assumed all future receptors (residents, construction worker, industrial workers, maintenance workers, recreators/visitors) would be exposed to the combined surface and subsurface soil. Exposure to the surface water and sediment or ingestion of fish was not evaluated for future residents because it was assumed their exposure would be similar to a recreator/visitor exposure to these media. Future residents may also be exposed to inhalation of VOCs in indoor air from VI related to shallow soil and groundwater.

Groundwater at the site is not currently used as a potable water supply; however, although unlikely, it was assumed that shallow groundwater could be used as a future potable water supply. Therefore, potable use of shallow groundwater by residents was evaluated. Additionally, due to the shallow depth to groundwater, it was assumed that construction workers could be exposed to groundwater during excavation activities.

Because of the multitude of different exposure areas a receptor could be exposed to during a site visit, they were grouped for evaluation in the HHRA. The receptors, exposure groups, and exposure pathways are identified below.

For current site use:

- Recreator/visitor adult and child:
  - Site 4/Upstream Pond: incidental ingestion of and dermal contact with surface soil outside fenced area of Site 4 (no COPCs identified for emissions from surface soil to air); incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channel to Upstream Pond; ingestion of fish from Youth and Upstream ponds.
  - Youth Pond: incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in drainage ditch to Youth Pond; ingestion of fish from Youth and Upstream ponds.
- Maintenance worker:
  - Site 4/Upstream Pond: incidental ingestion of and dermal contact with surface soil outside fenced area of Site 4 (no COPCs identified for emissions from surface soil to air); incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channel to Upstream Pond.
  - Youth Pond: incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in drainage ditch to Youth Pond.
- Industrial worker:
  - Site 4: incidental ingestion, dermal contact, inhalation of emissions from surface soil within fenced area of Site 4/Youth Pond.

For future site use:

- Recreator/visitor adult and child:
  - Site 4/Upstream Pond: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and Youth Pond; incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channel to Upstream Pond; ingestion of fish from Youth and Upstream Ponds.
  - Youth Pond: incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in drainage ditch to Youth Pond; ingestion of fish from Youth and Upstream ponds.

- Maintenance worker:
  - Site 4/Upstream Pond: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and Youth Pond; incidental ingestion of and dermal contact with surface water and sediment in Upstream Pond and drainage channel to Upstream Pond.
  - Youth Pond: incidental ingestion of and dermal contact with surface water and sediment in Youth Pond and sediment and surface soil in drainage ditches to Youth Pond.
- Industrial worker:
  - Site 4: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and Youth Pond; inhalation of VOCs in indoor air from VI from shallow groundwater and soil.
- Resident adult and child:
  - Site 4/Upstream Pond: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and Youth Pond ; ingestion of groundwater, and dermal contact and inhalation of volatiles (adult only) from groundwater while showering; inhalation of VOCs in indoor air from VI from shallow groundwater and soil.
- Construction worker:
  - Site 4/Youth Pond: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil across Site 4 and Youth Pond; dermal contact with groundwater and inhalation of volatile emissions from groundwater in an open excavation.
  - Site 4/Youth Pond current industrial are: incidental ingestion, dermal contact, and inhalation of emissions from surface and subsurface soil within fenced industrial area of site.

J.4.2 Calculation of Exposure Point Concentrations

Exposure is quantified by estimating the EPCs for the COPCs and intake (ingestion, dermal absorption, and inhalation) of the COPCs by the receptor. EPCs are the estimated concentrations that a receptor may contact and are specific to each exposure medium and data group. The EPCs for the site are provided in **Tables 3.1** through **3.17** of **Appendix K**.

EPCs may be directly monitored or estimated using environmental models. Constituent concentrations in soil, groundwater, surface water, and sediment were measured for this assessment. Fate and transport modeling was used to estimate constituent concentrations in volatile and particulate emissions from soil and volatile emissions from groundwater.

The methodologies used in the fate and transport modeling for each medium are discussed below:

- **Soil (Particulate and Volatile Emissions from Soil)**: Concentrations in particulate and volatile emissions from soil were estimated using the particulate emission factor (PEF) and volatile factor (VF) approach presented in USEPA's soil screening guidance (1996b) and *Supplemental Guidance for Developing Soil Levels for Superfund Sites* (2002b). PEFs and VFs were used to estimate potential ambient air concentrations from soil. The calculated air concentrations are shown in **Appendix K**, **Table 2 series**.
- **Groundwater (Water Vapors at Showerhead)**: Concentrations of VOCs in water vapors while showering were estimated using the Foster and Chrostowski shower model (Foster and Chrostowski, 1987), as provided in **Appendix K**, **Table 7.10.RME Supplement B**.
- **Groundwater (Water Vapors at Excavation Pit)**: Concentrations of VOCs in air resulting from volatilization of constituents from shallow groundwater in an open excavation were calculated following the Calculation of Inhalation Concentration in Excavation Trench from the Virginia Voluntary Remediation Guidance (found online at http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemedia

tionProgram/VRPRiskAssessmentGuidance/Tables.aspx, as provided in **Appendix K**, **Table 7.7.RME Supplement C**.

ProUCL software Version 4.1.01 (USEPA, 2011) was used to calculate the EPCs. ProUCL was used to determine the distribution that the data fit and calculate the 95 percent upper confidence levels (UCLs) on the mean concentrations used as the reasonable maximum exposure (RME) and central tendency exposure (CTE) EPCs. The recommendations outlined in the ProUCL software documentation (USEPA, 2010b) were followed to select the appropriate UCL and mean concentration. The maximum detected concentration was used as the RME EPC and CTE EPC in cases where the estimated 95 percent UCL was greater than the maximum detected concentration, where the COPC was only detected in one sample in a data groupi, or where fewer than eight samples were available for a data group. The arithmetic mean concentration of detected values was used as the EPC for lead.

The EPCs for groundwater were calculated using all of the groundwater samples because no groundwater plume was identified at the site.

All of the data groups were evaluated for any potential outliers or hotspots for a data group that may result in elevated risks at those locations, or may skew the results of the risk calculations for the data group. The outlier and hotspot evaluation is discussed in Section J.6.2, as applicable.

PCB Congeners

The 12 dioxin-like PCB congeners were analyzed in the two fish tissue samples, in addition to analysis of Aroclors. Following USEPA guidance (USEPA, 1996a), the dioxin-like PCB TEQ concentrations were calculated for each sample using the congener data. Non-dioxin-like PCB total concentrations and total PCB concentrations were not calculated using the PCB congener data because only the dioxin-like PCB congeners were analyzed in the fish tissue samples. The Aroclor data was used as representative of the total PCB concentrations. The dioxin-like PCB TEQ concentrations were calculated for each sample, using the method discussed below. The dioxin-like PCB TEQ concentrations were calculated using only the PCB congeners detected in each sample. Non-detected congeners were not included in the calculation. However, only 1 of the 12 congeners in one of the two fish tissue samples was not detected. The uncertainties associated with this approach are discussed in Section J.7.2.

TEQ concentrations for dioxin-like PCBs were calculated for each sample following the WHO TEF approach (Van den Berg et al., 2006; USEPA, 2010a). The purpose of using the WHO TEF approach is to adjust the relative carcinogenic potency of specific dioxin-like PCB congeners relative to 2,3,7,8-TCDD, the most potent dioxin congener. TEFs are published by WHO for mammals, fish, and wildlife. PCB TEQ concentrations for this HHRA were calculated using the mammal TEFs. Using the measured concentration values for each congener and the TEF for that congener, the dioxin-like TEQ concentration for a mixture of PCB congeners in a specific sample is calculated as follows:

$$\text{Dioxin-like PCB TEQ Concentration} = \Sigma\,(TEF_i \times C_i)$$

where:

Dioxin-like PCB TEQ = PCB toxicity equivalent concentration (mg/kg)
TEF_i = Toxicity equivalency factor for congener *i* (unitless)
C_i = Concentration of congener *i* (mg/kg)

Identification of the dioxin-like PCB TEQ concentration as a COPC was based on comparison to the RSLs for 2,3,7,8-TCDD. Risks were calculated for the dioxin-like PCB TEQ concentration using the noncarcinogenic and carcinogenic toxicity values for 2,3,7,8-TCDD. The TEFs used to calculate the dioxin-like PCB TEQ concentrations and the dioxin-like PCB TEQ concentration calculations are shown in **Table 2.12a** in **Appendix K**.

J.4.3 Estimation of Chemical Intakes for Individual Pathways

Chemical intake is the amount of the chemical constituent entering the receptor's body. The quantification of exposure is based on an estimate of the chronic daily intake (CDI), the average amount of the chemical contaminant entering the receptor's body per day. Chemical intake estimates for the ingestion and dermal exposure pathways are generally expressed as follows:

$$CDI = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

Where:

CDI = chronic daily intake (mg/kg-day)
C = chemical concentration (milligrams per liter [mg/L], mg/kg)
CR = contact rate (L/day, mg/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days)

For the dermal pathway, the contact rate usually incorporates the skin surface area in contact with the exposure medium (soil or groundwater), and an absorption factor. The USEPA (2004) guidance for absorption fractions for soil was used for this evaluation for soil and sediment, which recommends 13 percent for PAHs, 10 percent for other SVOCs, 3 percent for 2,3,7,8-TCDD, 14 percent for Aroclors, 4 percent for Lindane (gamma-BHC), 10 percent for other pesticides, 3 percent for arsenic, 0.1 percent for cadmium, and 1 percent for all of the other inorganics. The intake equation for the dermal exposure pathway is shown in the **Appendix K**, **Table 4 series**.

Chemical exposure estimates for the inhalation pathway are generally expressed as follows:

$$EC = \frac{Ca \times ET \times EF \times ED \times CF}{AT}$$

Where:

EC = exposure concentration (milligrams per cubic meter [mg/m^3])
Ca = chemical concentration in air (mg/m^3)
ET = exposure time (hours/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
CF = conversion factor (day/24 hours)
AT = averaging time (days)

The intake and exposure concentration equations require exposure parameters that are specific to each exposure pathway. Many of the exposure parameters have default values, which were used for this assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and duration are provided in USEPA guidance (USEPA, 1989; 1991; 1997a; 2002b, 2004), and Virginia Voluntary Remediation Risk Program Guidance (Virginia Department of Environmental Quality, 2003). Other assumptions (for example, for the trespasser and construction worker scenarios) required consideration of location-specific information and were selected using professional judgment. **Tables 4.1.RME** through **4.14.RME** and **Tables 4.1.CTE** though **4.14.CTE** of **Appendix K**, present the exposure parameters that were used for the exposure scenarios evaluated in the risk assessment. RME scenario exposure parameters were compiled for all scenarios; CTE parameters were compiled only for scenarios where the RME risk was greater than the noncarcinogenic hazard or carcinogenic risk target levels (cumulative noncarcinogenic target organ hazard index (HI) >1, and cumulative carcinogenic risk $>1 \times 10^{-4}$).

In addition to the parameters discussed above, a preparation/cooking loss factor was used to estimate the ingested dose of PCBs from the fish tissue. This evaluation assumed that half (50 percent) of the PCBs are eliminated during cleaning and cooking of fish, based on studies reported in the literature for PCBs (Zabik et al., 1995; Great Lakes Sport Fish Advisory Task Force, 1993; USEPA, 2000; California Environmental Protection Agency [Cal/EPA], 2008). Appendix C of USEPA's *Guidance for Assessment Chemical Contaminant Data for Use in Fish Advisories, Volume 2: Risk Assessment and Consumption Limits* (USEPA, 2000) summarizes many of the studies that have evaluated loss of PCBs from fish during food preparation and cooking. A review of the available literature found the results range considerably, both between various cooking methods and within the same method. Cooking losses, expressed as percent loss based on total PCB mass before and after cooking, as high as 74 percent were reported in one study (Skea et al., 1979). Other studies reported net gains of PCBs (Moya et al.,

1998; Armbruster et al., 1987). PCB losses from cooking may be a function of the cooking method (baking, frying, broiling, etc.), cooking duration, temperature during cooking, preparation techniques (trimmed vs. untrimmed, with or without skin), lipid content of the fish, the fish species, magnitude of the PCB contamination in the raw fish, the extent to which lipids separated during cooking are consumed, reporting method, and/or the experimental study design. Personal preferences for various preparation and cooking methods and other related habits (such as consuming pan drippings) may result in consumption of PCBs "lost" from the fish upon cooking.

J.5 Toxicity Assessment

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

USEPA recommends that a tiered approach be used to obtain the toxicity values (RfDs, RfCs, CSFs, and IURs) that are used to estimate noncarcinogenic hazards and carcinogenic risks (USEPA, 2003a). The hierarchy of toxicity value sources is the following:

1. Integrated Risk Information System (IRIS) (USEPA, 2013c)
2. Provisional Peer-Reviewed Toxicity Values
3. Other USEPA and non-USEPA sources, including the Health Effects Assessment Summary Tables (USEPA, 1997b), Cal/EPA Toxicity Criteria Database (Cal/EPA, 2013), New Jersey Department of Environmental Protection (NJDEP) chromium workgroup (NJDEP, 2009), and Agency for Toxic Substances and Disease Registry (2008).

The use of toxicity values from sources other than IRIS increases the uncertainty of the quantitative risk estimates. Some of the COPCs elicit both systemic (noncarcinogenic) toxic effects and cancer (carcinogenic) effects. Because of this, these constituents are evaluated as both noncarcinogens and carcinogens. The health risks for carcinogenic and noncarcinogenic effects were estimated separately based on different toxicity values.

The non-carcinogenic toxicity values used in the HHRA are provided in **Tables 5.1** and **5.2** of **Appendix K** and the carcinogenic toxicity values are provided in **Tables 6.1** and **6.2** of **Appendix K**.

Hexavalent chromium was analyzed for in a subset of the soil samples, but was not analyzed for in any of the sediment, surface water, groundwater, or fish tissue samples. Hexavalent chromium was detected and identified as a COPC for surface soil within the fenced area, combined surface and subsurface soil within the fenced area, and combined soil across the site, but not for surface soil outside the fenced area. Because hexavalent chromium was not detected in the surface soil outside the fenced area, the total chromium data were compared to the screening values for trivalent chromium and determined that total chromium was not a COPC for this data group. Chromium was identified as a COPC for groundwater, Upstream Pond sediment, drainage channel to Upstream Pond sediment, Youth Pond sediment, and fish. It was assumed that all of the chromium detected in these media is hexavalent chromium both for determining if chromium was a COPC (comparing the total chromium concentrations to hexavalent chromium RSLs) and for calculating the risks associated with exposure to chromium in these media. Hexavalent chromium is unstable in the body (in biological tissues) and is ultimately reduced to trivalent chromium by a variety of reducing agents, including ascorbate and glutathione (Agency for Toxic Substances and Disease Registry, 2008; USEPA, 2013c). Hexavalent chromium exerts toxicity through direct contact mechanisms rather than bioaccumulation to a critical concentration in tissue. However, the hexavalent chromium toxicity values were used to evaluate the risks associated with exposure to chromium for all media. An RfD and RfC for hexavalent chromium are available in IRIS; however, IRIS does not include a CSF or IUR for

hexavalent chromium. The CSF for hexavalent chromium used in the HHRA is the same one included on the RSL table (USEPA, 2013c) from NJDEP (2009).

Toxicity values for methylmercury, an organic form of mercury, were used to evaluate risks associated with exposure to mercury in fish tissue, and toxicity values for mercuric chloride, an inorganic form of mercury, were used to evaluate risks associated with exposure to mercury in groundwater. Fish tissue and groundwater were the only two media where mercury was identified as a COPC. The mercuric chloride RSLs were used to determine if mercury was a COPC for all media, except fish tissue. Typically, most mercury found in groundwater or soil is present in the inorganic form, whereas organic mercury (methylmercury) may accumulate in fish tissue (NJDEP, 2002).

J.5.1 Toxicity Information for Noncarcinogenic Effects

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

USEPA (1989) defines the chronic RfD as a dose that is likely to be without appreciable risk of deleterious effects during a lifetime of exposure. Chronic RfDs are specifically developed to be protective for long-term exposure to a compound (for example, 7 years to a lifetime), and consider uncertainty in the toxicological database and sensitive receptors. Subchronic RfDs (applicable for exposures less than 7 years), which are all provisional values (that is, not verified by USEPA), were used for the construction worker scenario, if available. Chronic RfDs were used to evaluate noncarcinogenic risks to all other receptors included in the HHRA. In the development of RfDs, all available studies examining the toxicity of a chemical following exposure are considered on the basis of scientific merit. The lowest dose level at which an observed toxic effect occurs is identified as the lowest observed adverse effect level, and the dose at which no effect is observed is identified as the no observed adverse effect level. Several uncertainty factors (UFs) may be applied to account for uncertainties such as limited data, extrapolation of data from animal studies to human exposures, or the use of subchronic studies to develop chronic criteria. These UFs range from 10 to 10,000, and are based on professional judgment. Consequently, there are varying degrees of uncertainty in the toxicity criteria, which range from 1 to 10,000 for the COPCs identified for this site.

In accordance with USEPA guidance, oral RfDs were adjusted from administered dose (oral) to absorbed dose (dermal) to evaluate dermal toxicity. When appropriate, the RfDs were adjusted using oral absorption factors (USEPA, 2004). This adjustment is shown in **Table 5.1** in **Appendix K**.

J.5.2 Toxicity Information for Carcinogenic Effects

Potential carcinogenic effects are quantified as CSFs or IURs that convert estimated exposures directly to incremental lifetime carcinogenic risks.

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

As was done for oral RfDs, oral CSFs were adjusted from administered dose (oral) to absorbed dose (dermal) to evaluate dermal toxicity. When appropriate, the CSFs were adjusted using oral absorption factors (USEPA, 2004). This adjustment is shown in **Table 6.1** in **Appendix K**.

J.5.3 Approach for Potential Mutagenic Effects

Consistent with the cancer guidelines and supplemental guidance (USEPA, 2005a and 2005b), cancer risks were estimated using age-dependent adjustment factors (ADAFs) for COPCs that act via a mutagenic mode of action (MMOA). Trichloroethene, carcinogenic PAHs, and chromium were the only COPCs that are categorized as chemicals with an MMOA. Trichloroethene is carcinogenic by an MMOA for induction of kidney tumors (USEPA,

2013c). Therefore, ADAFs were used to estimate carcinogenic risks only for the kidney cancer component of TCE. Modes of action have not been established for trichloroethene-induced non-Hodgkin lymphoma and liver cancer; therefore, ADAFs were not used to estimate risks for these types of cancers.

The calculation of cancer risks using ADAFs is presented in **Tables 7.3.RME Supplement A**, **7.6.RME Supplement A, 7.12.RME Supplement A**, **7.3.CTE Supplement A**, **7.5.CTE Supplement A**, and 7**.10.CTE Supplement A**, in **Appendix K**. Because chemical-specific data are not available for the trichloroethene, carcinogenic PAHs, or chromium, default ADAFs, as included in the USEPA Region III memorandum*, Derivation of RBCs for Carcinogens that Act Via a Mutagenic Mode of Action and Incorporate Default ADAFs* (USEPA, 2006), were used for the MMOA evaluation. The default ADAFs used to adjust the CSF and IUR are 10 for 0 to 2-year-olds, 3 for 2- to 6-year-olds, 3 for 6- to 12-year-olds, and 1 for 16- to 30-year-olds. The CSF was multiplied by the appropriate ADAF to derive the age-specific CSF for a receptor to calculate the total carcinogenic risk. Additionally, the exposure factors for children 0 to 2 years old and 2 to 6 years old were assumed to be the same as the parameters for a child 0 to 6 years old, with the exception of the exposure duration, which was 2 years and 4 years, respectively. The exposure factors for the adult residential receptor were used for residents 6 to 16 years old and 16 to 30 years old, with the exception of the exposure durations, which were 10 years and 14 years, respectively.

J.5.4 Constituents for Which USEPA Toxicity Values Are Not Available

Most of the constituents detected at Site 4 have toxicity factors and USEPA RSLs. Detected constituents that did not have RSLs were compared to RSLs for appropriate surrogate constituents during the COPC selection process. Surrogates were selected based on previous recommendations from USEPA Region III. The surrogates are identified in the **Table 2 series** in **Appendix K**.

Quantitative oral toxicity criteria are not available for lead. As a screening tool, lead is screened against 400 mg/kg in soil and 15 μg/L in groundwater, based on residential exposure. The potential risks associated with residential exposures to lead were addressed using the Integrated Exposure Uptake Biokinetic (IEUBK) lead model and the potential risks associated with worker and trespasser/visitor exposure to lead were addressed using the Adult Lead Model (ALM), as described in Section J.6.1.3.

J.6 Risk Characterization

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

J.6.1 Methods for Estimating Risks

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

J.6.1.1 Noncarcinogenic Hazard Estimation

Noncarcinogenic health risks are estimated by comparing the calculated exposures to RfDs or the exposure concentrations to RfCs. The calculated intake divided by the RfD, or exposure concentration divided by RfC, is equal to the HQ:

$$HQ = \text{Intake} / \text{RfD or Exposure Concentration} / \text{RfC}$$

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

To assess the potential for noncarcinogenic health effects posed by exposure to multiple constituents, an HI approach is used (USEPA, 1986). This approach assumes that noncarcinogenic hazards associated with exposure to more than one constituent are additive (HI = sum of the HQs). Synergistic or antagonistic interactions between constituents are not considered. The HI may exceed 1 even if all of the individual HQs are less than 1. HIs may be added across exposure routes to estimate the total noncarcinogenic health effects to a receptor posed by exposure through multiple routes. If the HI is greater than 1, separate HIs are estimated for each target organ to assess whether the HI for a specific target organ is greater than 1. A target organ-specific HI greater than 1 indicates there is some potential for adverse noncarcinogenic health effects associated with exposure to the COPCs, possibility warranting remedial action. If the HI for each target organ does not exceed 1, noncarcinogenic hazards are not expected.

J.6.1.2 Carcinogenic Risk Estimation

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

Carcinogenic risk is calculated by multiplying the intake by the CSF, or multiplying the exposure concentration by the IUR.

$$\text{ELCR} = \text{Intake} \times \text{CSF or Exposure Concentration x IUR}$$

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

As required under the National Oil and Hazardous Substances Pollution Contingency Plan (USEPA, 1994b), "[f]or known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6} using information on the relationship between dose and response." When a cumulative carcinogenic risk to a receptor under the assumed RME exposure conditions exceeds 1 in 10 thousand (10^{-4} ELCR), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) generally requires remedial action to reduce risks at the site.

J.6.1.3 Approach for Lead

Lead concentrations less than 0.015 mg/L in groundwater and surface water (the Safe Drinking Water Act action level for lead in potable water) and less than 400 mg/kg in soil and sediment (USEPA, 1994a) are considered adequately protective of human health under residential land-use conditions. Lead concentrations less than 800 mg/kg in soil and sediment are considered adequately protective of human health under industrial land-use conditions. Lead was retained as a COPC when exceeding the residential values. Lead was identified as a COPC for the following data groups: surface soil within the fenced area of Site 4 and Youth Pond, Upstream Pond sediment, surface and subsurface soil inside and outside fenced area of Site 4 and Youth Pond, surface and subsurface soil inside fenced area of Site 4 and Youth Pond, and groundwater. Lead does not have available published toxicity factors, and therefore potential risks associated with lead are evaluated differently than the other COPCs. The toxicity of lead is evaluated by USEPA based on blood-lead uptake using a physiologically based pharmacokinetic model called the IIEUBK model.

The potential risks associated with residential/recreational exposure to lead by children are addressed using the IEUBK lead model for Windows, Version 1.1, Build 11 (USEPA, 2010c). The IEUBK model was designed to provide predictions of the probability of elevated blood lead levels for children from ages 0 to 7 years with potential exposure to lead in various media. The IEUBK model was used to evaluate potential risks associated with future residential child exposures to lead in soil and groundwater and recreational child exposure to lead in soil and sediment. The arithmetic mean of the lead concentrations in soil, sediment, and groundwater were used with the model default input parameters to represent site-specific exposures to lead. The IEUBK model results are expressed as the predicted geometric mean blood lead level for children and the percent of the population

potentially experiencing concentrations above USEPA's recommended level of 10 micrograms per deciliter (µg/dL), below which adverse manifestations are not expected. USEPA's target level for lead is less than 5 percent of the population exceeding the 10 µg /dL blood lead level (USEPA, 1994a).

An interim approach to assessing risks associated with adult exposures to lead was developed by USEPA's Technical Review Workgroup for Lead (2003b) and updated in 2005 and 2009 (USEPA 2009b). This methodology is a variation of the IEUBK model. The ALM is used to evaluate risks associated with nonresidential adult exposures to lead in soil (and sediment in this assessment). The model focuses on estimating fetal blood concentrations in women exposed to lead in soil (USEPA, 2003b). Because the lead model is a probabilistic model, several of the EPA default parameters are based on central tendency (that is, average) values (USEPA, 2003b). Therefore, the arithmetic mean concentration for soil (and sediment) served as the input value for the soil concentration.

The default ingestion rate and exposure frequency values for the ALM were used in the model except as follows: a soil ingestion rate of 100 mg/day and an exposure frequency of 52 days/year were used for the adult visitor/recreator and maintenance worker exposed to soil, and a sediment ingestion rate of 50 mg/day and an exposure frequency of 52 days/year were used for the adult visitor/recreator exposed to sediment, consistent with the values used for estimating exposure to the other COPCs; and a soil ingestion rate of 100 mg/day (from Frequent Questions from Risk Assessors on the Adult Lead Methodology, (http://www.epa.gov/superfund/lead/almfaq.htm) and an exposure frequency of 125 days/year were used for the construction worker.

ALM spreadsheets provided by USEPA (2009c) were used to calculate blood lead concentrations for the various scenarios. The model results are expressed as the predicted geometric mean blood lead level for adults (that is, women of child-bearing age), the corresponding 95th percentile fetal blood lead concentrations, and the percent of the population potentially experiencing concentrations above EPA's target blood lead level of 10 µg/dL. USEPA's target level for lead is less than 5 percent of the population (for the ALM, fetuses of women of child-bearing age) exceeding the 10 µg /dL blood lead level (USEPA, 1994a).

J.6.2 Risk Assessment Results

The results of the risk estimates for Site 4 and Youth Pond are summarized below by receptor. A summary of the RME results is presented in **Table J-3**, and the CTE results are summarized in **Table J-4**. The risk calculations are presented in **Tables 7.1.RME** through **7.12.RME**, and **7.1.CTE** through **7.10.CTE** in **Appendix K**. CTE risks were calculated when the RME hazards exceeded the regulatory noncarcinogenic target HI of 1, or the RME carcinogenic risks exceeded the regulatory target risk range of 1×10^{-6} to 1×10^{-4}. **Tables 9.1.RME** through **9.12.RME** and **9.1.CTE** through **9.10.CTE** in **Appendix K** summarize the hazards and risks to each receptor. The constituents of concern (COCs) are identified below for each receptor. The COCs are those COPCs that contribute an HI greater than 0.1 to a cumulative target organ HI that exceeds 1, or a carcinogenic risk greater than 1×10^{-6} to a cumulative carcinogenic risk that exceeds 1×10^{-4}.

Factors such as nature of contamination source (site relatedness), data quality (laboratory contamination), and common pesticide use (unrelated to spills, improper storage disposal or use) are also considered when identifying COCs.

J.6.2.1 Current Industrial Worker (Tables 9.1.RME, and Table 9.1.CTE, Appendix K)

The risk assessment assumed that a current industrial worker could be exposed to surface soil within the fenced area of Site 4 and Youth Pond through incidental ingestion, dermal contact, inhalation of volatile and particulate emissions, and inhalation of VOCs through VI.

- Total HI (RME) = 0.3, is below regulatory target HI of 1.
- Total ELCR (RME) = 1×10^{-3}, exceeds the target risk range of 1×10^{-6} to 1×10^{-4}, due to carcinogenic PAHs, with smaller contributions from dieldrin and arsenic. The carcinogenic risk is associated with the PAHs detected in only one sample, CAA03-SS06-1109, adjacent to CAD Building 12. This sample may be an outlier/hotspot. as shown in **Appendix K**, **Table 12.1**.

- Lead was identified as a COPC in surface soil within the fenced area of Site 4 and Youth Pond. The ALM was used to evaluate exposure to lead in soil by the adult industrial worker. The input parameters for the ALM are provided in **Table 11.1a**, and the model results are presented in **Table 11.1b** of **Appendix K**. The mean soil lead concentration of 151 mg/kg results in geometric mean blood lead levels ranging from 1.2 to 1.7 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.9 to 5.2 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.008 to 0.6 percent. Therefore, there would be no risks above regulatory target levels associated with exposure to lead in surface soil from within the fenced area of Site 4 and Youth Pond for an industrial worker. It should be noted that the outlier evaluation indicated that the concentration of lead detected in sample CAA03-SS06-1109 could be a potential outlier/hotspot. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013), therefore, there would be no adverse effects associated with exposure to lead by industrial workers at this location.
- Total ELCR (CTE) = $1x10^{-4}$, does not exceed the regulatory target risk range.
- COCs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and arsenic in soil.

J.6.2.2 Current Adult Visitor/Recreational User (Tables 9.2.RME, and Table 9.2.CTE, Appendix K)

The risk assessment assumed that a current adult visitor/recreational user could be exposed to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond, and ingestion of fish from Youth and Upstream ponds; or to media associated with Youth Pond (surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingestion of fish from Youth and Upstream ponds). Exposure routes for surface soil, sediment, and surface water are incidental ingestion and dermal contact.

- Total HI (RME) = 3, from either the Youth Pond or Site 4/Upstream Pond exposure groupings, exceed the target HI. HI associated with fish ingestion alone exceeds the regulatory target HI. HIs for all other media in both exposure groupings are below the target HI. Hazard from fish ingestion is associated with dioxin-like PCBs detected in fish tissue, primarily the fish tissue composite sample from the fish collected from Upstream Pond. The dioxin-like PCB TEQ concentration for the fish tissue composite sample from the fish collected from Youth Pond would not result in a hazard above the regulatory target level.
- Total Youth Pond exposure grouping ELCR (RME) = 1×10^{-4}, does not exceed the target risk range.
- Total Upstream Pond ELCR (RME) = 2×10^{-4}, exceeds the target risk range. Risk is associated with ingestion of PCBs (Aroclors and dioxin-like PCB congeners) in fish, and primarily the composite fish tissue sample from the fish collected from Upstream Pond.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond. Although there is no model to specifically evaluate exposure to lead in sediment by recreators, the ALM model was used to provide a conservative evaluation of exposure to lead in sediment. The input parameter values for the ALM are provided in **Table 11.2a**, and the model results are presented in **Table 11.2b** of **Appendix K**. The mean sediment lead concentration of 60 mg/kg results in geometric mean blood lead levels ranging from 1.0 to 1.5 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.4 to 4.6 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.002 to 0.4 percent. Therefore, there would be no risks above regulatory target levels associated with exposure to lead in Upstream Pond sediment for a visitor/recreational user.
- Total HI (CTE) = 1, from either the Youth Pond or Upstream Pond exposure groups, does not exceed the target HI of 1.
- Total ELCR (CTE) from Upstream Pond exposure group =2×10^{-5}, is within the target risk range of 1×10^{-6} to 1×10^{-4}.

- COCs are dioxin-like PCBs, Aroclor-1254, Aroclor-1260, dieldrin, and chromium (assuming all detected chromium is hexavalent chromium) in fish tissue. However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue.

J.6.2.3 Current Child Visitor/Recreational User (Tables 9.3.RME, and 9.3.CTE, Appendix K)

The risk assessment assumed that a current child visitor/recreational user could be exposed to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond, and ingestion of fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in drainage ditches to Youth Pond, and ingestion of fish from Youth Pond and Upstream Pond). Exposure routes for surface soil, sediment, and surface water are incidental ingestion and dermal contact.

- Total HI (RME) for the Youth Pond exposure group = 7 and for the Upstream Pond exposure group = 8, exceeding the target HI. HI associated with fish ingestion alone exceeds target HI. HIs for all other media in both exposure groups are below the target HI. Hazard from fish ingestion is associated with dioxin-like PCBs detected in fish tissue. The risk is primarily associated with the dioxin-like PCBs detected in the fish tissue composite sample from the fish collected from Upstream Pond. The dioxin-like PCB TEQ concentration for the fish tissue composite sample from the fish collected from Youth Pond would not result in a hazard above the regulatory target level.
- Total Youth Pond exposure grouping ELCR (RME) = 1×10^{-4}, does not exceed the target risk range.
- Total Upstream Pond exposure grouping ELCR (RME) = 2×10^{-4}, exceeds the target risk range. Risk is associated with ingestion of PCBs (Aroclors and dioxin-like PCB congeners) in fish, and primarily the composite fish tissue sample from the fish collected from Upstream Pond.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond. Although there is no model to specifically evaluate exposure to lead in sediment for a child recreator, the IEUBK model was used to provide a conservative evaluation. This calculation was based on the site-specific arithmetic mean concentration of lead detected in sediment (60 mg/kg). The results of the model are presented in **Tables 11.8a** and **11.8b**, **Appendix K**. The predicted geometric mean blood lead level for a young child was 1.6 µg/dL, with less than 1 percent of the population potentially experiencing concentrations exceeding 10 µg/dL. These results indicate there would be no risks above target regulatory levels associated with exposure to lead in Upstream Pond surface and subsurface sediment.
- Total HI (CTE) from Youth Pond exposure grouping =1, does not exceed target HI of 1.
- Total HI (CTE) from Upstream Pond exposure grouping = 2, exceeds the target HI of 1.
- Total ELCR (CTE) from Upstream Pond =6×10^{-5}, is within the target risk range of 1×10^{-6} to 1×10^{-4}.
- COCs are dioxin-like PCBs, Aroclor-1254, Aroclor-1260, dieldrin, and chromium (assuming all detected chromium is hexavalent chromium) in fish tissue. However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue.

J.6.2.4 Current Maintenance Worker (Table 9.4.RME, Appendix K)

The risk assessment assumed that a current maintenance worker could be exposed to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in drainage ditches to Youth Pond) through incidental ingestion and dermal contact.

- Total HI (RME) for Youth Pond exposure grouping =0.04, does not exceed the regulatory target HI.

- Total HI (RME) for Upstream Pond exposure grouping = 0.2, does not exceed the target HI.
- Total ELCR (RME) for Youth Pond exposure grouping = 7×10^{-6}, is within the regulatory target risk range of 1×10^{-6} to 1×10^{-4}.
- Total ELCR (RME) from Upstream Pond exposure grouping = 5×10^{-5}, is within the target risk range of 1×10^{-6} to 1×10^{-4}.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond. Because exposure to sediment by the maintenance workers would be less frequent than for a visitor/recreator (based on exposure frequency used in the risk calculations), and exposure to lead by the visitor/recreator would not result in blood lead levels above regulatory levels, exposure to lead in sediment by a maintenance worker would not result in blood lead levels above regulatory levels.

J.6.2.5 Future Adult Visitor/Recreational User, (Tables 9.5.RME and 9.4.CTE, Appendix K)

The risk assessment assumed that a future adult visitor/recreational user could be exposed to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond, and ingestion of fish from Youth Pond and Upstream Pond or to media associated with Youth Pond (Youth Pond surface water and sediment, sediment/surface soil in drainage channel to Upstream Pond, and fish from Youth and Upstream Pond). Exposure routes for sediment and surface water are incidental ingestion and dermal contact; exposure routes for soil are incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions, and the exposure route for fish is ingestion.

- Total HI (RME) = 3, for either the Youth Pond exposure group or the Upstream Pond exposure group, exceeds the regulatory target HI. HI associated with fish ingestion alone exceeds target HI. HIs for all other media in both exposure groupings are below the target HI. Hazard from fish ingestion is associated with dioxin-like PCBs detected in fish tissue. The risk is primarily associated with the dioxin-like PCBs detected in the fish tissue composite sample from the fish collected from Upstream Pond. The dioxin-like PCB TEQ concentration for the fish tissue composite sample from the fish collected from Youth Pond would not result in a hazard above the regulatory target level.
- Total Youth Pond exposure group ELCR (RME) = 1×10^{-4}, does not exceed the target risk range.
- Total Upstream Pond ELCR (RME) = 2×10^{-4}, exceeds the target risk range. ELCR exceeding the target risk range is associated with ingestion of PCBs (Aroclors and dioxin-like PCB congeners) in fish, and primarily the composite fish tissue sample from the fish collected from Upstream Pond.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond. Although there is no model to specifically evaluate exposure to lead in sediment by recreators, the ALM model was used to provide a conservative evaluation. As discussed for the current adult visitor/recreational user, exposure to lead in Upstream Pond sediment would not result in risks above regulatory target levels.
- Lead was also identified as a COPC in combined surface and subsurface from inside and outside the fenced area of Site 4. The ALM was used to evaluate exposure to lead in soil. The input parameters for the ALM are provided in **Table 11.3a**, and the model results are presented in **Table 11.3b** of **Appendix K**. The mean soil lead concentration of 36.8 mg/kg results in geometric mean blood lead levels ranging from 1.0 to 1.5 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.7 to 4.7 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.003 to 0.4 percent. Therefore, there would be no risks above target regulatory levels associated with exposure to lead in combined surface and subsurface soil inside and outside the fenced area for a future adult visitor/recreational user.
- Total HI (CTE) for Youth Pond exposure group or Upstream Pond exposure group = 0.9, are below the target HI of 1.

- Total ELCR (CTE) from Upstream Pond exposure group = 2×10^{-5}, is within the target risk range of 1×10^{-6} to 1×10^{-4}.
- COCs are dioxin-like PCBs, Aroclor-1254, Aroclor-1260, dieldrin, and chromium (assuming all detected chromium is hexavalent chromium) in fish tissue. However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue.

J.6.2.5 Future Child Visitor/Recreational User, (Tables 9.6.RME and 9.5.CTE, Appendix K)

The risk assessment assumed that a future child visitor/recreational user could be exposed to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond, and ingestion of fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, sediment/surface soil in drainage channel to Upstream Pond, and ingestion of fish from Youth and Upstream Pond). Exposure routes for sediment and surface water are incidental ingestion and dermal contact; exposure routes for soil are incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions.

- Total HI (RME) = 7 for either Youth Pond exposure grouping or Upstream Pond exposure grouping, exceed the target HI. HI associated with fish ingestion alone exceeds target HI. HIs for all other media in both exposure groupings are below the target HI. The hazard from fish ingestion is associated with dioxin-like PCBs detected in fish tissue, primarily the fish tissue composite sample from the fish collected from Upstream Pond. The dioxin-like PCB TEQ concentration for the fish tissue composite sample from the fish collected from Youth Pond would not result in a hazard above the regulatory target level.
- Total Youth Pond ELCR (RME) = 1×10^{-4}, does not exceed the target risk range.
- Total Upstream Pond ELCR (RME) = 6×10^{-4}, exceeds the target risk range. Risk is associated with exposure to soil inside and outside fence line (primarily carcinogenic PAHs with a smaller contribution from arsenic), and ingestion of PCBs (Aroclors and dioxin-like PCB congeners) in fish, and primarily the composite fish tissue sample from the fish collected from Upstream Pond. The carcinogenic risk associated with exposure to the soil is associated with the PAHs detected in one or two samples, CAA03-SS06-1109 and CAS004-4HA06-00-1199. These samples may be outliers/hotspots, as shown in **Appendix K**, **Table 12.11**.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond, and in soil from inside and outside the fenced area. There is currently no model available to evaluate exposure to lead in sediment or soil by a child visitor/recreational user. However, exposure to lead in Upstream Pond sediment and in soil was conservatively evaluated using the residential child-based IEUBK model. The mean concentration of lead detected in soil (38.6 mg/kg) and the model default groundwater concentration (4 μg/L) were used to evaluate exposure to soil; and the mean concentration of lead in Upstream Pond sediment (60 mg/kg) and the model default groundwater concentration were used to evaluate exposure to lead in sediment. The results of the evaluation for sediment are presented in **Tables 11.8a** and **11.8b**, **Appendix K**. As discussed for the current child visitor/recreational user, the results of the model indicate no risks above target regulatory levels associated with exposure to lead in Upstream Pond sediment. The results of the evaluation for soil are presented in **Tables 11.9a** and **11.9b**, **Appendix K**. The predicted geometric mean blood lead level for a young child was 1.2 μg/dL, with less than 1 percent of the population potentially experiencing concentrations exceeding 10 μg/dL. These results indicate that there would be no risks above target regulatory levels associated with exposure to lead in combined surface and subsurface soil inside and outside the fenced area for a future child visitor/recreational user. There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level and this sample is a surface soil sample from within the fenced industrial area of the site. The next highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and recreational exposure to lead at this location alone could potentially result in unacceptable risks, it

is unlikely a future recreator would be exposed to lead in soil at this concentration. As this sample was collected from within the developed fenced area of the site, future use of this area would require considerable re-working of the area and the soil, and the soil would be mixed, resulting in the more concentrated lead soil mixed with the soil with much lower lead concentrations, resulting in a concentration more similar to the mean concentration used in the IEUBK model which demonstrated no adverse effects for exposure to soil.

- Total HI (CTE) from Youth Pond exposure groupi or Upstream Pond exposure group = 1, do not exceed the target HI of 1.
- Total ELCR (CTE) from Upstream Pond data group = 1×10^{-4}, does not exceed the target risk range of 1×10^{-6} to 1×10^{-4}.
- COCs are dioxin-like PCBs, Aroclor-1254, Aroclor-1260, dieldrin, and chromium (assuming all detected chromium is hexavalent chromium) in fish tissue. However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue,
- The COCs for combined surface and subsurface soil across the site are carcinogenic PAHs)benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene), dieldrin, and arsenic.

J.6.2.6 Future Construction Worker (Tables 9.7.RME, and 9.6.CTE, Appendix K)

The risk assessment assumed that a future construction worker could be exposed to combined surface and subsurface soil from inside and outside the fenced area or within the fenced area of Site 4/Youth Pond via incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions, and to shallow groundwater in an excavation through dermal contact and inhalation of volatile emissions.

- Total HI (RME) for both soil inside and outside the fenced area and shallow groundwater, and soil within the fenced area and groundwater =34, exceed the target HI. The HI associated with inhalation of volatile emission from groundwater exceeds the target HI. HIs for both soil exposure groups are below the target HI. Hazard from inhalation of groundwater is associated with 1,1-biphenyl and naphthalene. The HI is associated with sample CAA03-GW05-1109. This sample may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.13**.
- Total ELCR (RME) for soil inside and outside the fenced area and groundwater = 9×10^{-5}, is within the target risk range of 1×10^{-6} to 1×10^{-4}.
- Total ELCR (RME) for soil within the fenced area of Site 4/Youth Pond and shallow groundwater =3×10^{-4}, exceeds the target risk range associated with carcinogenic PAHs (and primarily benzo(a)pyrene) in soil.
- Lead was identified as a COPC in soil from inside and outside the fenced area of Site 4, and from within the fenced area of Site 4/Youth Pond. The ALM was used to evaluate exposure to lead in soil by the construction worker. The input parameters for the ALM are provided in **Tables 11.4a**, and **11.7a**, and the model results are presented in **Table 11.4b** and **11.7b** of **Appendix K**. The mean soil lead concentration of 36.8 mg/kg for soil inside and outside the fenced area results in geometric mean blood lead levels ranging from 1.1 to 1.6 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.5 to 4.8 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.003 to 0.4 percent. Therefore, there would be no risks above target levels associated with exposure to lead in soil inside and outside the fenced area for a future construction worker. The mean soil lead concentration of 117 mg/kg for soil within the fenced area of Site 4/Youth Pond results in geometric mean blood lead levels ranging from 1.2 to 1.7 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.8 to 5.2 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.007 to 0.6 percent. Therefore, there would be no risks above target levels associated with exposure to lead in soil within the fenced area of Site 4 /Youth Pond for a future construction worker. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg

(USEPA, 2013), therefore, there would be no adverse effects associated with exposure to lead by construction workers at this location.

- Total HI (CTE) for soil inside and outside the fenced area and shallow groundwater, and from soil within the fenced area of Site 4/Youth Pond and shallow groundwater = 17, exceeding the target HI. The hazard is associated with exposure to groundwater, primarily through inhalation of naphthalene from groundwater.
- Total ELCR (CTE) for soil within the fenced area of Site 4/Youth Pond and shallow groundwater =2×10^{-4}, exceeds the target risk range.
- COCs are 1,1-biphenyl and naphthalene in groundwater, and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene in soil from inside fenced area.

J.6.2.7 Future Industrial Worker (Tables 9.8.RME, and Table 9.7.CTE, Appendix K)

The risk assessment assumed that a future industrial worker could be exposed to combined surface and subsurface soil from inside and outside the fenced area via incidental ingestion, dermal contact, inhalation of volatile particulate emissions, and inhalation of VOCs through VI.

- Total HI (RME) = 0.3, is below the target HI of 1.
- Total ELCR (RME) = 2×10^{-4}, exceeds the target risk range of 1×10^{-6} to 1×10^{-4}, due to carcinogenic PAHs, with smaller contributions from dieldrin and arsenic. The carcinogenic risk is associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199. These samples may be outliers/hotspots, as shown in **Appendix K**, **Table 12.11**.
- Lead was identified as a COPC for soil from inside and outside the fenced area of Site 4. The ALM was used to evaluate exposure to lead in soil by the adult industrial worker. The input parameters for the ALM are provided in **Table 11.5a**, and the model results are presented in **Table 11.5b** of **Appendix K**. The mean soil lead concentration of 36.8 mg/kg results in geometric mean blood lead levels ranging from 1.1 to 1.6 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.5 to 4.7 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.003 to 0.4 percent. Therefore, there would be no risks above target levels associated with exposure to lead soil from inside and outside the fenced area of Youth Pond/Site 4 for an industrial worker. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013), therefore, there would be no adverse effects associated with exposure to lead by industrial workers at this location.
- Total ELCR (CTE) = 2×10^{-5} associated with exposure to surface soil within the fenced area of Youth Pond/Site 4 is within the acceptable target risk range.
- COCs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and arsenic in soil.
- Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out. COPCs are not identified and future risks are not quantified because defensible methods for quantifying VI risks using soil data are not available.

J.6.2.8 Future Maintenance Worker (Table 9.9.RME, Appendix K)

The risk assessment assumed that a future maintenance worker could be exposed to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond). Exposure routes for sediment and surface water are incidental ingestion and dermal contact and exposure routes for soil include incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions.

- Total HI (RME) from Youth Pond = 0.04, does not exceed the target HI.

- Total HI (RME) from Upstream Pond =0.2, does not exceed the target HI.
- Total ELCR (RME) from Youth Pond =7 × 10^{-6}, within the target risk range of 1 × 10^{-6} to 1 × 10^{-4}.
- Total ELCR (RME) from Upstream Pond = 8 × 10^{-5}, within the target risk range of 1 × 10^{-6} to 1 × 10^{-4}.
- Lead was identified as a COPC in combined surface and subsurface soil inside and outside the fenced area. The ALM was used to evaluate exposure to lead in soil by the adult maintenance worker. The input parameters for the ALM are provided in **Table 11.6a**, and the model results are presented in **Table 11.6b** of **Appendix K**. The mean soil lead concentration of 36.8 mg/kg results in geometric mean blood lead levels ranging from 1.0 to 1.5 µg/dL for women of child-bearing age in various populations. The corresponding 95th percentile fetal blood lead concentrations range from 2.4 to 4.7 µg/dL. The probabilities that the fetal blood lead levels exceed 10 µg/dL, range from 0.003 to 0.4 percent. Therefore, there would be no risks above target level associated with exposure to lead soil from inside and outside the fenced area for a maintenance worker. The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013), therefore, there would be no adverse effects associated with exposure to lead by maintenance workers at this location.

J.6.2.9 Future Adult Resident, (Non-carcinogenic Hazard, Tables 9.10.RME and 9.8.CTE, Appendix K)

The risk assessment assumed that a future adult resident could be exposed to combined surface and subsurface inside and outside the fenced area through ingestion, dermal contact, and inhalation of volatile and particulate emissions, and to groundwater through ingestion, dermal contact, and inhalation of volatiles while showering. Carcinogenic risks were not calculated for an adult resident but were calculated for a lifetime child/adult resident following USEPA guidance.

- Total (RME) HI=11 for exposure to soil and groundwater exceeds the target HI.
- Total HI (RME) = 0.8 for exposure to soil alone, does not exceed the target HI.
- Total HI (RME) = 10 associated with exposure to groundwater alone exceeds the acceptable HI. COCs for groundwater are arsenic and thallium associated with ingestion and 1,1-biphenyl and naphthalene associated with inhalation of volatiles while showering. Thallium was only detected in 1 of the 14 groundwater samples, CAS04-GW08-1212. The hazard is associated with inhalation of 1,1-biphenyl and naphthalene associated with sample CAA03-GW05-1109. This sample may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.13**.
- Total HI (CTE) = 4, exceeds the target HI of 1; however, no target organ HIs exceed 1.
- Lead was identified as a COPC in soil and groundwater. Site-specific lead exposures were not evaluated for adult residents, but were evaluated for the more-conservative child residential scenario using the IEUBK model. The results of the IEUBK model, described below for the future child resident, indicate that lead concentrations in soil and groundwater result in blood lead levels in exposed children (residential scenario) within the acceptable criteria.
- COCs are arsenic, thallium, 1,1-biphenyl, and naphthalene for groundwater.

J.6.2.10 Future Child Resident (Non-carcinogenic Hazard, Tables 9.11.RME and 9.9.CTE, Appendix K)

The risk assessment assumed that a future adult resident could be exposed to combined surface and subsurface inside and outside the fenced area through incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions, and to groundwater through ingestion and dermal contact while bathing. Carcinogenic risks were not calculated for an adult resident but were calculated for a lifetime child/adult resident following USEPA guidance.

- Total HI (RME) =24, exceeds the target HI.
- Total HI (RME) = 4 associated with exposure to soil alone exceeds the acceptable HI. COC for soil alone is arsenic. However, if groundwater is used as potable water supply and the child resident is exposed to both

soil and groundwater, aluminum, iron, and thallium would be additional COCs because they would contribute to target organ HIs above 1 associated with both soil and groundwater exposure. The hazard associated with exposure to arsenic is associated with sample CAS04-SS13-1012, which had a concentration more than an order of magnitude higher than the next-highest detection of arsenic. This sample may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.11**. The concentration of iron in this same sample may also be an outlier/hotspot. Thallium was only detected in 3 of the 51 soil samples.

- Total HI (RME) = 20 associated with exposure to groundwater alone exceeds the acceptable HI. Groundwater COCs are dibenzofuran, naphthalene, aluminum, arsenic, iron, manganese, and thallium. Thallium was only detected in 1 of the 14 groundwater samples, CAS04-GW08-1212. Hazard associated with dibenzofuran and naphthalene is primarily associated sample CAA03-GW05-1109. This sample may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.13**.
- Lead was identified as a COPC for soil and groundwater and was evaluated using the IEUBK model. Site-specific lead exposures were evaluated for residential children using the IEUBK model. This calculation was based on the site-specific arithmetic mean concentration of lead detected in soil (36.8 mg/kg) and groundwater (4.5 μg/L). The results of the model are presented in **Tables 11.10a** and **11.10b**, **Appendix K**. The predicted geometric mean blood lead level for a young child was 1.2 μg/dL, with less than 1 percent of the population potentially experiencing concentrations exceeding 10 μg/dL. These results indicate that if the site were to be developed for residential use in the future resulting in potable use of the groundwater and contact with the soil from inside and outside the fenced area, there would be no risks above target levels associated with lead. There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level and this sample is a surface soil sample from within the fenced industrial area of the site. The next highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and residential exposure to lead at this location alone would most likely result in unacceptable risks, it is unlikely a future resident would be exposed to lead in soil at this concentration. As this sample was collected from within the developed fenced area of the site, future use of this area would require considerable re-working of the area and the soil, and the soil would be mixed, resulting in the more concentrated lead soil mixed with the soil with much lower lead concentrations, resulting in a concentration more similar to the mean concentration used in the IEUBK model which demonstrated no adverse effects with future child residential exposure to soil.
- Total HI (CTE) =1 associated with exposure to soil alone, does not exceed the acceptable level.
- The Total HI (CTE) = 13 associated with exposure to groundwater, exceeds the target hazard level.
- COCs are dibenzofuran, naphthalene, aluminum, arsenic, iron, manganese, and thallium for groundwater, and arsenic, aluminum, iron, and thallium for soil (however, if groundwater is not used as potable water supply, aluminum, iron, and thallium would not be COCs for soil).

J.6.2.11 Future Lifetime Resident (Carcinogenic Risk, Tables 9.12.RME and 9.10.CTE, Appendix K)

The risk assessment assumed that a future lifetime child/adult resident could be exposed to soil through incidental ingestion, dermal contact, and inhalation of volatile and particulate emissions, and to groundwater through ingestion, dermal contact, inhalation of volatiles while showering, and inhalation of VOCs through VI.

- Total ELCR (RME) = 1×10^{-2}, exceeds the target risk range.
- Total ELCR (RME) = 3×10^{-3} associated with exposure to soil alone, exceeds the target risk range, due to carcinogenic PAHs, with smaller contributions from Aroclor- 1242, Aroclor-1260, dieldrin, arsenic, and hexavalent chromium. The PAH carcinogenic risk is associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199. These samples may be outliers/hotspots, as shown in **Appendix K**, **Table 12.11**. The carcinogenic risk associated with dieldrin is also associated with CAA03-SS06-1109, which may be an outlier/hotspot (see **Appendix K**, **Table 12.11**). The carcinogenic risk associated with the Aroclors

is primarily associated with two samples from the same boring, CAS004-4-HA05-01-1199 and CAS004-4HA05-00-1199, with a smaller contribution from the sample CAS004-4HA04-00-1199. These samples may be outliers/hotspots, as shown in **Appendix K**, **Table 12.11**. The risk associated with exposure to arsenic is associated sample CAS04-SS13-1012, which had a concentration more than an order of magnitude higher than the next-highest detection of arsenic. This sample may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.11**.

- Total ELCR (CTE) = $8x10^{-4}$ associated with exposure to soil exceeds the target risk range associated with carcinogenic PAHs.
- Total ELCR (RME) = 1×10^{-2} associated with exposure to groundwater, exceeds the target risk range primarily through exposure to PAHs, arsenic, and chromium, with smaller contributions from benzene, ethylbenzene, 1,1-biphenyl, and dieldrin. Carcinogenic risk from PAHs is associated with samples CAA03-GW05-1109 and CAA03-GW04-1109. Sample CAA03-GW05-1109 may be an outlier/hotspot, as shown in **Appendix K**, **Table 12.13**. Benzene, ethylbenzene, and 1,1-biphenyl were only detected in sample CAA03-GW05-1109; therefore, carcinogenic risks for these constituents are associated with this sample, which may be an outlier/hotspot (see **Appendix K**, **Table 12.13**).
- Total ELCR (CTE) = $5x10^{-3}$ associated with exposure to groundwater exceeds the target risk range primarily through exposure to PAHs and chromium.
- COCs for soil are benzo(a)pyrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor1260, dieldrin, arsenic, and chromium. COCs for groundwater are benzene, ethylbenzene, 1,1-biphenyl, benzo(a)pyrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, arsenic, and chromium (based on the assumption that all detected chromium is hexavalent chromium).
- Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out should building additions or new buildings be constructed. COPCs are not identified and future risks are not quantified because defensible methods for quantifying VI risks using soil data are not available.

J.7 Uncertainty Associated with Human Health Assessment

The risk measures used in site risk assessments are not fully probabilistic estimates of risk, but are conditional estimates given that a set of assumptions about exposure and toxicity are realized. As a result, it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective.

J.7.1 Uncertainty in Data Evaluation and COPC Selection

The sampling of site media focused on the areas most likely affected by past site activities and where contamination would most likely be found. Therefore, the uncertainty associated with missing a contaminated location is expected to be minimal because the investigation was focused to find the most likely and potentially highest areas of contamination associated with historical site use. The uncertainty associated with the data analysis is minimal, and all of the data were validated before being used in the HHRA. A data quality evaluation was performed on all analytical data evaluated in the HHRA, as discussed in Section 4 of the RI report.

The general assumptions used in the COPC selection process were conservative so that true COPCs were not eliminated from the quantitative risk assessment, and that the reasonable maximum risk was estimated. RSLs based on residential assumptions were used to select the COPCs for all exposure scenarios, including non-residential scenarios.

A comparison of site concentrations to background concentrations was not used to select the COPCs. Therefore, it is possible that any of the metals identified as COPCs and COCs may be associated with background conditions; however, the maximum detected concentration of the inorganic COCs exceeds the CAX/Yorktown background concentrations.

There is uncertainty in the actual concentrations of VOCS in groundwater beneath CAD Buildings 11 and 12, because no groundwater data from beneath the buildings were available for review. In addition, groundwater data are not available from within 100 feet of CAD Building 11 and only one monitoring well is located within 100 feet of CAD Building 12. However, there is a low probability the conclusions of the evaluation would change, based on the MLE.

There is also uncertainty in the actual concentrations of VOCS in in soil beneath CAD Buildings 11 and 12 because no data from beneath the buildings were available for review. In addition, the highest naphthalene concentration was detected in a surface soil sample located approximately 20 feet from CAD building 12. Although the detected naphthalene concentration of 26,000J µg/kg in this sample appears to be limited in extent, the true extent of elevated naphthalene concentrations in soil is uncertain. However, there is a low probability the conclusions of the evaluation would change based on the MLE.

The algorithm contained in the J&E model was used to predict soil to soil vapor partitioning based on a maximum naphthalene concentration of 28 µg/kg. Using the J&E model to predict soil vapor concentrations is not a generally accepted method for conducting VI evaluations. However, there is a low probability the conclusions of the evaluation would change based on the MLE.

Additionally, a site-specific attenuation factor has not been calculated for CAX Site 4 buildings; therefore, it is uncertain whether the attenuation factor of 0.001, calculated for other Department of Defense facilities is applicable. However, there is a low probability the conclusions of the evaluation would change based on the MLE.

Detection limits for constituents that were not detected within a media were compared to the screening levels to identify any non-detected constituents with detection limits above the screening level. There were a few VOCs, SVOCs, pesticides, and explosives detected with detection limits above the screening level, but all of them were within an order of magnitude or two above the screening level and would not result in unacceptable risks if they were present at concentrations below their detection limit Additionally, because of the limited number of analytes detected, it is not expected that they are present, and if they are, it is likely they would be below levels of potential concern for human health. Based on this evaluation, there are not expected to be any non-detected analytes present at the site that would result in unacceptable risks or change the results of the HHRA evaluation.

Although an outlier evaluation was performed for the various data groups for the site, there is substantial uncertainty associated with the outlier evaluation. The primary uncertainty is associated with the small sample sizes for many of the data groups and the assumptions used in the outlier tests that the data sets are normally distributed.

J.7.2 Uncertainty Associated with Exposure Assessment

Uncertainty in the exposure assessment was generally treated with conservative decision rules and assumptions, and therefore the uncertainty likely overestimates actual exposure to COPCs. Several exposure pathways evaluated by the HHRA, such as residential land use, are hypothetical and are not likely to occur in the future at Site 4. It is also not likely that groundwater from the shallow aquifer would ever be used as a potable or industrial water supply because of the availability of better water supplies with respect to both water quality and quantity. Most of the exposure factors used for quantitation of exposure are generally conservative and reflect worst-case, or upper-bound, assumptions for the exposure.

Site-related contamination is expected to decrease with time due to naturally occurring attenuation processes such as degradation due to weathering, volatilization, advection, dispersion, and leaching due to infiltrating precipitation. The risk assessment assumed that concentrations would remain constant throughout the exposure period and that these concentrations occur everywhere throughout the site. This assumption likely results in an over-estimation of risk.

The percent of a constituent absorbed through the skin is another source of uncertainty and is likely to be affected by many parameters, including soil loading, moisture content, organic content, pH, and the presence of other constituents. The availability of a constituent for absorption through the skin depends on site-specific fate and transport properties of the chemical species available for eventual absorption. Constituent concentrations,

specific properties of the constituent, and the kinetics of constituents being released from sediment all affect the amount of a constituent that is absorbed. These factors contribute to the uncertainty associated with dermal absorption estimates, and make it difficult to quantify the amount of certain constituents absorbed through the skin from soil.

The future soil exposure scenario provides additional conservatism by assuming that the subsurface soil will become surface soil during any future construction activities, and that future receptors may come in contact with what is the current surface soil and current subsurface soil in the future. During many construction projects, clean fill material such as topsoil is placed over the soil that is disturbed during excavation projects. The topsoil material is generally needed to support growth of grass and other landscape plants. This would decrease the possibility of future exposure to both the current surface and subsurface soil after any construction activities.

For PCBs, only the detected congeners were used to calculate the 2,3,7,8-TCDD TEQ concentrations for both fish tissue samples used in the risk calculations. Undetected congeners were not included in the calculations because inclusion of congeners that were not detected but have a high TEF could skew the 2,3,7,8-TCDD TEQ concentration much higher than it actually is. This could result in underestimating the risk associated with PCBs in fish tissue. However, only one of congeners (of the 12 dioxin-like PCB congeners analyzed for) was not detected in only one of the fish tissue samples. The 2,3,7,8-TCDD TEQ concentration calculated either including the non-detected concentration at one-half the detection limit or not including the non-detected concentration was the same.

There are inherent limitations and uncertainties associated with estimating health risks based on fish consumption that should be considered when interpreting the results of the HHRA. Factors contributing to these uncertainties include the incorporation of variable fish sizes and ages in the HHRA, due to limitations in sampling successes. Bioaccumulative chemicals like PCBs are anticipated to be higher in older fish, and use of variable sizes and ages may have introduced some uncertainty.

The selection of a fish ingestion rate for recreational anglers is associated with a high degree of uncertainty. Many recreational anglers do not eat their catch; however, it was assumed recreational anglers would eat the fish they catch. Additionally, there is a fish advisory for Youth Pond, recommending that anglers do not eat the fish they catch there. The data used to derive the fish ingestion rate for the adult are from USEPA (1997a) and are based on mailed questionnaire surveys (Ebert et al., 1993; West et al., 1989, 1993) and a diary study (Connelly et al., 1992, 1996) that reported mean intakes from 5 to 17 grams per day for recreational anglers.

As described in Section J.4.3, reported cooking losses vary considerably among the numerous studies reviewed. However, little information is available to quantify personal preferences among anglers for various preparation and cooking methods and other related habits (such as consumption of pan drippings). The assumption that there is a 50 percent loss of PCBs during cooking or preparation may either result in an overestimate or underestimate of actual risks.

J.7.3 Uncertainty Associated with Toxicity Assessment

Uncertainty associated with the noncarcinogenic toxicity factors is included in the toxicity tables in **Appendix K**. Several UFs were applied to extrapolate dose points from animal studies to humans. These UFs range between 1 and 3,000. Therefore, there is a high degree of uncertainty in the noncarcinogenic toxicity criteria based on the available scientific data for each constituent. The noncarcinogenic toxicity factors are most likely an overestimate of actual toxicity.

The uncertainty associated with CSFs and IURs is mostly attributable to the low dose extrapolation wherein carcinogenicity at low doses is assumed to be a linear response. This is a conservative assumption, which introduces a high uncertainty into slope factors and unit risk factors that are extrapolated from this area of the dose-response curve. The CSFs and IURS are based on the assumption that there is no threshold level for carcinogenicity; however, most of the experimental studies indicate the existence of a threshold level. Therefore, CSFs and IURs developed by USEPA represent upper-bound estimates. Carcinogenic risks generated in this assessment should be regarded as upper-bound estimates on potential carcinogenic risks, rather than an accurate representation of carcinogenic risk. The true carcinogenic risk is likely to be less than the predicted value (USEPA, 1989). Uncertainty

is also associated with the application of the MMOA for PAHs and hexavalent chromium; this may overestimate or underestimate risks. Additionally, generic ADAFs were used in the MMOA calculations because no chemical-specific ADAFs are available for the COPCs.

Total chromium was identified as a COPC in sediment, groundwater, and fish tissue. The toxicity values for hexavalent chromium were conservatively used to estimate potential non-carcinogenic hazards and carcinogenic risks associated with exposures to total chromium. It is highly unlikely all of the chromium detected is in the hexavalent form, as discussed in Section J.5; therefore, the hazards and risks are likely overestimated for potential exposures to chromium through direct contact with sediment and groundwater, and ingestion of fish.

Use of provisional toxicity factors increases the uncertainty of the quantitative hazard and risk estimates. These provisional values were used to provide a quantitative estimate rather than a merely qualitative risk discussion; however, these values should be interpreted cautiously because USEPA has not approved these toxicity values.

CSFs developed by USEPA represent upper-bound estimates. Carcinogenic risks generated in this assessment should be regarded as an upper-bound estimate of the potential carcinogenic risks rather than an accurate representation of carcinogenic risk. The true carcinogenic risk is likely to be less than the predicted value (USEPA, 1989).

The TEFs used to adjust the concentrations of the dioxin-like PCB congeners to the TEQ of dioxin for the fish also result in uncertainty in the risk assessment. There is substantial uncertainty associated with use of this process, and even more uncertainty with use of it for noncarcinogenic hazards because the TEFs are based on the relationship of the PCB congeners to the carcinogenic risks associated with dioxin.

Additional uncertainty lies in the prediction of relative sensitivities of different species of animals and the applicability of animal data to humans.

A large degree of uncertainty is associated with the oral-to-dermal adjustment factors (based on constituent-specific gastrointestinal absorption factors) used to transform the oral RfDs based on administered doses to dermal RfDs based on absorbed doses. It is not known if the adjustment factor results in an underestimate or overestimate of the actual toxicity associated with dermal exposure.

J.7.4 Uncertainty in Risk Characterization

The uncertainties identified in each component of risk assessment ultimately contribute to uncertainty in risk characterization. The addition of risks and HIs across pathways and constituents contributes to uncertainty based on chemical interactions such as additivity, synergism, potentiation, and susceptibility of exposed receptors.

J.8 Human Health Risk Summary

The HHRA was conducted to evaluate the potential human health risks associated with exposure to soil, surface water, sediment, fish, and groundwater at Site 4 and Youth Pond.

Tables J-3 and **J-4**, and **Tables 9.1.RME** through **9.12.RME** and **9.1.CTE** through **9.10.CTE** in **Appendix K** summarize the RME and CTE potential hazards and risks to each receptor. **Tables 10.1.RME** through **10.10.RME** and **10.1.CTE** through **10.3.CTE**, **Appendix K** show the receptor scenarios with cumulative HIs greater than 1, or total carcinogenic risks greater than 1×10^{-4}. The COPCs that contribute HIs greater than 0.1 or carcinogenic risks greater than 1×10^{-6} are included in the tables. COCs are identified below for the scenarios with potentially unacceptable risks. The COCs are those COPCs that contribute an HI greater than 0.1 to a cumulative target organ HI that exceeds 1 or a carcinogenic risk greater than 1×10^{-6} to a cumulative carcinogenic risk that exceeds 1×10^{4}. Risk estimates are summarized below.

Current and Future Industrial Worker

- Current exposure to surface soil within the fenced area of Site 4/Youth Pond and future exposure to surface and subsurface soil within and outside of the fenced area of Site 4/Youth Pond.
- HI (RME) for current scenario is within regulatory target hazard levels.
- HI (RME) for future scenario is within regulatory target hazard levels.

- ELCR (RME) for current scenario exceeds the regulatory target risk range. The carcinogenic risk is primarily associated with the PAHs detected in only one sample, CAA03-SS06-1109, adjacent to CAD Building 12.
- ELCR (RME) for future scenario exceeds the regulatory target risk range. The carcinogenic risk is primarily associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199.
- ELCR (CTE) for current and future scenario does not exceed the target risk range.
- The ALM showed there would be no adverse effects above regulatory target levels associated with exposure to lead in surface soil within the fenced area of Site 4 /Youth Pond or combined surface and subsurface soil across Site 4/Youth Pond areas.
- The COCs for surface soil within the fenced area of Site 4/Youth Pond are carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene), diedrin, and arsenic.
- The COCs for combined surface and subsurface soil across the site are carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene), dieldrin, and arsenic.
- No COPCs were identified for current industrial workers from VI related to shallow groundwater and soil concentrations.
- Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out. COPCs are not identified and future risks are not quantified because defensible methods for quantifying VI risks using soil data are not available.

Current and Future Adult and Child Visitor/Recreational User

- Current exposure to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond, and ingestion of fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond, and ingest fish from Youth and Upstream ponds).
- Future exposure to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond, and fish from Youth Pond and Upstream Pond) or to media associated with Youth Pond (surface water and sediment, sediment/surface soil in drainage channel to Upstream Pond, and fish from Youth and Upstream ponds).
- Total HI (RME) for current and future scenarios for adult and child for either Site 4 and Upstream Pond exposure group or Youth Pond exposure group exceed target regulatory levels associated with fish ingestion (primarily dioxin-like PCBs in fish tissue) and primarily the composite fish tissue sample from the fish collected from Upstream Pond.
- Total ELCR (RME) for current and future scenarios for adult and child for exposure to Youth Pond exposure group is within regulatory target levels.
- Total ELCR (RME) for current and future scenario for adult and child for exposure to Site 4/Upstream Pond exposure group exceeds target regulatory levels primarily associated with fish ingestion (primarily dioxin-like PCBs in fish tissue), and primarily the composite fish tissue sample from the fish collected from Upstream Pond. For the future child scenario, exposure to surface and subsurface soil inside and outside the fence line also contributes to the risk exceeding regulatory levels, primarily associated with carcinogenic PAHs, and a smaller contribution from arsenic. The carcinogenic risk associated with exposure to the soil is associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199.

- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond, and in soil from inside and outside the fenced area. A conservative evaluation of lead using ALM and the IEUBK model indicated no risks above target regulatory levels associated with exposure to lead in either sediment or soil.
- Total HI (CTE) for current and future scenarios for adult for exposure to Youth Pond exposure group or Site 4/Upstream Pond exposure group and current and future scenarios for child for exposure to Youth Pond exposure group, and future scenario for child exposure to Site 4/Upstream Pond exposure group are below regulatory target levels.
- Total HI (CTE) for current scenario for child exposure to Site 4/Upstream Pond exposure grouping exceeds regulatory target level.
- Total ELCR (CTE) for current and future scenarios for adult and child for exposure to Youth Pond exposure group or Site 4/Upstream Pond exposure group is within the regulatory target risk range.
- The COCs for fish tissue are Aroclor-1254, Aroclor-1260, dioxin-like PCBs, and chromium (assuming all chromium is hexavalent chromium). However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue.
- The COCs for combined surface and subsurface soil across the site are carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene), dieldrin, and arsenic .

Current and Future Maintenance Worker

- Current exposure to media around Site 4 and Upstream Pond (surface soil from outside the fenced area of Site 4, Upstream Pond surface water and sediment, and surface water and sediment from the drainage channel to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, and sediment/surface soil in drainage channel to Upstream Pond).
- Future exposure to media around Site 4 and Upstream Pond (combined surface and subsurface soil from inside and outside the fenced area of Site 4, Upstream Pond surface water and sediment, surface water and sediment from the drainage channel to Upstream Pond) or to media associated with Youth Pond (Youth Pond surface water and sediment, sediment/surface soil in drainage channel to Upstream Pond).
- HIs and ELCRs (RME) for current and future scenarios for both exposure groupings are within regulatory target levels.
- Lead was identified as a COPC in surface and subsurface sediment from Upstream Pond, and in soil from inside and outside the fenced area. A conservative evaluation of lead using the ALM indicated no risks above target regulatory levels associated with exposure to lead in either sediment or soil.

Future Construction Worker

- Exposure to combined surface and subsurface soil from inside and outside the fenced area, or within the fenced area of Site 4/Youth Pond.
- Total HI (RME) for both soil inside and outside the fenced area and shallow groundwater, and soil within the fenced area and groundwater exceed the regulatory target HI. HI from either soil exposure group is below the target HI. The hazard is associated with inhalation of naphthalene, with a smaller contribution from inhalation of 1,1-biphenyl, from groundwater associated with sample CAA03-GW05-1109.
- Total ELCR (RME) for soil inside and outside the fenced area and shallow groundwater is within the regulatory target risk range.
- Total ELCR (RME) for soil within the fenced area of Site 4/Youth Pond and shallow groundwater exceeds the target risk range, associated with carcinogenic PAHs (and primarily benzo(a)pyrene) in soil.

- Lead was identified as a COPC in soil from inside and outside the fenced area, and within the fenced area of Site 4/Youth Pond. The ALM showed there would be no adverse effects above regulatory levels associated with exposure to lead in soil for a future construction worker.
- Total HI (CTE) for soil inside and outside the fenced area and shallow groundwater, and from soil within the fenced area of Site 4/Youth Pond and shallow groundwater exceeds the target HI, associated with shallow groundwater.
- Total ELCR (CTE) for soil within the fenced area of Site 4/Youth Pond and shallow groundwater exceeds the target risk range, associated with soil.
- The COCs for groundwater are naphthalene and 1,1-biphenyl.
- The COCs for soil within fenced area of site are carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene) .

Future Resident (adult and child)

- Exposure to surface and subsurface soil inside and outside fenced area and to groundwater.
- Total (RME) HI for exposure to soil and groundwater for adult and child residents exceeds the regulatory target HI.
- HI (RME) for adult exposure to soil alone does not exceed the regulatory target HI.
- HI (RME) for child exposure to soil exceeds the target level. The COC for exposure to soil alone is arsenic. However, if groundwater used as a potable water supply and the child resident exposed to both soil and groundwater, aluminum, iron, and thallium would be additional COCs because they would contribute to target organ HIs above 1.
- HI (RME) for adult and child exposed to groundwater exceeds the target HI, associated with dibenzofuran, naphthalene, aluminum, arsenic, iron, manganese, and thallium. Thallium was only detected in 1 of the 14 groundwater samples, CAS04-GW08-1212. The hazard associated with dibenzofuran and naphthalene is primarily associated with sample CAA03-GW05-1109.
- HI (CTE) for the child exposure to soil does not exceed the target level.
- HI (CTE) for the adult exposure to groundwater exceeds the regulatory target HI; however, none of the target organ HIs exceed 1. Child HI (CTE) associated with exposure to groundwater exceeds the target HI.
- Cumulative ELCR (RME) associated with exposure to soil and groundwater for lifetime resident exceeds regulatory target risk range, primarily associated with carcinogenic PAHs in soil and groundwater.
- ELCR (RME) associated with exposure to soil alone exceeds the target risk range associated with carcinogenic PAHs, with smaller contributions from Aroclor- 1242, Aroclor-1260, dieldrin, arsenic, and hexavalent chromium. The carcinogenic risk associated with the PAHs is associated with the PAHs detected in samples CAA03-SS06-1109 and CAS004-4HA06-00-1199. The carcinogenic risk associated with dieldrin is also associated with CAA03-SS06-1109. The carcinogenic risk associated with the Aroclors is primarily associated with two samples from the same boring, CAS004-4-HA05-01-1199 and CAS004-4HA05-00-1199, with a smaller contribution from sample CAS004-4HA04-00-1199. The risk associated with exposure to arsenic is associated with sample CAS04-SS13-1012, which had a concentration of more than an order of magnitude higher than the next-highest detection of arsenic.
- ELCR (RME) associated with exposure to groundwater exceeds the target risk range due primarily to PAHs, arsenic, and chromium, with smaller contributions from benzene, ethylbenzene, 1,1-biphenyl, and dieldrin. Carcinogenic risk from PAHs is associated with samples CAA03-GW05-1109 and CAA03-GW04-1109. Benzene, ethylbenzene, and 1,1-biphenyl were only detected in sample CAA03-GW05-1109; therefore, carcinogenic risks for these constituents are associated with this sample.

- ELCR (CTE) associated with exposure to soil or groundwater for lifetime resident exceeds the regulatory target risk range.
- Lead was identified as a COPC for soil and groundwater, and was therefore evaluated using the IEUBK model. The model showed there would be no adverse effects exceeding regulatory levels associated with exposure to lead for a future resident.
- The COCs for groundwater are dibenzofuran, naphthalene, 1,1-biphenyl, aluminum, arsenic, iron, manganese, and thallium.
- The COCs for soil are carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene), Aroclor-1242, Aroclor 1260, dieldrin, arsenic, aluminum, chromium (assuming all detected chromium is hexavalent chromium), iron, and thallium for soil (however, if groundwater not used as a potable water supply, aluminum, iron, and thallium would not be COCs for soil).
- Given the high concentrations of naphthalene in soil and groundwater, the potential for future VI cannot be ruled out. COPCs were not identified and future risks were not quantified because defensible methods for quantifying VI risks using soil data are not available.

In summary, there are no COCs (or unacceptable risks) for exposure to surface water or sediment in any of the exposure groups evaluated in the HHRA. The human health COCs identified for soil groups, groundwater, and fish tissue are:

- Surface soil within the fenced area of Youth Pond/Site 4 COCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, and arsenic.
- Surface soil from outside the fenced area of Site 4: none.
- Surface and subsurface soil from inside the fence area of Site 4/Youth Pond: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- Surface and subsurface soil from inside and outside fenced area of site: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1242, Aroclor1260, dieldrin arsenic, aluminum, chromium, iron, and thallium (however, if groundwater is not used as potable water supply, aluminum, iron, and thallium would not be COCs based on exposure to soil from inside and outside the fenced area alone).
- Groundwater: benzene, ethylbenzene, naphthalene, 1,1-biphenyl, dibenzofuran, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, aluminum, arsenic, chromium (assuming all detected chromium is hexavalent chromium), iron, manganese, and thallium.
- Fish from Youth Pond and Upstream Pond: dioxin-like PCBs, Aroclor-1254, Aroclor-1260, dieldrin, and chromium (assuming all detected chromium is hexavalent chromium) in fish tissue. However, as discussed in Section J.5, it is unlikely the chromium detected in fish tissue is hexavalent chromium, and therefore, chromium was not considered a COC for fish tissue.

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Tables

TABLE J-1

Summary of Data Used in Baseline Human Health Risk Assessment

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Medium / SampleID	Date of Sampling	Sample Locations	Parameters
Surface Soil within Fenced Area of Youth Pond/Site 4			
CAA03-SS01-1109	11/3/2009	CAA03-SS01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS06-1109	11/4/2009	CAA03-SS06	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS07-1109	11/5/2009	CAA03-SS07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS08-1012	10/23/2012	CAS04-SO08	Select SVOCs, PCBs, Metals
CAYP-SS01-1012	10/19/2012	CAYP-SO01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS02-1012	10/19/2012	CAYP-SO02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
Surface Water from Youth Pond			
CAYP-SW01-1012	10/11/2012	CAYP-SWSD01	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW01P-1012[1]	10/11/2012	CAYP-SWSD01	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW02-1012	10/11/2012	CAYP-SWSD02	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW03-1012	10/11/2012	CAYP-SWSD03	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW04-1012	10/11/2012	CAYP-SWSD04	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW05-1112	11/9/2012	CAYP-SWSD05	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
CAYP-SW06-1112	11/9/2012	CAYP-SWSD06	VOCs, SVOCs, Pest/PCBs, Explosives, Total Metals, Filtered Metals
Surface and Subsurface Sediment from Youth Pond			
CAYP-SD07-1012	10/22/2012	CAYP-SD07	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD07-1012	10/22/2012	CAYP-SD07	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD08-1012	10/12/2012	CAYP-SD08	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD08-1012	10/12/2012	CAYP-SD08	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD09-1012	10/22/2012	CAYP-SD09	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD09-1012	10/22/2012	CAYP-SD09	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD10-1012	10/22/2012	CAYP-SD10	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD10-1012	10/22/2012	CAYP-SD10	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD11-1012	10/11/2012	CAYP-SD11	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD11-1012	10/11/2012	CAYP-SD11	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD12-1012	10/22/2012	CAYP-SD12	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD12-1012	10/22/2012	CAYP-SD12	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD12P-1012[1]	10/22/2012	CAYP-SD12	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD13-1012	10/12/2012	CAYP-SD13	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD13-1012	10/12/2012	CAYP-SD13	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD01-1012	10/12/2012	CAYP-SWSD01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD01-1012	10/12/2012	CAYP-SWSD01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD02-1012	10/22/2012	CAYP-SWSD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD02-1012	10/22/2012	CAYP-SWSD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD02P-1012[1]	10/22/2012	CAYP-SWSD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD02P-1012[1]	10/22/2012	CAYP-SWSD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD03-1012	10/11/2012	CAYP-SWSD03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD03-1012	10/11/2012	CAYP-SWSD03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD04-1112	11/9/2012	CAYP-SWSD04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD04-1112	11/9/2012	CAYP-SWSD04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD05-1112	11/9/2012	CAYP-SWSD05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD05-1112	11/9/2012	CAYP-SWSD05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD06-1112	11/9/2012	CAYP-SWSD06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SSD06-1112	11/9/2012	CAYP-SWSD06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
Sediment/Surface Soil from Drainage Ditches to Youth Pond outside Fenced Area			
CAYP-SD14-1012	10/12/2012	CAYP-SD14	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SD15-1012	10/12/2012	CAYP-SD15	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS03-1012	10/19/2012	CAYP-SO03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS03P-1012[1]	10/19/2012	CAYP-SO03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS04-1012	10/19/2012	CAYP-SO04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS05-1012	10/19/2012	CAYP-SO05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS06-1012	10/19/2012	CAYP-SO06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
Soil* within Fenced Area of Youth Pond/Site 4			
CAA03-SB01-1109	11/3/2009	CAA03-SB01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB06-1109	11/4/2009	CAA03-SB06	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB07-1109	11/5/2009	CAA03-SB07	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS01-1109	11/3/2009	CAA03-SS01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS06-1109	11/4/2009	CAA03-SS06	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS07-1109	11/5/2009	CAA03-SS07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS08-1012	10/23/2012	CAS04-SO08	Select SVOCs, PCBs, Metals
CAYP-SS01-1012	10/19/2012	CAYP-SO01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAYP-SS02-1012	10/19/2012	CAYP-SO02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Medium / SampleID	Date of Sampling	Sample Locations	Parameters
Fish from Youth Pond and Upstream Pond			
CAS04-TS13-F-1012	10/4/2012	CAS04-TS13	PCBs, PCB Congeners, Metals
CAYP-TS08-F-1012	10/5/2012	CAYP-TS08	PCBs, PCB Congeners, Metals
Surface Soil outside Fenced Area of Site 4			
CAA03-SS02-1109	11/4/2009	CAA03-SS02	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS03-1109	11/4/2009	CAA03-SS03	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS04-1109	11/4/2009	CAA03-SS04	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS05-1109	11/4/2009	CAA03-SS05	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS08-1109	11/5/2009	CAA03-SS08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS08P-1109[1]	11/5/2009	CAA03-SS08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS09-1109	11/5/2009	CAA03-SS09	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS10-1109	11/5/2009	CAA03-SS10	VOCs, SVOCs, Pest/PCBs, Metals
CAS004-4HA01-00-1199	11/12/1999	CAS004-4HA01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA02-00-1199	11/12/1999	CAS004-4HA02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA02D-00-1199[1]	11/12/1999	CAS004-4HA02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA03-00-1199	11/12/1999	CAS004-4HA03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA04-00-1199	11/12/1999	CAS004-4HA04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA05-00-1199	11/12/1999	CAS004-4HA05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA06-00-1199	11/12/1999	CAS004-4HA06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS04-SS06-1012	10/23/2012	CAS04-SO06	Select SVOCs, PCBs, Metals
CAS04-SS07-1012	10/23/2012	CAS04-SO07	Select SVOCs, PCBs, Metals
CAS04-SS09-1012	10/23/2012	CAS04-SO09	Select SVOCs, PCBs, Metals
CAS04-SS10-1012	10/23/2012	CAS04-SO10	Select SVOCs, PCBs, Metals
CAS04-SS11-1012	10/23/2012	CAS04-SO11	Select SVOCs, PCBs, Metals
CAS04-SS12-1012	10/23/2012	CAS04-SO12	Select SVOCs, PCBs, Metals
CAS04-SS12P-1012[1]	10/23/2012	CAS04-SO12	Select SVOCs, PCBs, Metals
CAS04-SS13-1012	10/23/2012	CAS04-SO13	Select SVOCs, PCBs, Metals
CAS04-SS14-1012	10/23/2012	CAS04-SO14	Hexavalent Chromium, Total Chromium
CAS04-SS14P-1012[1]	10/23/2012	CAS04-SO14	Hexavalent Chromium, Total Chromium
CAS04-SS15-1012	10/23/2012	CAS04-SO15	Hexavalent Chromium, Total Chromium
CAS04-SS01-1109	11/3/2009	CAS04-SS01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS02-1109	11/3/2009	CAS04-SS02	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS03-1109	11/3/2009	CAS04-SS03	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS04-1109	11/3/2009	CAS04-SS04	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS05-1109	11/3/2009	CAS04-SS05	VOCs, SVOCs, Pest/PCBs, Metals
Surface Water from Upstream Pond			
CAA03-SW01-1209	12/7/2009	CAA03-SW01	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-SW01P-1209[1]	12/7/2009	CAA03-SW01	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-SW02-1209	12/7/2009	CAA03-SW02	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-SW03-1209	12/7/2009	CAA03-SW03	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-SW04-1209	12/7/2009	CAA03-SW04	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW01-1209	12/7/2009	CAS04-SW01	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW02-1209	12/7/2009	CAS04-SW02	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW03-1209	12/7/2009	CAS04-SW03	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW04-1209	12/7/2009	CAS04-SW04	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
Surface Water from Drainage Channel to Upstream Pond			
CAS04-SW05-1209	12/8/2009	CAS04-SW05	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW06-1209	12/8/2009	CAS04-SW06	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW07-1209	12/8/2009	CAS04-SW07	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW07P-1209[1]	12/8/2009	CAS04-SW07	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW08-1209	12/8/2009	CAS04-SW08	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-SW09-1209	12/8/2009	CAS04-SW09	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
Surface Sediment from Drainage Channel to Upstream Pond			
CAS04-SD05-1209A	12/8/2009	CAS04-SD05	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD05-1209B	12/8/2009	CAS04-SD05	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD06-1209A	12/8/2009	CAS04-SD06	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD06-1209B	12/8/2009	CAS04-SD06	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD07-1209A	12/8/2009	CAS04-SD07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD07P-1209A[1]	12/8/2009	CAS04-SD07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD07-1209B	12/8/2009	CAS04-SD07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD07P-1209B[1]	12/8/2009	CAS04-SD07	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD08-1209A	12/8/2009	CAS04-SD08	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD08-1209B	12/8/2009	CAS04-SD08	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD09-1209A	12/8/2009	CAS04-SD09	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD09-1209B	12/8/2009	CAS04-SD09	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD15-1012	10/11/2012	CAS04-SD15	Select SVOCs, PCBs, Metals
CAS04-SD16-1012	10/11/2012	CAS04-SD16	Select SVOCs, PCBs, Metals
CAS04-SD17-1012	10/11/2012	CAS04-SD17	Select SVOCs, PCBs, Metals

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Medium / SampleID	Date of Sampling	Sample Locations	Parameters
Surface and Subsurface Sediment from Upstream Pond			
CAA03-SD01-1209A	12/9/2009	CAA03-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD01-1209B	12/9/2009	CAA03-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD02-1209A	12/9/2009	CAA03-SD02	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD02-1209B	12/9/2009	CAA03-SD02	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD03-1209A	12/9/2009	CAA03-SD03	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD03-1209B	12/9/2009	CAA03-SD03	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD04-1209A	12/9/2009	CAA03-SD04	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SD04-1209B	12/9/2009	CAA03-SD04	VOCs, SVOCs, Pest/PCBs, Metals
CAS004-4-SED01-00-1199	11/12/1999	CAS004-4SD01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SED01-01-1199	11/12/1999	CAS004-4SD01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD02-00-1199	11/14/1999	CAS004-4SD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD02-01-1199	11/14/1999	CAS004-4SD02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD03-00-1199	11/13/1999	CAS004-4SD03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD03-01-1199	11/13/1999	CAS004-4SD03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD04-00-1199	11/13/1999	CAS004-4SD04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD04-00D-1199[1]	11/13/1999	CAS004-4SD04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-SD04-01-1199	11/13/1999	CAS004-4SD04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS04-SD01-1209A	12/9/2009	CAS04-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD01P-1209A[1]	12/9/2009	CAS04-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD01-1209B	12/9/2009	CAS04-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD01P-1209B[1]	12/9/2009	CAS04-SD01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD02-1209A	12/9/2009	CAS04-SD02	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD02-1209B	12/9/2009	CAS04-SD02	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD03-1209A	12/9/2009	CAS04-SD03	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD03-1209B	12/9/2009	CAS04-SD03	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD04-1209A	12/9/2009	CAS04-SD04	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD04-1209B	12/9/2009	CAS04-SD04	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SD10-1012	10/23/2012	CAS04-SD10	Select SVOCs, PCBs, Metals
CAS04-SD10P-1012[1]	10/23/2012	CAS04-SD10	Select SVOCs, PCBs, Metals
CAS04-SD11-1012	10/2/2012	CAS04-SD11	Select SVOCs, PCBs, Metals
CAS04-SD12-1012	10/2/2012	CAS04-SD12	Select SVOCs, PCBs, Metals
CAS04-SD13-1012	10/3/2012	CAS04-SD13	Select SVOCs, PCBs, Metals
CAS04-SD14-1012	10/3/2012	CAS04-SD14	Select SVOCs, PCBs, Metals
CAS04-SD18-1012	10/2/2012	CAS04-SD18	Select SVOCs, PCBs, Metals
CAS04-SD19-1012	10/2/2012	CAS04-SD19	Select SVOCs, PCBs, Metals
CAS04-SD20-1012	10/2/2012	CAS04-SD20	Select SVOCs, PCBs, Metals
CAS04-SD21-1012	10/2/2012	CAS04-SD21	Select SVOCs, PCBs, Metals
CAS04-SD22-1012	10/2/2012	CAS04-SD22	Select SVOCs, PCBs, Metals
CAS04-SD23-1012	10/2/2012	CAS04-SD23	Select SVOCs, PCBs, Metals
Soil* inside and outside Fenced Area			
CAA03-SB01-1109	11/3/2009	CAA03-SB01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB02-1109A	11/4/2009	CAA03-SB02	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB03-1109A	11/4/2009	CAA03-SB03	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB04-1109A	11/4/2009	CAA03-SB04	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB05-1109A	11/4/2009	CAA03-SB05	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB06-1109	11/4/2009	CAA03-SB06	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB07-1109	11/5/2009	CAA03-SB07	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB08-1109	11/5/2009	CAA03-SB08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB08P-1109[1]	11/5/2009	CAA03-SB08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB09-1109	11/5/2009	CAA03-SB09	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SB10-1109	11/5/2009	CAA03-SB10	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS01-1109	11/3/2009	CAA03-SS01	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS02-1109	11/4/2009	CAA03-SS02	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS03-1109	11/4/2009	CAA03-SS03	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS04-1109	11/4/2009	CAA03-SS04	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS05-1109	11/4/2009	CAA03-SS05	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS06-1109	11/4/2009	CAA03-SS06	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS07-1109	11/5/2009	CAA03-SS07	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS08-1109	11/5/2009	CAA03-SS08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS08P-1109[1]	11/5/2009	CAA03-SS08	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS09-1109	11/5/2009	CAA03-SS09	VOCs, SVOCs, Pest/PCBs, Metals
CAA03-SS10-1109	11/5/2009	CAA03-SS10	VOCs, SVOCs, Pest/PCBs, Metals
CAS004-4HA01-00-1199	11/12/1999	CAS004-4HA01	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA02-00-1199	11/12/1999	CAS004-4HA02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA02D-00-1199[1]	11/12/1999	CAS004-4HA02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-HA02-02-1199	11/12/1999	CAS004-4HA02	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA03-00-1199	11/12/1999	CAS004-4HA03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-HA03-02-1199	11/12/1999	CAS004-4HA03	VOCs, SVOCs, Pest/PCBs, Explosives, Metals

TABLE J-1

Summary of Data Used in Baseline Human Health Risk Assessment

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Medium / SampleID	Date of Sampling	Sample Locations	Parameters
Soil* inside and outside Fenced Area (continued)			
CAS004-4HA04-00-1199	11/12/1999	CAS004-4HA04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-HA04-01-1199	11/12/1999	CAS004-4HA04	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA05-00-1199	11/12/1999	CAS004-4HA05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-HA05-01-1199	11/12/1999	CAS004-4HA05	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4HA06-00-1199	11/12/1999	CAS004-4HA06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS004-4-HA06-02-1199	11/12/1999	CAS004-4HA06	VOCs, SVOCs, Pest/PCBs, Explosives, Metals
CAS04-SB01-1109	11/3/2009	CAS04-SB01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SB02-1109	11/3/2009	CAS04-SB02	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SB03-1109	11/3/2009	CAS04-SB03	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SB04-1109	11/3/2009	CAS04-SB04	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SB05-1109	11/3/2009	CAS04-SB05	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS06-1012	10/23/2012	CAS04-SO06	Select SVOCs, PCBs, Metals
CAS04-SB06-1012	10/23/2012	CAS04-SO06	Select SVOCs, PCBs, Metals
CAS04-SB06P-1012[1]	10/23/2012	CAS04-SO06	Select SVOCs, PCBs, Metals
CAS04-SS07-1012	10/23/2012	CAS04-SO07	Select SVOCs, PCBs, Metals
CAS04-SB07-1012	10/23/2012	CAS04-SO07	Select SVOCs, PCBs, Metals
CAS04-SS08-1012	10/23/2012	CAS04-SO08	Select SVOCs, PCBs, Metals
CAS04-SS09-1012	10/23/2012	CAS04-SO09	Select SVOCs, PCBs, Metals
CAS04-SS10-1012	10/23/2012	CAS04-SO10	Select SVOCs, PCBs, Metals
CAS04-SS11-1012	10/23/2012	CAS04-SO11	Select SVOCs, PCBs, Metals
CAS04-SS12-1012	10/23/2012	CAS04-SO12	Select SVOCs, PCBs, Metals
CAS04-SS12P-1012[1]	10/23/2012	CAS04-SO12	Select SVOCs, PCBs, Metals
CAS04-SS13-1012	10/23/2012	CAS04-SO13	Select SVOCs, PCBs, Metals
CAS04-SS14-1012	10/23/2012	CAS04-SO14	Hexavalent Chromium, Total Chromium
CAS04-SS14P-1012[1]	10/23/2012	CAS04-SO14	Hexavalent Chromium, Total Chromium
CAS04-SS15-1012	10/23/2012	CAS04-SO15	Hexavalent Chromium, Total Chromium
CAS04-SB15-1012	10/23/2012	CAS04-SO15	Hexavalent Chromium, Total Chromium
CAS04-SB16-1012	10/23/2012	CAS04-SO16	Hexavalent Chromium, Total Chromium
CAS04-SS01-1109	11/3/2009	CAS04-SS01	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS02-1109	11/3/2009	CAS04-SS02	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS03-1109	11/3/2009	CAS04-SS03	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS04-1109	11/3/2009	CAS04-SS04	VOCs, SVOCs, Pest/PCBs, Metals
CAS04-SS05-1109	11/3/2009	CAS04-SS05	VOCs, SVOCs, Pest/PCBs, Metals
Groundwater - Shallow Aquifer			
CAA03-GW01-1109	11/2/2009	CAA03-GW01	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-GW02-1109	11/5/2009	CAA03-GW02	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-GW03-1109	11/5/2009	CAA03-GW03	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-GW04-1109	11/5/2009	CAA03-GW04	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAA03-GW05-1109	11/5/2009	CAA03-GW05	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-GW01-1009	10/30/2009	CAS04-GW01	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-GW02-1009	10/30/2009	CAS04-GW02	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-GW03-1009	10/30/2009	CAS04-GW03	VOCs, SVOCs, Pest/PCBs, Total Metals, Filtered Metals
CAS04-GW05-1212	12/13/2012	CAS04-GW05	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW05P-1212[1]	12/13/2012	CAS04-GW05	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW06-1212	12/13/2012	CAS04-GW06	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW07-1212	12/13/2012	CAS04-GW07	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW08-1212	12/13/2012	CAS04-GW08	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW09-1212	12/13/2012	CAS04-GW09	VOCs, Select SVOCs, Total Metals, Filtered Metals
CAS04-GW10-1212	12/13/2012	CAS04-GW10	VOCs, Select SVOCs, Total Metals, Filtered Metals

Notes:
Soil* - combined surface and subsurface soil
[1] Duplicate of previous sample.
SVOCs - Semivolatile Organic Compounds
VOCs - Volatile Organic Compounds
Pest/PCBs - Pesticides/Polychlorinated Biphenyls

TABLE J-2

Summary of COPCs

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Surface Soil within Fenced Area of Youth Pond/Site 4	***Surface Soil outside Fenced Area of Site 4***
Benzo(a)anthracene	Benzo(a)anthracene
Benzo(a)pyrene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(b)fluoranthene
Benzo(k)fluoranthene	Benzo(k)fluoranthene
Carbazole	Dibenz(a,h)anthracene
Chrysene	Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene	Aldrin
Dibenzofuran	Aroclor-1242
Fluoranthene	Aroclor-1260
Indeno(1,2,3-cd)pyrene	Aluminum
Naphthalene	Arsenic
Pyrene	Cobalt
Dieldrin	Iron
gamma-BHC (Lindane)	Manganese
Aluminum	Thallium
Arsenic	Vanadium
Chromium (hexavalent)	
Cobalt	
Iron	
Lead	
Manganese	
Air	
Naphthalene	
Surface Water from Youth Pond	***Surface Water from Upstream Pond***
Arsenic	Benzo(a)pyrene
	Arsenic
	Iron
Surface and Subsurface Sediment from Youth Pond	***Surface and Subsurface Sediment from Upstream Pond***
Benzo(a)anthracene	Benzo(a)anthracene
Benzo(a)pyrene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(b)fluoranthene
Dibenz(a,h)anthracene	Dibenz(a,h)anthracene
Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene
Arsenic	Aroclor-1254
Chromium	Aroclor-1260
Thallium	Dieldrin
	Heptachlor epoxide
	Arsenic
	Chromium
	Lead
Sediment/Surface Soil from Drainage Ditches to Youth Pond outside Fenced Area	***Surface Water from Drainage Channel to Upstream Pond***
Benzo(a)anthracene	Arsenic
Benzo(a)pyrene	Iron
Benzo(b)fluoranthene	***Surface Sediment from Drainage Channel to Upstream Pond***
Dibenz(a,h)anthracene	Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene	Arsenic
Arsenic	Chromium
Cobalt	
Iron	
Manganese	
Fish from Youth and Upstream Pond	
Aroclor-1254	
Aroclor-1260	
Dioxin-Like PCB TEQ	
Chromium	
Mercury	
Soil* from inside and outside Fenced Area	***Soil* from within Fenced Area of Youth Pond/Site 4***
Benzo(a)anthracene	Benzo(a)anthracene
Benzo(a)pyrene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(b)fluoranthene
Benzo(k)fluoranthene	Benzo(k)fluoranthene
bis(2-Ethylhexyl)phthalate	Carbazole
Carbazole	Chrysene
Chrysene	Dibenz(a,h)anthracene
Dibenz(a,h)anthracene	Dibenzofuran

TABLE J-2

Summary of COPCs

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Surface Soil within Fenced Area of Youth Pond/Site 4	***Surface Soil outside Fenced Area of Site 4***
Dibenzofuran	Fluoranthene
Fluoranthene	Indeno(1,2,3-cd)pyrene
Indeno(1,2,3-cd)pyrene	Naphthalene
Naphthalene	Pyrene
Pyrene	Dieldrin
Aldrin	gamma-BHC (Lindane)
Aroclor-1242	Aluminum
Aroclor-1260	Arsenic
Dieldrin	Chromium (hexavalent)
gamma-BHC (Lindane)	Cobalt
Aluminum	Iron
Arsenic	Lead
Chromium (hexavalent)	Manganese
Cobalt	
Iron	***Air***
Lead	Naphthalene
Manganese	
Thallium	
Vanadium	
Air	
Naphthalene	
Groundwater	***Groundwater***
1,4-Dichlorobenzene	Air - showering
Benzene	1,4-Dichlorobenzene
Ethylbenzene	Benzene
m- and p-Xylene	Ethylbenzene
Trichloroethene	m- and p-Xylene
Xylene, total	Trichloroethene
1,1-Biphenyl	Xylene, total
2,4-Dimethylphenol	1,1-Biphenyl
2-Methylnaphthalene	2-Methylnaphthalene
Benzo(a)anthracene	Dibenzofuran
Benzo(a)pyrene	Naphthalene
Benzo(b)fluoranthene	
Benzo(k)fluoranthene	
Dibenz(a,h)anthracene	
Dibenzofuran	
Indeno(1,2,3-cd)pyrene	
Naphthalene	
Dieldrin	
Aluminum	
Antimony	
Arsenic	
Barium	
Chromium	
Cobalt	
Iron	
Lead	
Manganese	
Mercury	
Thallium	
Vanadium	
Groundwater	***Groundwater***
Residential Indoor Air	***Industrial Indoor Air***
Benzene	Benzene
Ethylbenzene	Naphthalene
Naphthalene	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Current Industrial Worker Adult	Surface Soil within Fenced Area of Youth Pond/Site 4	Ingestion	5E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene, Dieldrin, Arsenic	0.2	
		Dermal Contact	4E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene, Dieldrin	0.07	
		Inhalation	1E-06				0.03	
		Total	1E-03	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene, Dieldrin, Arsenic	0.3	
Current Visitor/Recreational User Adult	Surface Soil outside Fenced Area of Site 4	Ingestion	1E-05			Benzo(a)pyrene, Arsenic	0.08	
		Dermal Contact	2E-06				0.01	
		Inhalation	NA				NA	
		Total	1E-05			Benzo(a)pyrene, Arsenic	0.09	
	Surface Water Youth Pond	Ingestion	1E-07				0.0007	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	1E-07				0.0009	
	Surface Water Upstream Pond	Ingestion	7E-07				0.007	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.002	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene		0.009	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	4E-06			Arsenic	0.03	
		Dermal Contact	9E-07				0.007	
		Inhalation	NA				NA	
		Total	5E-06			Arsenic	0.04	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-06				0.004	
		Dermal Contact	1E-05			Chromium	0.02	
		Inhalation	NA				NA	
		Total	1E-05			Chromium	0.02	
	Surface and Subsurface Sediment Youth Pond	Ingestion	5E-06			Arsenic	0.04	
		Dermal Contact	1E-05			Arsenic, Chromium	0.04	
		Inhalation	NA				NA	
		Total	2E-05			Arsenic, Chromium	0.08	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-06				0.008	
		Dermal Contact	5E-06			Aroclor-1242	0.01	
		Inhalation	NA				NA	
		Total	7E-06			Aroclor-1242, Arsenic	0.02	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	6E-07				0.006	
		Dermal Contact	1E-06				0.003	
		Inhalation	NA				NA	
		Total	2E-06				0.009	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Current Visitor/Recreational User Adult (con't)	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	1E-04		Aroclor-1260, Dioxin-Like PCB TEQ	Aroclor-1254, Chromium	3	Dioxin-Like PCB TEQ
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	1E-04		Aroclor-1260, Dioxin-Like PCB TEQ	Aroclor-1254, Chromium	3	Dioxin-Like PCB TEQ
	All Media - Youth Pond	Total	1E-04				3	
	All Media - Upstream Pond	Total	2E-04				3	
Current Visitor/Recreational User Child	Surface Soil outside Fenced Area of Site 4	Ingestion	5E-05		Benzo(a)pyrene, Arsenic	Benzo(a)anthracene, Benzo(b)fluoranthene	0.8	
		Dermal Contact	1E-05			Benzo(a)pyrene, Arsenic	0.06	
		Inhalation	NA				NA	
		Total	6E-05		Benzo(a)pyrene, Arsenic	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.8	
	Surface Water Youth Pond	Ingestion	1E-07				0.003	
		Dermal Contact	1E-08				0.0003	
		Inhalation	NA				NA	
		Total	1E-07				0.004	
	Surface Water Upstream Pond	Ingestion	1E-06				0.03	
		Dermal Contact	5E-05		Benzo(a)pyrene		0.003	
		Inhalation	NA				NA	
		Total	5E-05		Benzo(a)pyrene		0.04	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	5E-06			Arsenic	0.1	
		Dermal Contact	4E-07				0.01	
		Inhalation	NA				NA	
		Total	5E-06			Arsenic	0.2	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-05			Chromium	0.04	
		Dermal Contact	1E-05			Chromium	0.02	
		Inhalation	NA				NA	
		Total	2E-05			Chromium	0.06	
	Surface and Subsurface Sediment Youth Pond	Ingestion	2E-05			Benzo(a)pyrene, Arsenic, Chromium	0.4	
		Dermal Contact	1E-05			Benzo(a)pyrene, Chromium	0.05	
		Inhalation	NA				NA	
		Total	3E-05			Benzo(a)pyrene, Arsenic, Chromium	0.4	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	7E-06			Benzo(a)pyrene, Arsenic	0.07	
		Dermal Contact	2E-06				0.01	
		Inhalation	NA				NA	
		Total	9E-06			Benzo(a)pyrene, Arsenic	0.08	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	2E-06				0.06	
		Dermal Contact	1E-06				0.003	
		Inhalation	NA				NA	
		Total	3E-06			Benzo(a)pyrene	0.06	
Current Visitor/Recreational User Child (con't)	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	9E-05		Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	Aroclor-1254	6	Aroclor-1254, Dioxin-Like PCB TEQ

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	9E-05		Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	Aroclor-1254	6	Aroclor-1254, Dioxin-Like PCB TEQ
	All Media - Youth Pond	Total	1E-04				7	
	All Media - Upstream Pond	Total	2E-04				8	
Current Maintenance Worker Adult	Surface Soil outside Fenced Area of Site 4	Ingestion	1E-05			Benzo(a)pyrene, Arsenic	0.08	
		Dermal Contact	4E-06			Benzo(a)pyrene, Arsenic	0.01	
		Inhalation	NA				NA	
		Total	2E-05			Benzo(a)pyrene, Arsenic	0.1	
	Surface Water Youth Pond	Ingestion	3E-07				0.002	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	3E-07				0.002	
	Surface Water Upstream Pond	Ingestion	2E-06			Arsenic	0.02	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.002	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene	Arsenic	0.02	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	1E-05			Arsenic	0.07	
		Dermal Contact	1E-06				0.008	
		Inhalation	NA				NA	
		Total	1E-05			Arsenic	0.08	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	4E-07				0.001	
		Dermal Contact	4E-06			Chromium	0.008	
		Inhalation	NA				NA	
		Total	4E-06			Chromium	0.01	
	Surface and Subsurface Sediment Youth Pond	Ingestion	2E-06			Arsenic	0.02	
		Dermal Contact	4E-06			Arsenic, Chromium	0.02	
		Inhalation	NA				NA	
		Total	6E-06			Arsenic, Chromium	0.03	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	7E-07				0.003	
		Dermal Contact	2E-06				0.004	
		Inhalation	NA				NA	
		Total	3E-06				0.007	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	2E-07				0.002	
		Dermal Contact	4E-07				0.001	
		Inhalation	NA				NA	
		Total	7E-07				0.003	
	All Media - Youth Pond	Total	7E-06				0.04	
	All Media - Upstream Pond	Total	5E-05				0.2	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Visitor/Recreational User Adult	Surface Water Youth Pond	Ingestion	1E-07				0.0007	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	1E-07				0.0009	
	Surface Water Upstream Pond	Ingestion	7E-07				0.007	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.002	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene		0.009	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	4E-06			Arsenic	0.03	
		Dermal Contact	9E-07				0.007	
		Inhalation	NA				NA	
		Total	5E-06			Arsenic	0.04	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-06				0.004	
		Dermal Contact	1E-05			Chromium	0.02	
		Inhalation	NA				NA	
		Total	1E-05			Chromium	0.02	
	Surface and Subsurface Sediment Youth Pond	Ingestion	5E-06			Arsenic	0.04	
		Dermal Contact	1E-05			Arsenic, Chromium	0.04	
		Inhalation	NA				NA	
		Total	2E-05			Arsenic, Chromium	0.08	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-06				0.008	
		Dermal Contact	5E-06			Aroclor-1242	0.01	
		Inhalation	NA				NA	
		Total	7E-06			Aroclor-1242, Arsenic	0.02	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	6E-07				0.006	
		Dermal Contact	1E-06				0.003	
		Inhalation	NA				NA	
		Total	2E-06				0.009	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	1E-04		Aroclor-1260, Dioxin-Like PCB TEQ	Aroclor-1254, Chromium	3	Dioxin-Like PCB TEQ
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	1E-04		Aroclor-1260, Dioxin-Like PCB TEQ	Aroclor-1254, Chromium	3	Dioxin-Like PCB TEQ
	Soil* inside and outside Fenced Area	Ingestion	3E-05			Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.05	
		Dermal Contact	1E-05			Benzo(a)pyrene	0.007	
		Inhalation	3E-08				0.0008	
		Total	4E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.06	
	All Media - Youth Pond	Total	1E-04				3	
	All Media - Upstream Pond	Total	2E-04				3	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Visitor/Recreational User Child	Surface Water Youth Pond	Ingestion	1E-07				0.003	
		Dermal Contact	1E-08				0.0003	
		Inhalation	NA				NA	
		Total	1E-07				0.004	
	Surface Water Upstream Pond	Ingestion	1E-06				0.03	
		Dermal Contact	5E-05		Benzo(a)pyrene		0.003	
		Inhalation	NA				NA	
		Total	5E-05		Benzo(a)pyrene		0.04	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	5E-06			Arsenic	0.1	
		Dermal Contact	4E-07				0.01	
		Inhalation	NA				NA	
		Total	5E-06			Arsenic	0.2	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-05			Chromium	0.04	
		Dermal Contact	1E-05			Chromium	0.03	
		Inhalation	NA				NA	
		Total	2E-05		Chromium		0.06	
	Surface and Subsurface Sediment Youth Pond	Ingestion	2E-05			Benzo(a)pyrene, Arsenic, Chromium	0.4	
		Dermal Contact	1E-05			Benzo(a)pyrene, Chromium	0.05	
		Inhalation	NA				NA	
		Total	3E-05			Benzo(a)pyrene, Arsenic, Chromium	0.4	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	7E-06			Benzo(a)pyrene, Arsenic	0.07	
		Dermal Contact	2E-06				0.01	
		Inhalation	NA				NA	
		Total	9E-06			Benzo(a)pyrene, Arsenic	0.08	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	3E-06				0.06	
		Dermal Contact	1E-06				0.003	
		Inhalation	NA				NA	
		Total	4E-06			Benzo(a)pyrene	0.06	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	9E-05		Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	Aroclor-1254	6	Aroclor-1254, Dioxin-Like PCB TEQ
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	9E-05		Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	Aroclor-1254	6	Aroclor-1254, Dioxin-Like PCB TEQ
	Soil* inside and outside Fenced Area	Ingestion	3E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene, Arsenic	0.5	
		Dermal Contact	1E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.04	
		Inhalation	7E-09				0.0008	
		Total	4E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene, Arsenic	0.5	
	All Media - Youth Pond	Total	1E-04				7	
	All Media - Upstream Pond	Total	6E-04				7	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Construction Worker Adult	Soil* inside and outside Fenced Area	Ingestion	9E-06			Benzo(a)pyrene	0.4	
		Dermal Contact	3E-06			Benzo(a)pyrene	0.04	
		Inhalation	5E-09				0.004	
		Total	1E-05			Benzo(a)pyrene	0.4	
	Soil* within the Fenced Area of Youth Pond/Site 4	Ingestion	2E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	0.3	
		Dermal Contact	6E-05		Benzo(a)pyrene		0.04	
		Inhalation	2E-08				0.02	
		Total	2E-04	Benzo(a)pyrene		Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.3	
	Groundwater Shallow Aquifer - Water in Excavation Trench	Ingestion	NA				NA	
		Dermal Contact	4E-05		Benzo(a)pyrene	Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Chromium	0.3	
		Inhalation	5E-05		Naphthalene	Benzene	33	1,1-Biphenyl, Naphthalene
		Total	8E-05		Benzo(a)pyrene, Naphthalene	Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Chromium	34	1,1-Biphenyl, Naphthalene
	All Media - Inside and Outside Fenced Area and Groundwater	Total	9E-05				34	
	All Media - Within Fenced Area and Groundwater	Total	3E-04				34	
Future Industrial Worker Adult	Soil* inside and outside Fenced Area	Ingestion	1E-04		Benzo(a)pyrene, Arsenic	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.3	
		Dermal Contact	1E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	0.05	
		Inhalation	3E-07				0.007	
		Total	2E-04		Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	Indeno(1,2,3-cd)pyrene, Dieldrin	0.3	
Future Maintenance Worker Adult	Soil * inside and outside Fenced Area	Ingestion	3E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.05	
		Dermal Contact	2E-05			Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	0.01	
		Inhalation	6E-08				0.002	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Future Maintenance Worker Adult (con't)		Total	5E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.06	
	Surface Water Youth Pond	Ingestion	3E-07				0.002	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	3E-07				0.002	
	Surface Water Upstream Pond	Ingestion	2E-06			Arsenic	0.02	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.002	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene	Arsenic	0.02	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	1E-05			Arsenic	0.07	
		Dermal Contact	1E-06				0.008	
		Inhalation	NA				NA	
		Total	1E-05			Arsenic	0.08	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	4E-07				0.001	
		Dermal Contact	4E-06			Chromium	0.008	
		Inhalation	NA				NA	
		Total	4E-06			Chromium	0.01	
	Surface and Subsurface Sediment Youth Pond	Ingestion	2E-06			Arsenic	0.02	
		Dermal Contact	4E-06			Arsenic, Chromium	0.02	
		Inhalation	NA				NA	
		Total	6E-06			Arsenic, Chromium	0.03	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	7E-07				0.003	
		Dermal Contact	2E-06				0.004	
		Inhalation	NA				NA	
		Total	3E-06				0.007	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	2E-07				0.002	
		Dermal Contact	4E-07				0.001	
		Inhalation	NA				NA	
		Total	7E-07				0.003	
	All Media - Youth Pond	Total	7E-06				0.04	
	All Media - Upstream Pond	Total	8E-05				0.2	
Future Resident Adult	Soil* Inside and Outside Fenced Area	Ingestion	NA				0.4	
		Dermal Contact	NA				0.05	
		Inhalation	NA				0.03	
		Total	NA				0.4	
	Groundwater Shallow Aquifer - Tap Water	Ingestion	NA				8	Arsenic, Thallium
		Dermal Contact	NA				0.8	
		Inhalation	NA				2	
		Total	NA				10	Arsenic, Thallium
	All Media	Total	NA				11	
Future Resident Child	Soil* Inside and Outside Fenced Area	Ingestion	NA				3	Arsenic
		Dermal Contact	NA				0.3	
		Inhalation	NA				0.03	
		Total	NA				4	Arsenic
	Groundwater Shallow Aquifer - Tap Water	Ingestion	NA				18	Arsenic, Iron, Thallium
		Dermal Contact	NA				2	

TABLE J-3

Summary of RME Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Resident Child (con't)		Inhalation	NA				NA	
		Total	NA				20	Dibenzofuran, Arsenic, Iron, Thallium
	All Media	Total	NA				24	
Future Child/Adult Resident	Soil* Inside and Outside	Ingestion	2E-03	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene, Arsenic	Benzo(k)fluoranthene, Chrysene, Aroclor-1242, Dieldrin	NA	
	Fenced Area	Dermal Contact	8E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene, Arochlor-1242, Arsenic, Chromium (hexavalent)	NA	
		Inhalation	1E-06				NA	
		Total	3E-03	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene, Arsenic	Benzo(k)fluoranthene, Chrysene, Aroclor-1242, Aroclor-1260, Dieldrin, Chromium (hexavalent)	NA	
Future Child/Adult Resident	Groundwater Shallow Aquifer - Tap Water	Ingestion	1E-03	Benzo(a)pyrene, Arsenic, Chromium	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene,	Benzene, Ethylbenzene, Benzo(k)fluoranthene, Dieldrin	NA	
		Dermal Contact	1E-02	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Chromium	Benzo(k)fluoranthene	Benzene, Dieldrin, Arsenic	NA	
		Inhalation	4E-08				NA	
		Total	1E-02	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(ah)anthracene, Indeno(123)pyrene, Arsenic, Chromium	Trichloroethene, Benzo(k)fluoranthene	Benzene, Ethylbenzene, 1,1-Biphenyl, Dieldrin	NA	
	All Media	Total	1E-02				NA	

Soil* - surface soil and subsurface soil combined.

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Current Industrial Worker Adult	Surface Soil within Fenced Area of Youth Pond/Site 4	Ingestion	8E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.07	
		Dermal Contact	1E-05			Benzo(a)pyrene, Dibenz(a,h)anthracene	0.006	
		Inhalation	4E-07				0.03	
		Total	1E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.1	
Current Visitor/Recreational User Adult	Surface Soil outside Fenced Area of Site 4	Ingestion	1E-06				0.02	
		Dermal Contact	6E-08				0.0006	
		Inhalation	NA				NA	
		Total	1E-06				0.02	
	Surface Water Upstream Pond	Ingestion	1E-07				0.004	
		Dermal Contact	4E-06			Benzo(a)pyrene	0.0008	
		Inhalation	NA				NA	
		Total	4E-06			Benzo(a)pyrene	0.004	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	7E-07				0.02	
		Dermal Contact	2E-07				0.004	
		Inhalation	NA				NA	
		Total	9E-07				0.02	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-07				0.001	
		Dermal Contact	6E-08				0.0004	
		Inhalation	NA				NA	
		Total	2E-07				0.001	
	Surface and Subsurface Sediment Youth Pond	Ingestion	4E-07				0.01	
		Dermal Contact	7E-08				0.0007	
		Inhalation	NA				NA	
		Total	5E-07				0.01	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-07				0.002	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	2E-07				0.002	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	5E-08				0.002	
		Dermal Contact	7E-09				0.00005	
		Inhalation	NA				NA	
		Total	6E-08				0.002	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ	1	
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ	1	
	All Media - Youth Pond	Total	2E-05				1	
	All Media - Upstream Pond	Total	2E-05				1	

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Current Visitor/Recreational User Visitor	Surface Soil outside Fenced Area of Site 4	Ingestion	1E-05			Benzo(a)pyrene, Arsenic	0.2	
		Dermal Contact	1E-06				0.006	
		Inhalation	NA				NA	
		Total	1E-05			Benzo(a)pyrene, Arsenic	0.2	
	Surface Water Upstream Pond	Ingestion	6E-07				0.02	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.001	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene		0.02	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	2E-06			Arsenic	0.07	
		Dermal Contact	2E-07				0.006	
		Inhalation	NA				NA	
		Total	2E-06			Arsenic	0.08	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	3E-06			Chromium	0.009	
		Dermal Contact	1E-06				0.002	
		Inhalation	NA				NA	
		Total	5E-06			Chromium	0.01	
	Surface and Subsurface Sediment Youth Pond	Ingestion	5E-06			Arsenic	0.09	
		Dermal Contact	1E-06				0.005	
		Inhalation	NA				NA	
		Total	6E-06			Arsenic, Chromium	0.1	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-06				0.02	
		Dermal Contact	2E-07				0.001	
		Inhalation	NA				NA	
		Total	2E-06				0.02	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	7E-07				0.01	
		Dermal Contact	1E-07				0.0003	
		Inhalation	NA				NA	
		Total	9E-07				0.01	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	1	
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	1	
	All Media - Youth Pond	Total	2E-05				1	
	All Media - Upstream Pond	Total	6E-05				2	
Future Visitor/Recreational User Adult	Surface Water Upstream Pond	Ingestion	1E-07				0.004	
		Dermal Contact	4E-06			Benzo(a)pyrene	0.0008	
		Inhalation	NA				NA	
		Total	4E-06			Benzo(a)pyrene	0.004	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	7E-07				0.02	
		Dermal Contact	2E-07				0.004	
		Inhalation	NA				NA	
		Total	9E-07				0.02	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	1E-07				0.001	
		Dermal Contact	6E-08				0.0004	
		Inhalation	NA				NA	
		Total	2E-07				0.001	

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks >10^{-4}	Chemicals with Cancer Risks >10^{-5} and <10^{-4}	Chemicals with Cancer Risks >10^{-6} and <10^{-5}	Hazard Index	Chemicals with HI>1
Future Visitor/Recreational User Adult (cont'd)	Surface and Subsurface Sediment Youth Pond	Ingestion	4E-07				0.01	
		Dermal Contact	7E-08				0.0007	
		Inhalation	NA				NA	
		Total	5E-07				0.01	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-07				0.002	
		Dermal Contact	3E-08				0.0002	
		Inhalation	NA				NA	
		Total	2E-07				0.002	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	5E-08				0.002	
		Dermal Contact	7E-09				0.00005	
		Inhalation	NA				NA	
		Total	6E-08				0.002	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ	0.9	
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ	0.9	
	Soil* inside and outside Fenced Area of Site 4	Ingestion	3E-06				0.01	
		Dermal Contact	1E-06				0.002	
		Inhalation	5E-09				0.0001	
		Total	4E-06			Benzo(a)pyrene	0.02	
	All Media - Youth Pond	Total	2E-05				0.9	
	All Media - Upstream Pond	Total	2E-05				0.9	
Future Visitor/Recreational User Child	Surface Water Upstream Pond	Ingestion	6E-07				0.02	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.001	
		Inhalation	NA				NA	
		Total	2E-05		Benzo(a)pyrene		0.02	
	Surface Water Drainage Channel to Upstream Pond	Ingestion	2E-06			Arsenic	0.07	
		Dermal Contact	2E-07				0.006	
		Inhalation	NA				NA	
		Total	2E-06			Arsenic	0.08	
	Surface Sediment Drainage Channel to Upstream Pond	Ingestion	3E-06			Chromium	0.009	
		Dermal Contact	1E-06				0.002	
		Inhalation	NA				NA	
		Total	4E-06			Chromium	0.01	
	Surface and Subsurface Sediment Youth Pond	Ingestion	5E-06			Arsenic	0.09	
		Dermal Contact	1E-06				0.005	
		Inhalation	NA				NA	
		Total	6E-06			Arsenic, Chromium	0.1	
	Surface and Subsurface Sediment Upstream Pond	Ingestion	2E-06				0.02	
		Dermal Contact	2E-07				0.001	
		Inhalation	NA				NA	
		Total	2E-06				0.02	
	Sediment/Surface Soil Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	7E-07				0.01	
		Dermal Contact	1E-07				0.0003	
		Inhalation	NA				NA	
		Total	9E-07				0.01	
	Fish - Youth and Upsteam Pond Fish Tissue	Ingestion	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	1	
		Dermal Contact	NA				NA	
		Inhalation	NA				NA	
		Total	2E-05			Aroclor-1260, Dioxin-Like PCB TEQ, Chromium	1	

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Visitor/Recreational User Child (con't)	Soil* inside and outside Fenced Area of Site 4	Ingestion	7E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	0.1	
		Dermal Contact	1E-05			Benzo(a)pyrene	0.004	
		Inhalation	6E-13				7E-08	
		Total	8E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	0.1	
	All Media - Youth Pond	Total	2E-05				1	
	All Media - Upstream Pond	Total	1E-04				1	
Future Construction Worker Adult	Soil* inside and outside Fenced Area	Ingestion	5E-06			Benzo(a)pyrene	0.2	
		Dermal Contact	1E-06				0.01	
		Inhalation	5E-09				0.004	
		Total	6E-06			Benzo(a)pyrene	0.2	
	Soil* within the Fenced Area of Youth Pond/Site 4	Ingestion	9E-05		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	0.2	
		Dermal Contact	2E-05		Benzo(a)pyrene		0.01	
		Inhalation	2E-08				0.02	
		Total	1E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene	0.2	
	Groundwater Shallow Aquifer - Water in Excavation Trench	Ingestion	NA				NA	
		Dermal Contact	3E-05			Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	0.2	
		Inhalation	2E-05		Naphthalene		17	Naphthalene
		Total	5E-05		Naphthalene	Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Chromium	17	Naphthalene
	All Media -Soil* Inside and Outside Fenced Area and Groundwater	Total	5E-05				17	
	All Media - Soil* Within Fenced Area and Groundwater	Total	2E-04				17	

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Industrial Worker Adult	Soil* inside and outside Fenced Area	Ingestion	2E-05			Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.1	
		Dermal Contact	3E-06			Benzo(a)pyrene	0.005	
		Inhalation	8E-08				0.006	
		Total	2E-05			Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Arsenic	0.1	
Future Resident Adult	Soil* Inside and Outside Fenced Area	Ingestion	NA				0.1	
		Dermal Contact	NA				0.004	
		Inhalation	NA				0.02	
		Total	NA				0.1	
	Groundwater Shallow Aquifer - Tap Water	Ingestion	NA				4	
		Dermal Contact	NA				0.4	
		Inhalation	NA				0.2	
		Total	NA				4	
	All Media	Total	NA				4	
Future Resident Child	Soil* Inside and Outside Fenced Area	Ingestion	NA				1	
		Dermal Contact	NA				0.04	
		Inhalation	NA				0.02	
		Total	NA				1	
	Groundwater Shallow Aquifer - Tap Water	Ingestion	NA				12	Arsenic, Iron, Thallium
		Dermal Contact	NA				1	
		Inhalation	NA				NA	
		Total	NA				13	Arsenic, Iron, Thallium
	All Media	Total	NA				14	
Future Child/Adult Resident	Soil* Inside and Outside Fenced Area	Ingestion	7E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	Benzo(k)fluoranthene	NA	
		Dermal Contact	1E-04		Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	NA	
		Inhalation	4E-07				NA	
		Total	8E-04	Benzo(a)pyrene	Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	Benzo(k)fluoranthene, Carbazole	NA	

TABLE J-4

Summary of CTE Cancer Risks and Hazard Indices

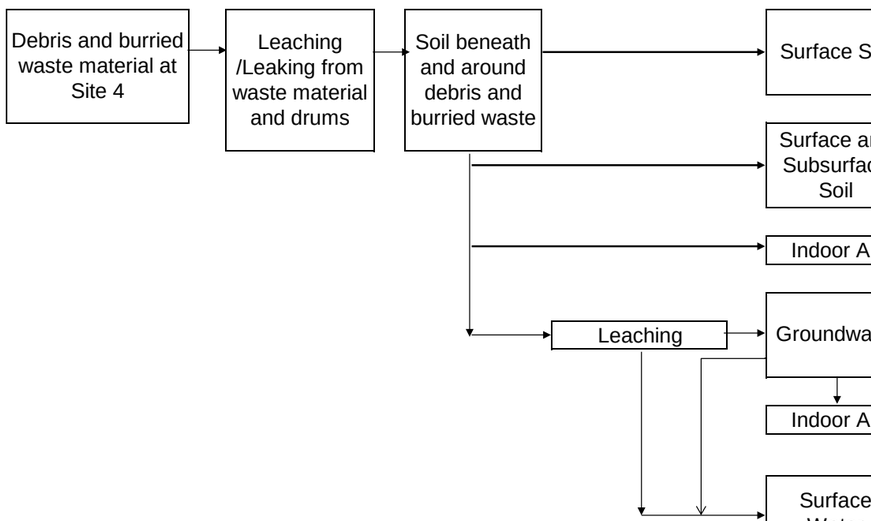
Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$ and $<10^{-4}$	Chemicals with Cancer Risks $>10^{-6}$ and $<10^{-5}$	Hazard Index	Chemicals with HI>1
Future Child/Adult Resident	Groundwater Shallow Aquifer - Tap Water	Ingestion	6E-04	Chromium	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Arsenic	Benzene, Benzo(k)fluoranthene	NA	
		Dermal Contact	4E-03	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene, Chromium		NA	
		Inhalation	2E-09				NA	
		Total	5E-03	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Chromium	Benzo(k)fluoranthene, Arsenic	Benzene, Dieldrin	NA	
	All Media	Total	5E-03				NA	

Soil* - surface soil and subsurface soil combined.

Figures

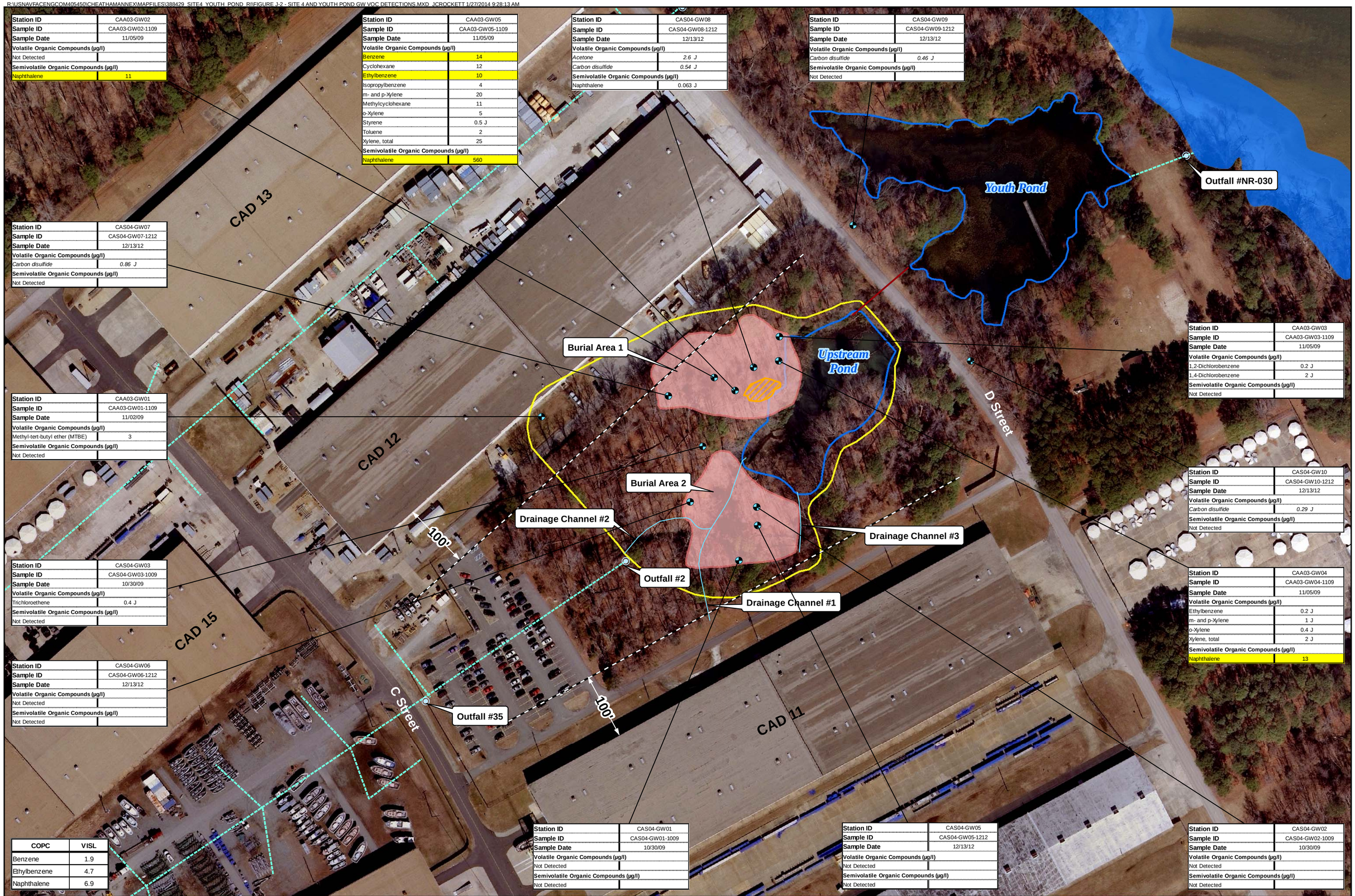


Exposure Media	Exposure Route	Potential Human Receptors: Current/Future: Visitor/Recreational Adult/Child	Industrial Worker	Maintenance Worker	Future: Resident Adult/Child	Construction Worker	Industrial Worker	Maintenance Worker	Visitor/ Recreational Adult/Child
Surface Soil	Ingestion	X	X	X	NA	NA	NA	NA	NA
	Dermal Contact	X	X	X	NA	NA	NA	NA	NA
	Inhalation	X	X	X	NA	NA	NA	NA	NA
Surface and Subsurface Soil	Ingestion	NA	NA	NA	X	X	X	X	X
	Dermal Contact	NA	NA	NA	X	X	X	X	X
	Inhalation	NA	NA	NA	X	X	X	X	X
Indoor Air	Inhalation	NA	X	NA	X	NA	X	NA	NA
Groundwater	Ingestion	NA	NA	NA	X	NA	X	NA	NA
	Dermal Contact	NA	NA	NA	X	X	NA	NA	NA
	Inhalation	NA	NA	NA	X	X	NA	NA	NA
Indoor Air	Inhalation	NA	X	NA	X	NA	X	NA	NA
Surface Water	Ingestion	X	NA	X	NA	NA	NA	X	X
	Dermal Contact	X	NA	X	NA	NA	NA	X	X
	Inhalation	NA	NA	NA	NA	NA	NA	NA	NA
Sediment	Ingestion	X	NA	X	NA	NA	NA	X	X
	Dermal Contact	X	NA	X	NA	NA	NA	X	X
	Inhalation	NA	NA	NA	NA	NA	NA	NA	NA
Fish	Ingestion	X	NA	NA	NA	NA	NA	NA	X

FIGURE J-1
Conceptual Site Model for HHRA
Site 4/Youth Pond Remedial Investigation
Washington Navy Yard
Washington D.C.

NA - Not Applicable or pathway is incomplete
X - Potentially complete exposure pathways

R:\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE J-2 - SITE 4 AND YOUTH POND GW VOC DETECTIONS.MXD JCROCKETT 1/27/2014 9:28:13 AM



Station ID	CAA03-GW02
Sample ID	CAA03-GW02-1109
Sample Date	11/05/09
Volatile Organic Compounds (µg/l)	
Not Detected	
Semivolatile Organic Compounds (µg/l)	
Naphthalene	11

Station ID	CAA03-GW05
Sample ID	CAA03-GW05-1109
Sample Date	11/05/09
Volatile Organic Compounds (µg/l)	
Benzene	14
Cyclohexane	12
Ethylbenzene	10
Isopropylbenzene	4
m- and p-Xylene	20
Methylcyclohexane	11
o-Xylene	5
Styrene	0.5 J
Toluene	2
Xylene, total	25
Semivolatile Organic Compounds (µg/l)	
Naphthalene	560

Station ID	CAS04-GW08
Sample ID	CAS04-GW08-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Acetone	*2.6 J*
Carbon disulfide	*0.54 J*
Semivolatile Organic Compounds (µg/l)	
Naphthalene	0.063 J

Station ID	CAS04-GW09
Sample ID	CAS04-GW09-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Carbon disulfide	*0.46 J*
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAS04-GW07
Sample ID	CAS04-GW07-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Carbon disulfide	*0.86 J*
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAA03-GW03
Sample ID	CAA03-GW03-1109
Sample Date	11/05/09
Volatile Organic Compounds (µg/l)	
1,2-Dichlorobenzene	0.2 J
1,4-Dichlorobenzene	2 J
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAA03-GW01
Sample ID	CAA03-GW01-1109
Sample Date	11/02/09
Volatile Organic Compounds (µg/l)	
Methyl-tert-butyl ether (MTBE)	3
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAS04-GW10
Sample ID	CAS04-GW10-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Carbon disulfide	*0.29 J*
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAS04-GW03
Sample ID	CAS04-GW03-1009
Sample Date	10/30/09
Volatile Organic Compounds (µg/l)	
Trichloroethene	0.4 J
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAA03-GW04
Sample ID	CAA03-GW04-1109
Sample Date	11/05/09
Volatile Organic Compounds (µg/l)	
Ethylbenzene	0.2 J
m- and p-Xylene	1 J
o-Xylene	0.4 J
Xylene, total	2 J
Semivolatile Organic Compounds (µg/l)	
Naphthalene	13

Station ID	CAS04-GW06
Sample ID	CAS04-GW06-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Not Detected	
Semivolatile Organic Compounds (µg/l)	
Not Detected	

COPC	VISL
Benzene	1.9
Ethylbenzene	4.7
Naphthalene	6.9

Station ID	CAS04-GW01
Sample ID	CAS04-GW01-1009
Sample Date	10/30/09
Volatile Organic Compounds (µg/l)	
Not Detected	
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAS04-GW05
Sample ID	CAS04-GW05-1212
Sample Date	12/13/12
Volatile Organic Compounds (µg/l)	
Not Detected	
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Station ID	CAS04-GW02
Sample ID	CAS04-GW02-1009
Sample Date	10/30/09
Volatile Organic Compounds (µg/l)	
Not Detected	
Semivolatile Organic Compounds (µg/l)	
Not Detected	

Legend

- Groundwater Samples
- Outfall
- Storm Water Line
- Culvert
- Drainage Channels
- Surface Debris Pile
- Extent of Buried Debris
- 100 year Flood Zone Area
- Site 4 Boundary
- Shoreline

Note:
Exceedance of VISL

N
W E
S

0 50 100
Feet

Figure J-2
Site 4 and Youth Pond Groundwater VOC Detections
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

DVR \\NNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE_4_DETECTS\FIGURE X - SUBSURFACE SOIL DETECTS.MXD JCROCKETT 1/27/2014 8:30:44 AM

Station ID	CAA03-SB05
Sample ID	CAA03-SB05-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Chloroform	*1 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB05
Sample ID	CAA03-SB05-1109B
Sample Date	11/04/09
Depth	15.1-15.6'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*34 J*
Acetone	*210 J*
Benzene	2 J
Carbon disulfide	*1 J*
Ethylbenzene	2 J
Isopropylbenzene	9 J
m- and p-Xylene	19 J
Methylcyclohexane	6 J
o-Xylene	5 J
Toluene	4 J
Xylene, total	24 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	3,500 J

Station ID	CAA03-SB06
Sample ID	CAA03-SB06-1109
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Toluene	2 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	28

Station ID	CAA03-SB01
Sample ID	CAA03-SB01-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*13 J*
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	240

Station ID	CAA03-SB10
Sample ID	CAA03-SB10-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*12 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB05
Sample ID	CAS04-SB05-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*98*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB04
Sample ID	CAS04-SB04-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*120 J*
Chloroform	*1 J*
Methylene chloride	*12 J*
Toluene	2 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB02
Sample ID	CAA03-SB02-1109B
Sample Date	11/04/09
Depth	15.5-16'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*31 J*
Acetone	*290 J*
Carbon disulfide	*4 J*
Methylene chloride	*19 J*
Toluene	3 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	630

Station ID	CAA03-SB02
Sample ID	CAA03-SB02-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	7.4 J

Station ID	CAA03-SB07
Sample ID	CAA03-SB07-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	29

Station ID	CAA03-SB08
Sample ID	CAA03-SB08-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*240 J*
Chloroform	*0.8 J*
Styrene	2 J
Toluene	5 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB03
Sample ID	CAA03-SB03-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*16 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB03
Sample ID	CAA03-SB03-1109B
Sample Date	11/04/09
Depth	15.5-16'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*17 J*
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	14 J

Station ID	CAA03-SB04
Sample ID	CAA03-SB04-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB04
Sample ID	CAA03-SB04-1109B
Sample Date	11/04/09
Depth	14.5-15'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*40 J*
Acetone	*310 J*
Carbon disulfide	*3 J*
m- and p-Xylene	3 J
Methylcyclohexane	2 J
Xylene, total	3 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	8,000

Station ID	CAS004-4HA06
Sample ID	CAS004-4-HA06-02-1199
Sample Date	11/12/99
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB09
Sample ID	CAA03-SB09-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA03
Sample ID	CAS004-4-HA03-02-1199
Sample Date	11/12/99
Depth	1-2'
Volatile Organic Compounds (µg/kg)	
Tetrachloroethene	3 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA04
Sample ID	CAS004-4-HA04-01-1199
Sample Date	11/12/99
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB03
Sample ID	CAS04-SB03-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA05
Sample ID	CAS004-4-HA05-01-1199
Sample Date	11/12/99
Depth	0.5-1'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB01
Sample ID	CAS04-SB01-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA02
Sample ID	CAS004-4-HA02-02-1199
Sample Date	11/12/99
Depth	1-2'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*8 J*
Ethylbenzene	2 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB02
Sample ID	CAS04-SB02-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Legend

- Subsurface Soil Samples
- Outfall
- Storm Water Line
- Culvert
- Drainage Channels
- Surface Debris Pile
- Extent of Buried Debris
- Site 4 Boundary
- Shoreline

Note:
Italicized = constituents are likely lab contaminants
Constituent detected within approximately 100' of a building
Constituent detected outside approximately 100' of a building

N
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0 50 100
Feet

Figure J-3
Site 4 and Youth Pond Surface Soil VOC Detections
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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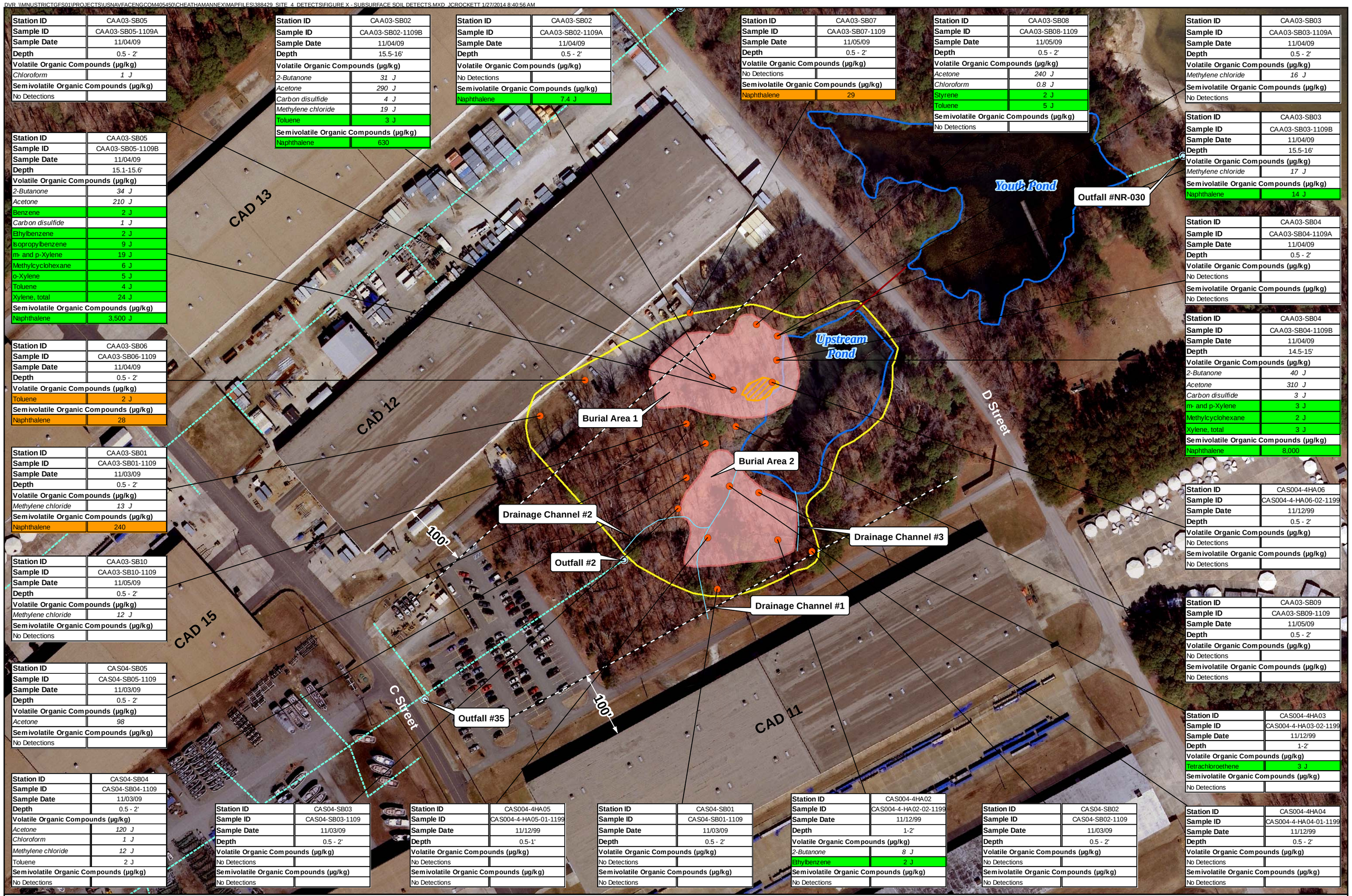
DVR \\NNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE_4_DETECTS\FIGURE X - SUBSURFACE SOIL DETECTS.MXD JCROCKETT 1/27/2014 8:40:56 AM



Station ID	CAA03-SB05
Sample ID	CAA03-SB05-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Chloroform	*1 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB05
Sample ID	CAA03-SB05-1109B
Sample Date	11/04/09
Depth	15.1-15.6'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*34 J*
Acetone	*210 J*
Benzene	2 J
Carbon disulfide	*1 J*
Ethylbenzene	2 J
Isopropylbenzene	9 J
m- and p-Xylene	19 J
Methylcyclohexane	6 J
o-Xylene	5 J
Toluene	4 J
Xylene, total	24 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	3,500 J

Station ID	CAA03-SB06
Sample ID	CAA03-SB06-1109
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Toluene	2 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	28

Station ID	CAA03-SB01
Sample ID	CAA03-SB01-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*13 J*
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	240

Station ID	CAA03-SB10
Sample ID	CAA03-SB10-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*12 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB05
Sample ID	CAS04-SB05-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*98*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB04
Sample ID	CAS04-SB04-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*120 J*
Chloroform	*1 J*
Methylene chloride	*12 J*
Toluene	2 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB02
Sample ID	CAA03-SB02-1109B
Sample Date	11/04/09
Depth	15.5-16'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*31 J*
Acetone	*290 J*
Carbon disulfide	*4 J*
Methylene chloride	*19 J*
Toluene	3 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	630

Station ID	CAA03-SB02
Sample ID	CAA03-SB02-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	7.4 J

Station ID	CAA03-SB07
Sample ID	CAA03-SB07-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	29

Station ID	CAA03-SB08
Sample ID	CAA03-SB08-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Acetone	*240 J*
Chloroform	*0.8 J*
Styrene	2 J
Toluene	5 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB03
Sample ID	CAA03-SB03-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*16 J*
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB03
Sample ID	CAA03-SB03-1109B
Sample Date	11/04/09
Depth	15.5-16'
Volatile Organic Compounds (µg/kg)	
Methylene chloride	*17 J*
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	14 J

Station ID	CAA03-SB04
Sample ID	CAA03-SB04-1109A
Sample Date	11/04/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB04
Sample ID	CAA03-SB04-1109B
Sample Date	11/04/09
Depth	14.5-15'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*40 J*
Acetone	*310 J*
Carbon disulfide	*3 J*
m- and p-Xylene	3 J
Methylcyclohexane	2 J
Xylene, total	3 J
Semivolatile Organic Compounds (µg/kg)	
Naphthalene	8,000

Station ID	CAS004-4HA06
Sample ID	CAS004-4-HA06-02-1199
Sample Date	11/12/99
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAA03-SB09
Sample ID	CAA03-SB09-1109
Sample Date	11/05/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA03
Sample ID	CAS004-4-HA03-02-1199
Sample Date	11/12/99
Depth	1-2'
Volatile Organic Compounds (µg/kg)	
Tetrachloroethene	3 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA04
Sample ID	CAS004-4-HA04-01-1199
Sample Date	11/12/99
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB03
Sample ID	CAS04-SB03-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA05
Sample ID	CAS004-4-HA05-01-1199
Sample Date	11/12/99
Depth	0.5-1'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB01
Sample ID	CAS04-SB01-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS004-4HA02
Sample ID	CAS004-4-HA02-02-1199
Sample Date	11/12/99
Depth	1-2'
Volatile Organic Compounds (µg/kg)	
2-Butanone	*8 J*
Ethylbenzene	2 J
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Station ID	CAS04-SB02
Sample ID	CAS04-SB02-1109
Sample Date	11/03/09
Depth	0.5 - 2'
Volatile Organic Compounds (µg/kg)	
No Detections	
Semivolatile Organic Compounds (µg/kg)	
No Detections	

Legend

- Subsurface Soil Samples
- Outfall
- Storm Water Line
- Culvert
- Drainage Channels
- Surface Debris Pile
- Extent of Buried Debris
- Site 4 Boundary
- Shoreline

Note:
Italicized = constituents are likely lab contaminants
Constituent detected within approximately 100' of a building
Constituent detected outside approximately 100' of a building

N W E S

0 50 100 Feet

Figure J-4
Site 4 and Youth Pond Subsurface Soil VOC Detections
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

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Appendix K
Human Health Risk Assessment

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Industrial Worker	Adult	Dermal	On-site	Quant	Industrial workers may contact surface soil within the fenced area while working at the site.
						Ingestion	On-site	Quant	
		Air	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Industrial Worker	Adult	Inhalation	On-site	Quant	Industrial workers may inhale vapors and dust from soil within the fenced area when working at the site.
	Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Visitor/Recreational User	Adult	Dermal	On-site	Quant	Visitors/Recreational users may contact surface soil soil outside of fenced area of site.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-site	Quant	Maintenance workers may may contact surface soil outside of Fenced Area of Site.
						Ingestion	On-site	Quant	
		Air	Emissions from Surface Soil outside Fenced Area of Site 4	Visitor/Recreational User	Adult	Inhalation	On-site	Quant	Visitors/Recreational users may inhale vapors and dust from soil outside of fenced area of site.
					Child	Inhalation	On-site	Quant	
				Maintenance Worker	Adult	Inhalation	On-site	Quant	Maintenance workers may inhale vapors and dust from surface soil outside Fenced Area of Site.
Current/Future	Surface Water	Surface Water	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond	Visitor/Recreational User	Adult	Dermal	On-Site	Quant	Youth Pond is used for recreational activities, however, Upstream Pond is not currently used for recreational activities. Visitors or recreational users may contact surface water in Youth Pond, and although less likely, in Upsteam Pond and drainageways to Upstream Pond.
						Ingestion	On-Site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-Site	Quant	Maintenance workers may contact surface water in Youth Pond, drainageways to Upstream Pond, or Upstream Pond.
						Ingestion	On-Site	Quant	
	Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Visitor/Recreational User	Adult	Dermal	On-site	Quant	Although unlikely since Upstream Pond not used recreationally, visitors or recreational users may contact sediment in drainage channels to Upsteam Pond.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-Site	Quant	Maintenance workers may contact sediment in drainage channels to Upstream Pond.
						Ingestion	On-Site	Quant	

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment	Surface and Subsurface Sediment	Youth Pond, Upstream Pond	Visitor/Recreational User	Adult	Dermal	On-site	Quant	Youth Pond is used for recreational activities, however, Upstream Pond is not currently used for recreational activities. Visitors or recreational users may contact surface and subsurface sediment in Youth Pond, and although less likely, in Upsteam Pond.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-Site	Quant	Maintenance workers may contact surface water in Youth Pond, drainageways to Upstream Pond, or Upstream Pond.
						Ingestion	On-Site	Quant	
	Sediment/ Surface Soil	Sediment/ Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Visitor/Recreational User	Adult	Dermal	On-site	Quant	Visitors or recreational users may contact sediment and soil in drainage ditches to Youth Pond outside of fenced area.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-Site	Quant	Maintenance workers may contact sediment and soil in drainage ditches to Youth Pond outside of fenced area.
						Ingestion	On-Site	Quant	
	Fish	Fish	Fish from Youth Pond and Upstream Pond	Visitor/Recreational User	Adult	Ingestion	On-site	Quant	Recreational users may fish in ponds and consume fish caught in ponds.
					Child	Ingestion	On-site	Quant	
Future	Soil*	Soil*	Soil* inside and outside Fenced Area	Visitor/Recreational User	Adult	Dermal	On-site	Quant	Future visitors/recreational users may contact surface and subsurface soil within and outside of fenced area of site if site use or fencing is changes.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Construction Worker	Adult	Dermal	On-site	Quant	Future construction workers may may contact surface and subsurface soil within and outside of fenced area of site.
						Ingestion	On-site	Quant	
				Industrial Worker	Adult	Dermal	On-site	Quant	Future industrial workers may may contact surface and subsurface soil within and outside of fenced area of site.
						Ingestion	On-site	Quant	
				Maintenance Worker	Adult	Dermal	On-site	Quant	Future maintenance workers may may contact surface and subsurface soil within and outside of fenced area of site.
						Ingestion	On-site	Quant	

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Soil*	Soil*	Soil* inside and outside Fenced Area	Resident**	Adult	Dermal	On-site	Quant	The site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
					Child/Adult	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
		Air	Emissions from Soil* from inside and outside Fenced Area	Visitor/Recreational User	Adult	Inhalation	On-site	Quant	Future visitors/recreational users may inhale dust and vapors from surface and subsurface soil within and outside fenced area of site.
					Child	Inhalation	On-site	Quant	
				Construction Worker	Adult	Inhalation	On-site	Quant	Future construction workers may inhale vapors and dust from surface and subsurface soil within and outside fenced area of site.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Future industrial workers may inhale vapors and dust from surface and subsurface soil within and outside fenced area of site.
				Maintenance Worker	Adult	Inhalation	On-site	Quant	Future maintenance workers may inhale vapors and dust from surface and subsurface soil within and outside fenced area of site.
				Resident**	Adult	Inhalation	On-site	Quant	The site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use. Future residents could inhale vapors and dust from surface and subsurface soil at site.
					Child	Inhalation	On-site	Quant	
					Child/Adult	Inhalation	On-site	Quant	
		Soil*	Soil* within Fenced Area of Youth Pond/Site 4	Construction Worker	Adult	Dermal	On-site	Quant	Construction workers may contact soil within fenced area of site if construction activities limited to areas within fenceline.
						Ingestion	On-site	Quant	
		Air	Emissions from Soil* from within the fence line	Construction Worker	Adult	Inhalation	On-site	Quant	Construction workers may inhale vapors and dust from soil while working within fenced area of site.
	Groundwater	Groundwater	Shallow Aquifer - Tap Water	Resident**	Adult	Dermal Absorption	On-site	Quant	Groundwater is not currently used on-site as a water supply and the site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use.
						Ingestion	On-site	Quant	
					Child	Dermal Absorption	On-site	Quant	
						Ingestion	On-site	Quant	
					Child/Adult	Dermal Absorption	On-site	Quant	
						Ingestion	On-site	Quant	
			Shallow Aquifer - Water in Excavation Trench	Construction Worker	Adult	Dermal	On-site	Quant	Workers could be exposed to shallow groundwater during excavation activities.
						Ingestion	On-site	None	Incidental ingestion of groundwater by construction workers would be minimal during construction or excavation activities.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Groundwater	Air	Shallow Aquifer - Water Vapors at Showerhead	Resident**	Adult	Inhalation	On-site	Quant	Groundwater is not currently used on-site as a water supply and the site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use.
					Child	Inhalation	On-site	None	Groundwater is not currently used on-site as a water supply and the site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use. Inhalation no significant pathway of exposure during bathing for child.
					Child/Adult	Inhalation	On-site	Quant	Groundwater is not currently used on-site as a water supply and the site is not expected to be developed for residential use; however, the residential scenario is included for a conservative evaluation of unrestricted land use.
			Shallow Aquifer - Water Vapors at Excavation Trench	Construction Worker	Adult	Inhalation	On-site	Quant	Construction workers could inhale vapors from groundwater in excavation during construction and excavation activities.
			Shallow Aquifer - Indoor Air	Resident**	Adult	Inhalation	On-site	Qual	The site is not expected to be developed for residential use; however, the residential scenario, including vapor intrusion fron shallow groundwater into indoor air, and inhalation of volatiles , is included for a conservative evaluation of unrestricted land use.
					Child	Inhalation	On-site	Qual	
					Child/Adult	Inhalation	On-site	Qual	
Current/Future	Groundwater	Air	Shallow Aquifer - Indoor Air	Industrial Worker	Adult	Inhalation	On-site	Qual	Industrial workers may inhale volatiles from groundwater in indoor air while performing work activities inside a building.

(1) Surface water and sediment in Youth Pond, Upstream Pond, and drainageways to Upstream Pond are evaluated separately.

Soil* = Combined surface and subsurface soil. Subsurface soil mixed with surface soil following excavation activities.

** Noncarcinogenic hazard evaluated separately for adult and child receptors, combined lifetime carcinogenic risk evaluated on an age-adjusted basis for residential scenario.

Quant: will be quantitatively evaluated.

Qual: will be qualitatively evaluated.

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier		Maximum [1] Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil																		
within Fenced	75-09-2	Methylene chloride	1.3E-02	J	1.3E-02	J	MG/KG	CAA03-SS06-1109	1/5	0.011 - 0.029	1.3E-02	N/A	3.6E+01	N	2.5E-03	SSL	NO	BSL
Area of Youth	92-52-4	1,1-Biphenyl	3.8E+00		3.8E+00		MG/KG	CAA03-SS06-1109	1/5	0.34 - 0.87	3.8E+00	N/A	5.1E+00	N	8.7E-03	SSL	NO	BSL
Pond/Site 4	105-67-9	2,4-Dimethylphenol	4.2E-01	J	4.2E-01	J	MG/KG	CAA03-SS06-1109	1/5	0.42 - 0.87	4.2E-01	N/A	1.2E+02	N	3.2E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	2.5E-03	J	2.3E-02	J	MG/KG	CAA03-SS01-1109	3/6	0.019 - 49	2.3E-02	N/A	2.3E+01	N	1.4E-01	SSL	NO	BSL
	95-48-7	2-Methylphenol	4.4E-01	J	4.4E-01	J	MG/KG	CAA03-SS06-1109	1/5	0.42 - 0.87	4.4E-01	N/A	3.1E+02	N	5.8E-01	SSL	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	1.2E+00		1.2E+00		MG/KG	CAA03-SS06-1109	1/5	0.42 - 0.87	1.2E+00	N/A	6.1E+02	N	1.2E+00	SSL	NO	BSL
	83-32-9	Acenaphthene	7.5E-03	J	2.4E+01	J	MG/KG	CAA03-SS06-1109	4/6	0.019 - 49	2.4E+01	N/A	3.4E+02	N	4.1E+00	SSL	NO	BSL
	208-96-8	Acenaphthylene	3.0E-03	J	4.1E+00	J	MG/KG	CAA03-SS06-1109	4/6	0.019 - 49	4.1E+00	N/A	3.4E+02	N	N/A		NO	BSL
	120-12-7	Anthracene	1.9E-02	J	1.4E+02		MG/KG	CAA03-SS06-1109	5/6	0.019 - 49	1.4E+02	N/A	1.7E+03	N	4.2E+01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**9.2E-02**		**1.8E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**1.8E+02**	**N/A**	**1.5E-01**	**C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**7.9E-02**		**1.3E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**1.3E+02**	**N/A**	**1.5E-02**	**C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**1.6E-01**		**2.0E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**2.0E+02**	**N/A**	**1.5E-01**	**C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	4.3E-02		6.6E+01	L	MG/KG	CAA03-SS06-1109	6/6	0.019 - 49	6.6E+01	N/A	1.7E+02	N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**5.8E-02**		**8.1E+01**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**8.1E+01**	**N/A**	**1.5E+00**	**C**	**3.5E-01**	**SSL**	**YES**	**ASL**
	117-81-7	bis(2-Ethylhexyl)phthalate	7.8E-01	J	7.8E-01	J	MG/KG	CAA03-SS07-1109	1/5	0.12 - 240	7.8E-01	N/A	3.5E+01	C	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	2.8E+00		2.8E+00		MG/KG	CAA03-SS07-1109	1/5	0.34 - 0.87	2.8E+00	N/A	2.6E+02	C	2.0E-01	SSL	NO	BSL
	86-74-8	**Carbazole**	**9.0E-02**	**J**	**1.2E+02**	**J**	**MG/KG**	**CAA03-SS06-1109**	**4/5**	**0.021 - 49**	**1.2E+02**	**N/A**	**2.4E+01**	**C**	**3.2E-02**	**SSL**	**YES**	**ASL**
	218-01-9	**Chrysene**	**1.2E-01**		**2.1E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**2.1E+02**	**N/A**	**1.5E+01**	**C**	**1.1E+00**	**SSL**	**YES**	**ASL**
	53-70-3	**Dibenz(a,h)anthracene**	**1.7E-02**	**J**	**2.2E+01**	**K**	**MG/KG**	**CAA03-SS06-1109**	**5/6**	**0.019 - 49**	**2.2E+01**	**N/A**	**1.5E-02**	**C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	132-64-9	**Dibenzofuran**	**3.8E-01**	**J**	**1.9E+01**		**MG/KG**	**CAA03-SS06-1109**	**2/5**	**0.34 - 2**	**1.9E+01**	**N/A**	**7.8E+00**	**N**	**1.1E-01**	**SSL**	**YES**	**ASL**
	117-84-0	Di-n-octylphthalate	7.7E-01		7.7E-01		MG/KG	CAA03-SS07-1109	1/5	0.42 - 0.87	7.7E-01	N/A	6.1E+01	N	5.3E+01	SSL	NO	BSL
	206-44-0	**Fluoranthene**	**7.5E-02**		**5.0E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**5.0E+02**	**N/A**	**2.3E+02**	**N**	**7.0E+01**	**SSL**	**YES**	**ASL**
	86-73-7	Fluorene	1.0E-02	J	4.0E+01	J	MG/KG	CAA03-SS06-1109	4/6	0.019 - 49	4.0E+01	N/A	2.3E+02	N	4.0E+00	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.2E-02**		**6.9E+01**	**J**	**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**6.9E+01**	**N/A**	**1.5E-01**	**C**	**2.0E-01**	**SSL**	**YES**	**ASL**
	91-20-3	**Naphthalene**	**6.6E-03**	**J**	**2.6E+01**	**J**	**MG/KG**	**CAA03-SS06-1109**	**4/6**	**0.019 - 49**	**2.6E+01**	**N/A**	**3.6E+00**	**C**	**4.7E-04**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	1.7E-01		4.7E+02		MG/KG	CAA03-SS06-1109	5/6	0.019 - 49	4.7E+02	N/A	1.7E+03	N	N/A		NO	BSL
	108-95-2	Phenol	6.0E-01		6.0E-01		MG/KG	CAA03-SS06-1109	1/5	0.42 - 0.87	6.0E-01	N/A	1.8E+03	N	2.6E+00	SSL	NO	BSL
	129-00-0	**Pyrene**	**7.9E-02**		**3.9E+02**		**MG/KG**	**CAA03-SS06-1109**	**6/6**	**0.019 - 49**	**3.9E+02**	**N/A**	**1.7E+02**	**N**	**9.5E+00**	**SSL**	**YES**	**ASL**
	72-54-8	4,4'-DDD	2.3E-03	J	2.8E-01	J	MG/KG	CAA03-SS06-1109	3/5	0.0032 - 0.078	2.8E-01	N/A	2.0E+00	C	6.4E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	5.2E-02	J	5.2E-02	J	MG/KG	CAA03-SS06-1109	1/5	0.0032 - 0.078	5.2E-02	N/A	1.4E+00	C	4.6E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	1.3E-02	J	8.8E-02	J	MG/KG	CAA03-SS06-1109	2/5	0.0032 - 0.078	8.8E-02	N/A	1.7E+00	C	6.7E-02	SSL	NO	BSL
	319-86-8	delta-BHC	1.4E-01	J	1.4E-01	J	MG/KG	CAA03-SS06-1109	1/5	0.0016 - 0.04	1.4E-01	N/A	2.7E-01	C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**6.5E-01**	**J**	**6.5E-01**	**J**	**MG/KG**	**CAA03-SS06-1109**	**1/5**	**0.0032 - 0.022**	**6.5E-01**	**N/A**	**3.0E-02**	**C**	**6.1E-05**	**SSL**	**YES**	**ASL**
	959-98-8	Endosulfan I	2.2E+00	J	2.2E+00	J	MG/KG	CAA03-SS06-1109	1/5	0.0016 - 0.022	2.2E+00	N/A	3.7E+01	N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	1.9E-03	J	1.9E-03	J	MG/KG	CAA03-SS01-1109	1/5	0.0032 - 0.078	1.9E-03	N/A	3.7E+01	N	N/A		NO	BSL
	72-20-8	Endrin	1.3E-01	J	1.3E-01	J	MG/KG	CAA03-SS06-1109	1/5	0.0032 - 0.078	1.3E-01	N/A	1.8E+00	N	6.8E-02	SSL	NO	BSL
	58-89-9	**gamma-BHC (Lindane)**	**5.2E-03**	**J**	**8.6E-01**		**MG/KG**	**CAA03-SS06-1109**	**2/5**	**0.0016 - 0.04**	**8.6E-01**	**N/A**	**5.2E-01**	**C**	**2.1E-04**	**SSL**	**YES**	**ASL**

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil	**7429-90-5**	**Aluminum**	**5.3E+03**	**1.3E+04**	**MG/KG**	**CAA03-SS01-1109**	**6/6**	**21 - 42.1**	**1.3E+04**	**1.2E+04**	**7.7E+03 N**	**2.3E+04**	**SSL**	**YES**	**ASL**
within Fenced	7440-36-0	Antimony	7.0E-02 J	2.1E-01 L	MG/KG	CAA03-SS06-1109	3/6	0.07 - 4.21	2.1E-01	N/A	3.1E+00 N	2.7E-01	SSL	NO	BSL
Area of Youth	**7440-38-2**	**Arsenic**	**2.8E+00**	**7.3E+00**	**MG/KG**	**CAA03-SS01-1109**	**6/6**	**0.35 - 4.21**	**7.3E+00**	**6.4E+00**	**6.1E-01 C**	**1.3E-03**	**SSL**	**YES**	**ASL**
Pond/Site 4	7440-39-3	Barium	3.2E+01	5.7E+01	MG/KG	CAA03-SS07-1109	6/6	0.35 - 1.05	5.7E+01	5.3E+01	1.5E+03 N	1.2E+02	SSL	NO	BSL
(cont'd)	7440-41-7	Beryllium	3.1E-01	7.2E-01	MG/KG	CAA03-SS06-1109	6/6	0.0852 - 0.47	7.2E-01	5.9E-01	1.6E+01 N	1.3E+01	SSL	NO	BSL
	7440-43-9	Cadmium	7.4E-02 J	7.0E-01 J	MG/KG	CAA03-SS07-1109	5/6	0.17 - 1.4	7.0E-01	N/A	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.8E+03	1.9E+04	MG/KG	03-SS06-1109 : CAS04-SS08-1	6/6	4.9 - 52.6	1.9E+04	2.3E+03	N/A	N/A		NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**5.3E-01**	**5.3E-01**	**MG/KG**	**CAYP-SS02-1012**	**1/1**	**0.49 - 0.49**	**5.3E-01**	N/A	**2.9E-01 C**	**5.9E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	1.1E+01	2.5E+01 K	MG/KG	CAA03-SS01-1109	6/6	0.71 - 2.1	2.5E+01	1.8E+01	1.2E+04 N	2.8E+07	SSL	NO	BSL
	7440-48-4	**Cobalt**	**1.5E+00**	**4.9E+00**	**MG/KG**	**CAA03-SS07-1109**	**6/6**	**0.07 - 1.05**	**4.9E+00**	**9.9E+00**	**2.3E+00 N**	**2.1E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	5.3E+00 K	3.7E+01	MG/KG	CAS04-SS08-1012	6/6	0.852 - 2.4	3.7E+01	4.3E+00	3.1E+02 N	2.2E+01	SSL	NO	BSL
	7439-89-6	**Iron**	**1.1E+04**	**1.9E+04**	**MG/KG**	**CAYP-SS02-1012**	**6/6**	**7 - 21**	**1.9E+04**	**2.0E+04**	**5.5E+03 N**	**2.7E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	**Lead**	**9.4E+00 K**	**7.9E+02**	**MG/KG**	**CAA03-SS06-1109**	**5/6**	**0.35 - 4.21**	**7.9E+02**	**1.7E+01**	**4.0E+02 NL**	**1.4E+01**	**SSL**	**YES**	**ASL**
	7439-95-4	Magnesium	6.7E+02	4.1E+03	MG/KG	CAA03-SS07-1109	6/6	4.4 - 52.6	4.1E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**5.3E+01**	**3.2E+02**	**MG/KG**	**CAA03-SS07-1109**	**6/6**	**0.35 - 2.1**	**3.2E+02**	**3.2E+02**	**1.8E+02 N**	**2.1E+01**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	1.0E-02 J	8.0E-02	MG/KG	CAS04-SS08-1012	5/6	0.0111 - 0.042	8.0E-02	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
	7440-02-0	Nickel	2.5E+00	9.0E+00	MG/KG	CAA03-SS06-1109	6/6	0.71 - 5.6	9.0E+00	9.5E+00	1.5E+02 N	2.0E+01	SSL	NO	BSL
	7440-09-7	Potassium	4.2E+02	2.8E+03	MG/KG	CAA03-SS07-1109	6/6	70 - 105	2.8E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	1.6E-01 J	8.4E-01	MG/KG	CAA03-SS06-1109	4/6	0.35 - 4.21	8.4E-01	5.1E-01	3.9E+01 N	4.0E-01	SSL	NO	BSL
	7440-23-5	Sodium	1.7E+01 J	1.8E+02 K	MG/KG	CAA03-SS06-1109	6/6	42.6 - 95	1.8E+02	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.4E+01	2.7E+01	MG/KG	CAYP-SS02-1012	6/6	0.35 - 2.1	2.7E+01	N/A	3.9E+01 N	7.8E+01	SSL	NO	BSL
	7440-66-6	Zinc	2.2E+01 K	1.6E+02	MG/KG	CAYP-SS01-1012	6/6	1.4 - 2.4	1.6E+02	N/A	2.3E+03 N	2.9E+02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.
RSL value for cresols used for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (III) insoluble salts used for chromium.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.
MG/KG = milligrams per kilogram
SSL = Risk Based Soil Screening Levels from RSL table (not adjusted for noncarcinogenic constituents)
N/A = not available/not applicable

Table 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

RSL value for endosulfan used as surrogate for endosulfan I and endosulfan sulfate.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Table 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	75-09-2	Methylene chloride	4.6E-03 J	4.6E-03 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	4.6E-03	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	92-52-4	1,1-Biphenyl	2.6E-02	2.6E-02	ug/m^3	CAA03-SS06-1109	1/5	N/A	2.6E-02	N/A	4.2E-02 N	N/A	N/A	NO	BSL
	105-67-9	2,4-Dimethylphenol	3.1E-07 J	3.1E-07 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	3.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-57-6	2-Methylnaphthalene	3.3E-05 J	3.1E-04 J	ug/m^3	CAA03-SS01-1109	3/6	N/A	3.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	95-48-7	2-Methylphenol	3.2E-07 J	3.2E-07 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	3.2E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	8.8E-07	8.8E-07	ug/m^3	CAA03-SS06-1109	1/5	N/A	8.8E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	4.1E-05 J	1.3E-01 J	ug/m^3	CAA03-SS06-1109	4/6	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.6E-05 J	2.3E-02 J	ug/m^3	CAA03-SS06-1109	4/6	N/A	2.3E-02	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	2.8E-05 J	2.1E-01	ug/m^3	CAA03-SS06-1109	5/6	N/A	2.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	6.8E-08	1.3E-04	ug/m^3	CAA03-SS06-1109	6/6	N/A	1.3E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	5.8E-08	9.6E-05	ug/m^3	CAA03-SS06-1109	6/6	N/A	9.6E-05	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.2E-07	1.5E-04	ug/m^3	CAA03-SS06-1109	6/6	N/A	1.5E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	3.2E-08	4.9E-05 L	ug/m^3	CAA03-SS06-1109	6/6	N/A	4.9E-05	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	4.3E-08	6.0E-05	ug/m^3	CAA03-SS06-1109	6/6	N/A	6.0E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	5.7E-07 J	5.7E-07 J	ug/m^3	CAA03-SS07-1109	1/5	N/A	5.7E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	2.1E-06	2.1E-06	ug/m^3	CAA03-SS07-1109	1/5	N/A	2.1E-06	N/A	N/A	N/A	N/A	NO	NTX
	86-74-8	Carbazole	6.6E-08 J	8.8E-05 J	ug/m^3	CAA03-SS06-1109	4/5	N/A	8.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	8.8E-08	1.5E-04	ug/m^3	CAA03-SS06-1109	6/6	N/A	1.5E-04	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	1.3E-08 J	1.6E-05 K	ug/m^3	CAA03-SS06-1109	5/6	N/A	1.6E-05	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	132-64-9	Dibenzofuran	1.5E-03 J	7.5E-02	ug/m^3	CAA03-SS06-1109	2/5	N/A	7.5E-02	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	5.7E-07	5.7E-07	ug/m^3	CAA03-SS07-1109	1/5	N/A	5.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	5.5E-08	3.7E-04	ug/m^3	CAA03-SS06-1109	6/6	N/A	3.7E-04	N/A	N/A	N/A	N/A	NO	NTX
	86-73-7	Fluorene	2.8E-05 J	1.1E-01 J	ug/m^3	CAA03-SS06-1109	4/6	N/A	1.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	193-39-5	Indeno(1,2,3-cd)pyrene	3.1E-08	5.1E-05 J	ug/m^3	CAA03-SS06-1109	6/6	N/A	5.1E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	91-20-3	**Naphthalene**	**1.1E-04 J**	**4.3E-01 J**	**ug/m^3**	**CAA03-SS06-1109**	**4/6**	**N/A**	**4.3E-01**	**N/A**	**7.2E-02 C**	**N/A**	**N/A**	**YES**	**ASL**
	85-01-8	Phenanthrene	2.5E-04	6.9E-01	ug/m^3	CAA03-SS06-1109	5/6	N/A	6.9E-01	N/A	N/A	N/A	N/A	NO	NTX
	108-95-2	Phenol	4.4E-07	4.4E-07	ug/m^3	CAA03-SS06-1109	1/5	N/A	4.4E-07	N/A	2.1E+01 N	N/A	N/A	NO	BSL
	129-00-0	Pyrene	2.6E-05	1.3E-01	ug/m^3	CAA03-SS06-1109	6/6	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	1.7E-09 J	2.1E-07 J	ug/m^3	CAA03-SS06-1109	3/5	N/A	2.1E-07	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	3.8E-08 J	3.8E-08 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	3.8E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	9.6E-09 J	6.5E-08 J	ug/m^3	CAA03-SS06-1109	2/5	N/A	6.5E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.0E-07 J	1.0E-07 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	1.0E-07	N/A	4.8E-03 C	N/A	N/A	NO	BSL
	60-57-1	Dieldrin	4.8E-07 J	4.8E-07 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	4.8E-07	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.6E-06 J	1.6E-06 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	1.6E-06	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	1.4E-09 J	1.4E-09 J	ug/m^3	CAA03-SS01-1109	1/5	N/A	1.4E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	9.6E-08 J	9.6E-08 J	ug/m^3	CAA03-SS06-1109	1/5	N/A	9.6E-08	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	3.8E-09 J	6.3E-07	ug/m^3	CAA03-SS06-1109	2/5	N/A	6.3E-07	N/A	7.8E-03 C	N/A	N/A	NO	BSL

Table 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from	7429-90-5	Aluminum	3.9E-03	9.3E-03	ug/m^3	CAA03-SS01-1109	6/6	N/A	9.3E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
Surface Soil	7440-36-0	Antimony	5.1E-08 J	1.5E-07 L	ug/m^3	CAA03-SS06-1109	3/6	N/A	1.5E-07	N/A	N/A	N/A	N/A	NO	NTX
within Fenced	7440-38-2	Arsenic	2.1E-06	5.4E-06	ug/m^3	CAA03-SS01-1109	6/6	N/A	5.4E-06	N/A	5.7E-04 C	N/A	N/A	NO	BSL
Area of Youth	7440-39-3	Barium	2.4E-05	4.2E-05	ug/m^3	CAA03-SS07-1109	6/6	N/A	4.2E-05	N/A	5.2E-02 N	N/A	N/A	NO	BSL
Pond/Site 4	7440-41-7	Beryllium	2.3E-07	5.3E-07	ug/m^3	CAA03-SS06-1109	6/6	N/A	5.3E-07	N/A	1.0E-03 C	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	5.5E-08 J	5.1E-07 J	ug/m^3	CAA03-SS07-1109	5/6	N/A	5.1E-07	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	7440-70-2	Calcium	1.3E-03	1.4E-02	ug/m^3	03-SS06-1109 : CAS04-SS08-1	6/6	N/A	1.4E-02	N/A	N/A	N/A	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	3.9E-07	3.9E-07	ug/m^3	CAYP-SS02-1012	1/1	N/A	3.9E-07	N/A	1.1E-05 C	N/A	N/A	NO	BSL
	7440-47-3	Chromium	8.0E-06	1.8E-05 K	ug/m^3	CAA03-SS01-1109	6/6	N/A	1.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-48-4	Cobalt	1.1E-06	3.6E-06	ug/m^3	CAA03-SS07-1109	6/6	N/A	3.6E-06	N/A	2.7E-04 C	N/A	N/A	NO	BSL
	7440-50-8	Copper	3.9E-06 K	2.7E-05	ug/m^3	CAS04-SS08-1012	6/6	N/A	2.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	8.2E-03	1.4E-02	ug/m^3	CAYP-SS02-1012	6/6	N/A	1.4E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	6.9E-06 K	5.8E-04	ug/m^3	CAA03-SS06-1109	5/6	N/A	5.8E-04	N/A	1.5E-01 N	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	4.9E-04	3.0E-03	ug/m^3	CAA03-SS07-1109	6/6	N/A	3.0E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	3.9E-05	2.3E-04	ug/m^3	CAA03-SS07-1109	6/6	N/A	2.3E-04	N/A	5.2E-03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	7.4E-09 J	5.9E-08	ug/m^3	CAS04-SS08-1012	5/6	N/A	5.9E-08	N/A	3.1E-02 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	1.8E-06	6.6E-06	ug/m^3	CAA03-SS06-1109	6/6	N/A	6.6E-06	N/A	9.4E-03 C	N/A	N/A	NO	BSL
	7440-09-7	Potassium	3.1E-04	2.1E-03	ug/m^3	CAA03-SS07-1109	6/6	N/A	2.1E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	1.2E-07 J	6.2E-07	ug/m^3	CAA03-SS06-1109	4/6	N/A	6.2E-07	N/A	2.1E+00 N	N/A	N/A	NO	BSL
	7440-23-5	Sodium	1.2E-05 J	1.3E-04 K	ug/m^3	CAA03-SS06-1109	6/6	N/A	1.3E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	9.9E-06	2.0E-05	ug/m^3	CAYP-SS02-1012	6/6	N/A	2.0E-05	N/A	7.3E-03 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	1.6E-05 K	1.2E-04	ug/m^3	CAYP-SS01-1012	6/6	N/A	1.2E-04	N/A	N/A	N/A	N/A	NO	NTX

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as Cair = Csoil*1000 ug/mg*(1/PEF + 1/VF).
PEF = 1.36E+09 m3/kg. VF calculated for volatile constituents only, on Table 2.4a. PEF from USEPA's Supplemental Guidance for Developing Soil Levels for Superfund Sites, 2002.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential air RSLs.
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL value for cresols used for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chromium (III) insoluble salts used for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
ug/m^3 = micrograms per cubic meter
N/A = not available/not applicable

Table 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Surface Soil															
outside Fenced	78-93-3	2-Butanone	2.2E-02 J	2.4E-02 J	MG/KG	CAA03-SS09-1109	2/17	0.01124 - 0.034	2.4E-02	N/A	2.8E+03 N	1.0E+00	SSL	NO	BSL
Area of Site 4	67-64-1	Acetone	9.4E-02 J	6.4E-01 J	MG/KG	CAA03-SS09-1109	6/17	0.01124 - 0.034	6.4E-01	N/A	6.1E+03 N	2.4E+00	SSL	NO	BSL
	67-66-3	Chloroform	6.0E-04 J	9.0E-04 J	MG/KG	CAA03-SS09-1109	3/17	0.006 - 0.01479	9.0E-04	N/A	2.9E-01 C	5.3E-05	SSL	NO	BSL
	75-09-2	Methylene chloride	9.0E-03 J	1.2E-02 J	MG/KG	CAA03-SS04-1109	2/18	0.01124 - 0.034	1.2E-02	N/A	3.6E+01 N	2.5E-03	SSL	NO	BSL
	100-42-5	Styrene	1.0E-03 J	1.0E-02 J	MG/KG	CAA03-SS10-1109	4/17	0.005 - 0.01479	1.0E-02	N/A	6.3E+02 N	1.2E+00	SSL	NO	BSL
	108-88-3	Toluene	2.0E-03 J	3.0E-03 J	MG/KG	CAA03-SS10-1109	2/17	0.005 - 0.01479	3.0E-03	N/A	5.0E+02 N	5.9E-01	SSL	NO	BSL
	1330-20-7	Xylene, total	2.0E-03 J	2.0E-03 J	MG/KG	CAS004-4HA02-00-1199	1/17	0.01124 - 0.02	2.0E-03	N/A	6.3E+01 N	1.9E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	6.8E-03 J	4.8E-02	MG/KG	CAS04-SS09-1012	5/25	0.02 - 5.5	4.8E-02	N/A	2.3E+01 N	1.4E-01	SSL	NO	BSL
	83-32-9	Acenaphthene	3.0E-03 J	3.3E-01 J	MG/KG	CAS004-4HA02-00-1199	9/25	0.02 - 5.5	3.3E-01	N/A	3.4E+02 N	4.1E+00	SSL	NO	BSL
	208-96-8	Acenaphthylene	3.8E-03 J	2.4E-01	MG/KG	CAA03-SS02-1109	8/25	0.02 - 5.5	2.4E-01	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	1.7E-03 J	1.7E+00 J	MG/KG	CAS004-4HA06-00-1199	19/25	0.02 - 5.5	1.7E+00	N/A	1.7E+03 N	4.2E+01	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.0E-01 J	2.0E-01 J	MG/KG	CAA03-SS08P-1109	1/12	0.37 - 0.46	2.0E-01	N/A	7.8E+02 N	3.3E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**1.0E-02 J**	**8.8E+00**	**MG/KG**	**CAS004-4HA06-00-1199**	**22/25**	**0.02 - 6.1**	**8.8E+00**	N/A	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**4.4E-03 J**	**7.0E+00**	**MG/KG**	**CAS004-4HA06-00-1199**	**22/25**	**0.02 - 6.1**	**7.0E+00**	N/A	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**1.0E-02 J**	**6.8E+00**	**MG/KG**	**CAS004-4HA06-00-1199**	**22/25**	**0.02 - 6.1**	**6.8E+00**	N/A	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.5E-03 L	3.4E+00 J	MG/KG	CAS004-4HA06-00-1199	15/24	0.02 - 6.1	3.4E+00	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**3.7E-03 J**	**6.8E+00**	**MG/KG**	**CAS004-4HA06-00-1199**	**19/25**	**0.02 - 6.1**	**6.8E+00**	N/A	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**ASL**
	117-81-7	bis(2-Ethylhexyl)phthalate	6.6E-02 J	6.6E-02 J	MG/KG	CAS04-SS05-1109	1/18	0.049 - 5.5	6.6E-02	N/A	3.5E+01 C	1.1E+00	SSL	NO	BSL
	86-74-8	Carbazole	2.1E-03 J	2.5E-01 J	MG/KG	CAS004-4HA02-00-1199	12/18	0.021 - 5.5	2.5E-01	N/A	2.4E+01 C	3.2E-02	SSL	NO	BSL
	218-01-9	Chrysene	4.0E-03 J	8.6E+00	MG/KG	CAS004-4HA06-00-1199	22/25	0.02 - 6.1	8.6E+00	N/A	1.5E+01 C	1.1E+00	SSL	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**3.6E-03 J**	**1.4E+00 J**	**MG/KG**	**CAS004-4HA06-00-1199**	**15/25**	**0.02 - 5.5**	**1.4E+00**	N/A	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	206-44-0	Fluoranthene	1.4E-02 J	1.4E+01	MG/KG	CAS004-4HA06-00-1199	24/25	0.02 - 6.1	1.4E+01	N/A	2.3E+02 N	7.0E+01	SSL	NO	BSL
	86-73-7	Fluorene	4.7E-03 J	2.5E-01 J	MG/KG	CAS004-4HA02-00-1199	9/25	0.02 - 5.5	2.5E-01	N/A	2.3E+02 N	4.0E+00	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**9.8E-03 K**	**3.4E+00 J**	**MG/KG**	**CAS004-4HA06-00-1199**	**20/25**	**0.02 - 6.1**	**3.4E+00**	N/A	**1.5E-01 C**	**2.0E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	7.7E-03 J	1.3E-01	MG/KG	CAS04-SS09-1012	5/25	0.02 - 5.5	1.3E-01	N/A	3.6E+00 C	4.7E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	7.7E-03 J	5.5E+00	MG/KG	CAS004-4HA06-00-1199	22/25	0.02 - 6.1	5.5E+00	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	6.9E-03 J	1.1E+01	MG/KG	CAS004-4HA06-00-1199	24/25	0.02 - 6.1	1.1E+01	N/A	1.7E+02 N	9.5E+00	SSL	NO	BSL
	72-54-8	4,4'-DDD	2.3E-03 J	2.5E-02 J	MG/KG	CAA03-SS02-1109	5/18	0.0035 - 0.027	2.5E-02	N/A	2.0E+00 C	6.4E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	8.0E-04 J	8.3E-02	MG/KG	CAA03-SS02-1109	10/18	0.0035 - 0.027	8.3E-02	N/A	1.4E+00 C	4.6E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	1.6E-03 J	2.2E-01 K	MG/KG	CAS004-4HA05-00-1199	11/18	0.0035 - 0.028	2.2E-01	N/A	1.7E+00 C	6.7E-02	SSL	NO	BSL
	309-00-2	**Aldrin**	**3.3E-02 K**	**3.3E-02 K**	**MG/KG**	**CAS004-4HA05-00-1199**	**1/18**	**0.0018 - 0.014**	**3.3E-02**	N/A	**2.9E-02 C**	**6.5E-04**	**SSL**	**YES**	**ASL**
	5103-71-9	alpha-Chlordane	5.4E-04 J	9.9E-04 J	MG/KG	CAA03-SS02-1109	2/18	0.0018 - 0.014	9.9E-04	N/A	1.6E+00 C	1.3E-02	SSL	NO	BSL
	53469-21-9	**Aroclor-1242**	**1.0E+00 K**	**1.0E+00 K**	**MG/KG**	**CAS004-4HA05-00-1199**	**1/25**	**0.018 - 0.28**	**1.0E+00**	N/A	**2.2E-01 C**	**5.3E-03**	**SSL**	**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**1.9E-02 J**	**2.7E+00 K**	**MG/KG**	**CAS004-4HA05-00-1199**	**10/25**	**0.018 - 0.28**	**2.7E+00**	N/A	**2.2E-01 C**	**2.4E-02**	**SSL**	**YES**	**ASL**
	60-57-1	Dieldrin	1.4E-03 J	1.4E-03 J	MG/KG	CAA03-SS04-1109	1/18	0.0035 - 0.027	1.4E-03	N/A	3.0E-02 C	6.1E-05	SSL	NO	BSL

Table 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	959-98-8	Endosulfan I	9.1E-04 J	9.1E-04 J	MG/KG	CAA03-SS08P-1109	1/18	0.0018 - 0.014	9.1E-04	N/A	3.7E+01 N	N/A		NO	BSL
Surface Soil	33213-65-9	Endosulfan II	4.4E-03 J	5.7E-03 J	MG/KG	CAS004-4HA03-00-1199	2/18	0.0035 - 0.027	5.7E-03	N/A	3.7E+01 N	N/A		NO	BSL
outside Fenced	1031-07-8	Endosulfan sulfate	8.9E-03 J	8.9E-03 J	MG/KG	CAA03-SS02-1109	1/18	0.0035 - 0.027	8.9E-03	N/A	3.7E+01 N	N/A		NO	BSL
Area of Site 4	72-20-8	Endrin	3.5E-03 J	5.5E-02	MG/KG	CAA03-SS09-1109	8/18	0.0035 - 0.028	5.5E-02	N/A	1.8E+00 N	N/A		NO	BSL
	7421-93-4	Endrin aldehyde	1.0E-03 J	7.7E-02 K	MG/KG	CAS004-4HA05-00-1199	8/18	0.0035 - 0.028	7.7E-02	N/A	1.8E+00 N	N/A		NO	BSL
	53494-70-5	Endrin ketone	4.5E-03	8.7E-02 K	MG/KG	CAS004-4HA05-00-1199	2/18	0.0035 - 0.028	8.7E-02	N/A	1.8E+00 N	6.8E-02	SSL	NO	BSL
	58-89-9	gamma-BHC (Lindane)	8.2E-04 J	9.6E-03	MG/KG	CAA03-SS02-1109	2/18	0.0018 - 0.014	9.6E-03	N/A	5.2E-01 C	2.1E-04	SSL	NO	BSL
	5103-74-2	gamma-Chlordane	1.5E-02 K	1.5E-02 K	MG/KG	CAS004-4HA05-00-1199	1/18	0.0018 - 0.014	1.5E-02	N/A	1.6E+00 C	1.3E-02	SSL	NO	BSL
	7429-90-5	**Aluminum**	**4.0E+03**	**2.9E+04**	**MG/KG**	**CAS04-SS02-1109**	**25/25**	**19 - 64**	**2.9E+04**	**1.2E+04**	**7.7E+03 N**	**2.3E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	7.0E-02 L	6.7E-01 J	MG/KG	CAS004-4HA04-00-1199	17/25	0.077 - 18	6.7E-01	N/A	3.1E+00 N	2.7E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**1.0E+00**	**3.5E+02 J**	**MG/KG**	**CAS04-SS13-1012**	**25/25**	**0.38 - 3.2**	**3.5E+02**	**6.4E+00**	**6.1E-01 C**	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.1E+01	1.6E+02	MG/KG	CAS004-4HA04-00-1199	25/25	0.32 - 60.1	1.6E+02	5.3E+01	1.5E+03 N	1.2E+02	SSL	NO	BSL
	7440-41-7	Beryllium	1.9E-01 J	7.6E-01	MG/KG	CAS04-SS02-1109	19/25	0.32 - 1.5	7.6E-01	5.9E-01	1.6E+01 N	1.3E+01	SSL	NO	BSL
	7440-43-9	Cadmium	4.0E-02 J	3.3E+00	MG/KG	CAS004-4HA05-00-1199	9/25	0.07 - 2	3.3E+00	N/A	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.4E+02	8.4E+03	MG/KG	CAS004-4HA03-00-1199	25/25	5.4 - 1502.4	8.4E+03	2.3E+03	N/A	N/A		NO	NUT
	7440-47-3	Chromium	5.8E+00	6.3E+01 J	MG/KG	CAS04-SS13-1012	27/27	0.5 - 4	6.3E+01	1.8E+01	1.2E+04 N	2.8E+07	SSL	NO	BSL
	7440-48-4	**Cobalt**	**7.2E-01**	**1.2E+01 J**	**MG/KG**	**CAS04-SS13-1012**	**24/25**	**0.077 - 15**	**1.2E+01**	**9.9E+00**	**2.3E+00 N**	**2.1E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.8E+00 K	1.5E+02	MG/KG	CAS004-4HA05-00-1199	22/25	1.6 - 10	1.5E+02	4.3E+00	3.1E+02 N	2.2E+01	SSL	NO	BSL
	57-12-5	Cyanide	7.0E-02 L	1.3E-01 L	MG/KG	CAS004-4HA02D-00-1199	3/18	0.02 - 0.84	1.3E-01	N/A	2.2E+00 N	1.4E-02	SSL	NO	BSL
	7439-89-6	**Iron**	**3.5E+03**	**1.2E+05 J**	**MG/KG**	**CAS04-SS13-1012**	**25/25**	**6.4 - 40**	**1.2E+05**	**2.0E+04**	**5.5E+03 N**	**2.7E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	7.9E+00 K	1.3E+02	MG/KG	CAS004-4HA05-00-1199	23/25	0.32 - 2	1.3E+02	1.7E+01	4.0E+02 NL	1.4E+01	SSL	NO	BSL
	7439-95-4	Magnesium	3.4E+02	2.3E+03 K	MG/KG	CAS04-SS02-1109	25/25	3.8 - 1502.4	2.3E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**1.9E+01**	**5.1E+02 J**	**MG/KG**	**CAS04-SS13-1012**	**25/25**	**0.32 - 4.5**	**5.1E+02**	**3.2E+02**	**1.8E+02 N**	**2.1E+01**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	1.0E-02 J	8.8E-01	MG/KG	CAS004-4HA05-00-1199	25/25	0.027 - 0.2	8.8E-01	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
	7440-02-0	Nickel	1.8E+00 J	4.7E+01 J	MG/KG	CAS04-SS13-1012	22/25	0.64 - 12	4.7E+01	9.5E+00	1.5E+02 N	2.0E+01	SSL	NO	BSL
	7440-09-7	Potassium	2.6E+02	2.6E+03 K	MG/KG	CAS04-SS02-1109	25/25	64 - 1502.4	2.6E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	1.8E-01 J	1.0E+00 J	MG/KG	CAS004-4HA04-00-1199	16/25	0.38 - 4	1.0E+00	5.1E-01	3.9E+01 N	4.0E-01	SSL	NO	BSL
	7440-22-4	Silver	9.0E-02 J	2.1E+01 L	MG/KG	CAS004-4HA06-00-1199	8/25	0.64 - 4	2.1E+01	N/A	3.9E+01 N	6.0E-01	SSL	NO	BSL
	7440-23-5	Sodium	1.4E+01 K	5.0E+01 K	MG/KG	CAS04-SS02-1109	12/25	64 - 1502.4	5.0E+01	5.2E+02	N/A	N/A		NO	NUT
	7440-28-0	**Thallium**	**4.7E-01 L**	**1.1E+00 L**	**MG/KG**	**CAS004-4HA06-00-1199**	**2/25**	**0.15 - 6**	**1.1E+00**	N/A	**7.8E-02 N**	**1.1E-02**	**SSL**	**YES**	**ASL**
	7440-62-2	**Vanadium**	**8.6E+00**	**6.4E+01**	**MG/KG**	**CAS04-SS02-1109**	**25/25**	**0.38 - 15**	**6.4E+01**	**2.8E+01**	**3.9E+01 N**	**7.8E+01**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	9.7E+00	3.2E+02	MG/KG	CAS004-4HA05-00-1199	23/25	1.3 - 6	3.2E+02	2.7E+01	2.3E+03 N	2.9E+02	SSL	NO	BSL

Table 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background surface soil samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (III) insoluble salts used for chromium. Chromium (VI) not detected in the surface soil.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.
MG/KG = milligrams per kilogram
SSL = Risk Based Soil Screening Levels from RSL table (not adjusted for noncarcinogenic constituents)
N/A = not available/not applicable

Table 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration	Qualifier	Maximum [1] Concentration	Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from																		
Surface Soil	78-93-3	2-Butanone	1.4E-03	J	1.5E-03	J	ug/m^3	CAA03-SS09-1109	2/17	N/A	1.5E-03	N/A	5.2E+02	N	N/A		NO	BSL
outside Fenced	67-64-1	Acetone	5.3E-03	J	3.6E-02	J	ug/m^3	CAA03-SS09-1109	6/17	N/A	3.6E-02	N/A	3.2E+03	N	N/A		NO	BSL
Area of Site 4	67-66-3	Chloroform	1.8E-04	J	2.6E-04	J	ug/m^3	CAA03-SS09-1109	3/17	N/A	2.6E-04	N/A	1.1E-01	C	N/A		NO	BSL
	75-09-2	Methylene chloride	3.2E-03	J	4.2E-03	J	ug/m^3	CAA03-SS04-1109	2/18	N/A	4.2E-03	N/A	6.3E+01	N	N/A		NO	BSL
	100-42-5	Styrene	8.3E-05	J	8.3E-04	J	ug/m^3	CAA03-SS10-1109	4/17	N/A	8.3E-04	N/A	1.0E+02	N	N/A		NO	BSL
	108-88-3	Toluene	3.6E-04	J	5.4E-04	J	ug/m^3	CAA03-SS10-1109	2/17	N/A	5.4E-04	N/A	5.2E+02	N	N/A		NO	BSL
	1330-20-7	Xylene, total	2.7E-04	J	2.7E-04	J	ug/m^3	CAS004-4HA02-00-1199	1/17	N/A	2.7E-04	N/A	1.0E+01	N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	9.1E-05	J	6.4E-04		ug/m^3	CAS04-SS09-1012	5/25	N/A	6.4E-04	N/A	N/A		N/A		NO	NTX
	83-32-9	Acenaphthene	1.6E-05	J	1.8E-03	J	ug/m^3	CAS004-4HA02-00-1199	9/25	N/A	1.8E-03	N/A	N/A		N/A		NO	NTX
	208-96-8	Acenaphthylene	2.1E-05	J	1.3E-03		ug/m^3	CAA03-SS02-1109	8/25	N/A	1.3E-03	N/A	N/A		N/A		NO	NTX
	120-12-7	Anthracene	2.5E-06	J	2.5E-03	J	ug/m^3	CAS004-4HA06-00-1199	19/25	N/A	2.5E-03	N/A	N/A		N/A		NO	NTX
	100-52-7	Benzaldehyde	6.9E-03	J	6.9E-03	J	ug/m^3	CAA03-SS08P-1109	1/12	N/A	6.9E-03	N/A	N/A		N/A		NO	NTX
	56-55-3	Benzo(a)anthracene	7.4E-09	J	6.5E-06		ug/m^3	CAS004-4HA06-00-1199	22/25	N/A	6.5E-06	N/A	8.7E-03	C	N/A		NO	BSL
	50-32-8	Benzo(a)pyrene	3.2E-09	J	5.1E-06		ug/m^3	CAS004-4HA06-00-1199	22/25	N/A	5.1E-06	N/A	8.7E-04	C	N/A		NO	BSL
	205-99-2	Benzo(b)fluoranthene	7.4E-09	J	5.0E-06		ug/m^3	CAS004-4HA06-00-1199	22/25	N/A	5.0E-06	N/A	8.7E-03	C	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.8E-09	L	2.5E-06	J	ug/m^3	CAS004-4HA06-00-1199	15/24	N/A	2.5E-06	N/A	N/A		N/A		NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.7E-09	J	5.0E-06		ug/m^3	CAS004-4HA06-00-1199	19/25	N/A	5.0E-06	N/A	8.7E-03	C	N/A		NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	4.9E-08	J	4.9E-08	J	ug/m^3	CAS04-SS05-1109	1/18	N/A	4.9E-08	N/A	1.0E+00	C	N/A		NO	BSL
	86-74-8	Carbazole	1.5E-09	J	1.8E-07	J	ug/m^3	CAS004-4HA02-00-1199	12/18	N/A	1.8E-07	N/A	N/A		N/A		NO	NTX
	218-01-9	Chrysene	2.9E-09	J	6.3E-06		ug/m^3	CAS004-4HA06-00-1199	22/25	N/A	6.3E-06	N/A	8.7E-02	C	N/A		NO	BSL
	53-70-3	Dibenz(a,h)anthracene	2.6E-09	J	1.0E-06	J	ug/m^3	CAS004-4HA06-00-1199	15/25	N/A	1.0E-06	N/A	8.0E-04	C	N/A		NO	BSL
	206-44-0	Fluoranthene	1.0E-08	J	1.0E-05		ug/m^3	CAS004-4HA06-00-1199	24/25	N/A	1.0E-05	N/A	N/A		N/A		NO	NTX
	86-73-7	Fluorene	1.3E-05	J	6.9E-04	J	ug/m^3	CAS004-4HA02-00-1199	9/25	N/A	6.9E-04	N/A	N/A		N/A		NO	NTX
	193-39-5	Indeno(1,2,3-cd)pyrene	7.2E-09	K	2.5E-06	J	ug/m^3	CAS004-4HA06-00-1199	20/25	N/A	2.5E-06	N/A	8.7E-03	C	N/A		NO	BSL
	91-20-3	Naphthalene	1.3E-04	J	2.2E-03		ug/m^3	CAS04-SS09-1012	5/25	N/A	2.2E-03	N/A	7.2E-02	C	N/A		NO	BSL
	85-01-8	Phenanthrene	1.1E-05	J	8.1E-03		ug/m^3	CAS004-4HA06-00-1199	22/25	N/A	8.1E-03	N/A	N/A		N/A		NO	NTX
	129-00-0	Pyrene	2.2E-06	J	3.6E-03		ug/m^3	CAS004-4HA06-00-1199	24/25	N/A	3.6E-03	N/A	N/A		N/A		NO	NTX
	72-54-8	4,4'-DDD	1.7E-09	J	1.8E-08	J	ug/m^3	CAA03-SS02-1109	5/18	N/A	1.8E-08	N/A	3.5E-02	C	N/A		NO	BSL
	72-55-9	4,4'-DDE	5.9E-10	J	6.1E-08		ug/m^3	CAA03-SS02-1109	10/18	N/A	6.1E-08	N/A	2.5E-02	C	N/A		NO	BSL
	50-29-3	4,4'-DDT	1.2E-09	J	1.6E-07	K	ug/m^3	CAS004-4HA05-00-1199	11/18	N/A	1.6E-07	N/A	2.5E-02	C	N/A		NO	BSL
	309-00-2	Aldrin	2.4E-08	K	2.4E-08	K	ug/m^3	CAS004-4HA05-00-1199	1/18	N/A	2.4E-08	N/A	5.0E-04	C	N/A		NO	BSL
	5103-71-9	alpha-Chlordane	4.0E-10	J	7.3E-10	J	ug/m^3	CAA03-SS02-1109	2/18	N/A	7.3E-10	N/A	2.4E-02	C	N/A		NO	BSL
	53469-21-9	Aroclor-1242	7.4E-07	K	7.4E-07	K	ug/m^3	CAS004-4HA05-00-1199	1/25	N/A	7.4E-07	N/A	4.3E-03	C	N/A		NO	BSL
	11096-82-5	Aroclor-1260	1.4E-08	J	2.0E-06	K	ug/m^3	CAS004-4HA05-00-1199	10/25	N/A	2.0E-06	N/A	4.3E-03	C	N/A		NO	BSL
	60-57-1	Dieldrin	1.0E-09	J	1.0E-09	J	ug/m^3	CAA03-SS04-1109	1/18	N/A	1.0E-09	N/A	5.3E-04	C	N/A		NO	BSL

Table 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
	959-98-8	Endosulfan I	6.7E-10 J	6.7E-10 J	ug/m^3	CAA03-SS08P-1109	1/18	N/A	6.7E-10	N/A	N/A	N/A		NO	NTX
Emissions from Surface Soil outside Fenced Area of Site 4	33213-65-9	Endosulfan II	3.2E-09 J	4.2E-09 J	ug/m^3	CAS004-4HA03-00-1199	2/18	N/A	4.2E-09	N/A	N/A	N/A		NO	NTX
	1031-07-8	Endosulfan sulfate	6.5E-09 J	6.5E-09 J	ug/m^3	CAA03-SS02-1109	1/18	N/A	6.5E-09	N/A	N/A	N/A		NO	NTX
	72-20-8	Endrin	2.6E-09 J	4.0E-08	ug/m^3	CAA03-SS09-1109	8/18	N/A	4.0E-08	N/A	N/A	N/A		NO	NTX
	7421-93-4	Endrin aldehyde	7.4E-10 J	5.7E-08 K	ug/m^3	CAS004-4HA05-00-1199	8/18	N/A	5.7E-08	N/A	N/A	N/A		NO	NTX
	53494-70-5	Endrin ketone	3.3E-09	6.4E-08 K	ug/m^3	CAS004-4HA05-00-1199	2/18	N/A	6.4E-08	N/A	N/A	N/A		NO	NTX
	58-89-9	gamma-BHC (Lindane)	6.0E-10 J	7.1E-09	ug/m^3	CAA03-SS02-1109	2/18	N/A	7.1E-09	N/A	7.8E-03 C	N/A		NO	BSL
	5103-74-2	gamma-Chlordane	1.1E-08 K	1.1E-08 K	ug/m^3	CAS004-4HA05-00-1199	1/18	N/A	1.1E-08	N/A	2.4E-02 C	N/A		NO	BSL
	7429-90-5	Aluminum	2.9E-03	2.2E-02	ug/m^3	CAS04-SS02-1109	25/25	N/A	2.2E-02	N/A	5.2E-01 N	N/A		NO	BSL
	7440-36-0	Antimony	5.1E-08 L	4.9E-07 J	ug/m^3	CAS004-4HA04-00-1199	17/25	N/A	4.9E-07	N/A	N/A	N/A		NO	NTX
	7440-38-2	Arsenic	7.4E-07	2.5E-04 J	ug/m^3	CAS04-SS13-1012	25/25	N/A	2.5E-04	N/A	5.7E-04 C	N/A		NO	BSL
	7440-39-3	Barium	8.3E-06	1.2E-04	ug/m^3	CAS004-4HA04-00-1199	25/25	N/A	1.2E-04	N/A	5.2E-02 N	N/A		NO	BSL
	7440-41-7	Beryllium	1.4E-07 J	5.6E-07	ug/m^3	CAS04-SS02-1109	19/25	N/A	5.6E-07	N/A	1.0E-03 C	N/A		NO	BSL
	7440-43-9	Cadmium	2.9E-08 J	2.4E-06	ug/m^3	CAS004-4HA05-00-1199	9/25	N/A	2.4E-06	N/A	1.4E-03 C	N/A		NO	BSL
	7440-70-2	Calcium	1.0E-04	6.2E-03	ug/m^3	CAS004-4HA03-00-1199	25/25	N/A	6.2E-03	N/A	N/A	N/A		NO	NUT
	7440-47-3	Chromium	4.3E-06	4.6E-05 J	ug/m^3	CAS04-SS13-1012	27/27	N/A	4.6E-05	N/A	N/A	N/A		NO	NTX
	7440-48-4	Cobalt	5.3E-07	8.5E-06 J	ug/m^3	CAS04-SS13-1012	24/25	N/A	8.5E-06	N/A	2.7E-04 C	N/A		NO	BSL
	7440-50-8	Copper	1.3E-06 K	1.1E-04	ug/m^3	CAS004-4HA05-00-1199	22/25	N/A	1.1E-04	N/A	N/A	N/A		NO	NTX
	57-12-5	Cyanide	5.1E-08 L	9.6E-08 L	ug/m^3	CAS004-4HA02D-00-1199	3/18	N/A	9.6E-08	N/A	8.3E-02 N	N/A		NO	BSL
	7439-89-6	Iron	2.5E-03	8.5E-02 J	ug/m^3	CAS04-SS13-1012	25/25	N/A	8.5E-02	N/A	N/A	N/A		NO	NTX
	7439-92-1	Lead	5.8E-06 K	9.5E-05	ug/m^3	CAS004-4HA05-00-1199	23/25	N/A	9.5E-05	N/A	1.5E-01 N	N/A		NO	BSL
	7439-95-4	Magnesium	2.5E-04	1.7E-03 K	ug/m^3	CAS04-SS02-1109	25/25	N/A	1.7E-03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.4E-05	3.8E-04 J	ug/m^3	CAS04-SS13-1012	25/25	N/A	3.8E-04	N/A	5.2E-03 N	N/A		NO	BSL
	7439-97-6	Mercury	7.4E-09 J	6.5E-07	ug/m^3	CAS004-4HA05-00-1199	25/25	N/A	6.5E-07	N/A	3.1E-02 N	N/A		NO	BSL
	7440-02-0	Nickel	1.3E-06 J	3.4E-05 J	ug/m^3	CAS04-SS13-1012	22/25	N/A	3.4E-05	N/A	9.4E-03 C	N/A		NO	BSL
	7440-09-7	Potassium	1.9E-04	1.9E-03 K	ug/m^3	CAS04-SS02-1109	25/25	N/A	1.9E-03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	1.3E-07 J	7.4E-07 J	ug/m^3	CAS004-4HA04-00-1199	16/25	N/A	7.4E-07	N/A	2.1E+00 N	N/A		NO	BSL
	7440-22-4	Silver	6.6E-08 J	1.5E-05 L	ug/m^3	CAS004-4HA06-00-1199	8/25	N/A	1.5E-05	N/A	N/A	N/A		NO	NTX
	7440-23-5	Sodium	1.1E-05 K	3.6E-05 K	ug/m^3	CAS04-SS02-1109	12/25	N/A	3.6E-05	N/A	N/A	N/A		NO	NUT
	7440-28-0	Thallium	3.5E-07 L	8.1E-07 L	ug/m^3	CAS004-4HA06-00-1199	2/25	N/A	8.1E-07	N/A	N/A	N/A		NO	NTX
	7440-62-2	Vanadium	6.3E-06	4.7E-05	ug/m^3	CAS04-SS02-1109	25/25	N/A	4.7E-05	N/A	7.3E-03 N	N/A		NO	BSL
	7440-66-6	Zinc	7.1E-06	2.4E-04	ug/m^3	CAS004-4HA05-00-1199	23/25	N/A	2.4E-04	N/A	N/A	N/A		NO	NTX

Table 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as Cair = Csoil*1000 ug/mg*(1/PEF + 1/VF).
PEF = 1.36E+09 m3/kg. VF calculated for volatile constituents only, on Table 2.4a. PEF from USEPA's Supplemental Guidance for Developing Soil Levels for Superfund Sites, 2002.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential air RSLs.
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (III) insoluble salts used for chromium. Chromium (VI) not detected in the surface soil.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
ug/m^3 = micrograms per cubic meter
N/A = not available/not applicable

Table 2.4a
Calculation of Volatilization Factor - Soil
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)
2-Butanone	9.1E-02	2.3E-03	1.0E-05	4.5E+00	2.7E-02	2.2E+05	8.9E-05	1.6E+04
Acetone	1.1E-01	1.4E-03	1.2E-05	2.4E+00	1.4E-02	1.0E+06	7.1E-05	1.8E+04
Chloroform	7.7E-02	1.5E-01	1.1E-05	3.2E+01	1.9E-01	8.0E+03	1.9E-03	3.4E+03
Ethylbenzene	6.8E-02	3.2E-01	8.5E-06	4.5E+02	2.7E+00	1.7E+02	4.1E-04	7.3E+03
Methylene chloride	1.0E-01	1.3E-01	1.3E-05	2.2E+01	1.3E-01	1.3E+04	2.8E-03	2.8E+03
Styrene	7.1E-02	1.1E-01	8.8E-06	4.5E+02	2.7E+00	3.1E+02	1.5E-04	1.2E+04
Tetrachloroethene	5.0E-02	7.2E-01	9.5E-06	9.5E+01	5.7E-01	2.1E+02	2.4E-03	3.0E+03
Toluene	7.8E-02	2.7E-01	9.2E-06	2.3E+02	1.4E+00	5.3E+02	7.2E-04	5.5E+03
Xylene	8.5E-02	2.1E-01	9.9E-06	3.8E+02	2.3E+00	1.1E+02	3.9E-04	7.5E+03
1,1-Biphenyl	4.7E-02	1.3E-02	7.6E-06	5.1E+03	3.1E+01	6.9E+00	1.0E-06	1.5E+05
2-Methylnaphthalene	5.2E-02	2.1E-02	7.8E-06	2.5E+03	1.5E+01	2.5E+01	4.0E-06	7.5E+04
Acenaphthene	5.1E-02	7.5E-03	8.3E-06	5.0E+03	3.0E+01	3.9E+00	6.7E-07	1.8E+05
Acenaphthylene	5.1E-02	7.5E-03	8.3E-06	5.0E+03	3.0E+01	3.9E+00	6.7E-07	1.8E+05
Anthracene	3.9E-02	2.3E-03	7.9E-06	1.6E+04	9.8E+01	4.3E-02	4.9E-08	6.8E+05
Benzaldehyde	7.4E-02	1.1E-03	9.5E-06	1.1E+01	6.7E-02	7.0E+03	2.6E-05	2.9E+04
Dibenzofuran	4.1E-02	8.7E-03	7.4E-06	9.2E+03	5.5E+01	3.1E+00	3.5E-07	2.5E+05
Fluorene	4.4E-02	3.9E-03	7.9E-06	9.2E+03	5.5E+01	1.7E+00	1.7E-07	3.6E+05
Naphthalene	6.0E-02	1.8E-02	8.4E-06	1.5E+03	9.3E+00	3.1E+01	6.2E-06	6.0E+04
Phenanthrene	3.9E-02	2.3E-03	7.9E-06	1.6E+04	9.8E+01	4.3E-02	4.9E-08	6.8E+05
Pyrene	2.8E-02	4.9E-04	7.2E-06	5.4E+04	3.3E+02	1.4E-01	2.3E-09	3.1E+06

Volatilization factor (VF) = (m^3/kg)

$$\frac{\Theta/C * (3.14 * D_A * T)^{1/2} * 10^{-4}\ m^2/cm^2}{2 * \rho_b * D_A}$$

Apparent Diffusivity (D_A) = (cm^2/s)

$$\frac{[(\Theta_a^{10/3} * D_i * H' + \Theta_w^{10/3} * D_w)/n^2]}{(\rho_b * K_d + \Theta_w + \Theta_a * H')}$$

Parameters	Values
Θ/Cvol - Inverse of the geometric mean air concentration to th of a 0.5-acre-square source (Harrisburg, PA) (g/m2-s per kg/m3)	81.9
T - Exposure interval(s)	9.5E+08
ρ_b - Soil bulk density (g/cm^3)	1.5
Q_a - Air-filled soil porosity (L_{air}/L_{water}) = n - Q_w	0.28
n - Total soil porosity (Lpore/Lsoil) = 1 - (r_b/r_s)	0.43
Θ_w - Water-filled soil porosity (Lwater/Lsoil)	0.15
ρ_s - Soil particle density (g/cm^3)	2.65
f_{oc} - fraction organic carbon in soil (g/g)	0.006

Equations from USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
Physical/chemical properties from Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Acenapthene used as surrogate for acenaphthylene
Anthracene used as surrogate for phenanthrene

Table 2.5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Youth Pond															
	7429-90-5	Aluminum	9.4E+00 J	5.9E+01	UG/L	CAYP-SW01-1012	5/6	50 - 50	5.9E+01	2.3E+02	1.6E+04 N	N/A		NO	BSL
	7440-36-0	Antimony	1.2E-01 J	2.1E-01 J	UG/L	CAYP-SW05-1112	3/6	2 - 2	2.1E-01	N/A	6.0E+00 N	6.4E+02	NRWQC	NO	BSL
	7440-38-2	**Arsenic**	**1.2E+00 J**	**1.6E+00 J**	**UG/L**	**CAYP-SW01P-1012**	**6/6**	**20 - 20**	**1.6E+00**	**8.8E+00**	**4.5E-01 C**	**1.4E-01**	**NRWQC**	**YES**	**ASL**
	7440-39-3	Barium	9.5E+00 J	3.0E+01	UG/L	CAYP-SW06-1112	6/6	10 - 10	3.0E+01	2.7E+01	2.9E+03 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.8E-01 J	2.9E-01 J	UG/L	CAYP-SW04-1012	2/6	8 - 8	2.9E-01	8.0E-02	6.9E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	2.4E+04	9.5E+04	UG/L	CAYP-SW06-1112	6/6	12000 - 24000	9.5E+04	N/A	N/A	N/A		NO	NUT
	7440-48-4	Cobalt	2.9E-01 J	2.9E-01 J	UG/L	CAYP-SW06-1112	1/6	1 - 1	2.9E-01	N/A	4.7E+00 N	N/A		NO	BSL
	7440-50-8	Copper	2.4E-01 J	1.2E+00	UG/L	CAYP-SW05-1112	6/6	1 - 1	1.2E+00	N/A	6.2E+02 N	N/A		NO	BSL
	7439-89-6	Iron	3.5E+02	1.2E+03	UG/L	CAYP-SW02-1012	6/6	30 - 300	1.2E+03	2.6E+03	1.1E+04 N	N/A		NO	BSL
	7439-92-1	Lead	8.9E-01 J	8.9E-01 J	UG/L	CAYP-SW01-1012	1/6	1.2 - 1.2	8.9E-01	N/A	1.5E+01 N	N/A		NO	BSL
	7439-95-4	Magnesium	9.0E+02	2.2E+03	UG/L	CAYP-SW06-1112	6/6	240 - 240	2.2E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.3E+01	7.9E+01	UG/L	CAYP-SW03-1012	6/6	2.56 - 2.56	7.9E+01	1.6E+02	3.2E+02 N	1.0E+02	NRWQC	NO	BSL
	7440-02-0	Nickel	5.3E-01 J	2.2E+00 J	UG/L	CAYP-SW06-1112	6/6	2.4 - 2.4	2.2E+00	N/A	3.0E+02 N	4.6E+03	NRWQC	NO	BSL
	7440-09-7	Potassium	1.9E+03 J	2.4E+03 J	UG/L	CAYP-SW01-1012	6/6	3500 - 3500	2.4E+03	N/A	N/A	N/A		NO	NUT
	7440-22-4	Silver	4.2E-02 J	4.2E-02 J	UG/L	CAYP-SW04-1012	1/6	0.24 - 0.24	4.2E-02	N/A	7.1E+01 N	N/A		NO	BSL
	7440-23-5	Sodium	1.9E+03	6.3E+03	UG/L	CAYP-SW06-1112	6/6	240 - 240	6.3E+03	N/A	N/A	N/A		NO	NUT
	7440-66-6	Zinc	3.9E+00 J	1.3E+01 L	UG/L	CAYP-SW02-1012	4/6	12 - 12	1.3E+01	1.8E+00	4.7E+03 N	2.6E+04	NRWQC	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL of pooled values from Youth Pond, Upstream Pond, and Penniman Lake.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html.
The tap water value of 15 ug/L for lead is the action level provided in the Drinking Water Regulations and Health Advisories.
Tap water RSLs were multiplied by 10 for exposures to surface water. Concentrations based on noncarcinogenic health effects are adjusted to an HQ=0.1

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
N/A = not available/not applicable
UG/L = micrograms per liter
NRWQC = National Recommended Water Quality Criteria (USEPA, 2009) for consumption of organisms.

Table 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Upstream Pond															
	83-32-9	Acenaphthene	6.9E-02 J	6.9E-02 J	UG/L	CAA03-SW02-1209	1/8	0.19 - 0.2	6.9E-02	N/A	4.0E+02 N	9.9E+02	NRWQC	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**7.3E-02 J**	**2.4E-01 J**	**UG/L**	**CAS04-SW04-1209**	**2/8**	**0.19 - 0.2**	**2.4E-01**	**N/A**	**2.9E-02 C**	**1.8E-02**	**NRWQC**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	1.6E-01 J	1.6E-01 J	UG/L	CAS04-SW04-1209	1/8	0.19 - 0.2	1.6E-01	N/A	8.7E+01 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	1.5E-01 J	1.5E-01 J	UG/L	CAS04-SW04-1209	1/8	0.19 - 0.2	1.5E-01	N/A	2.9E+00 C	1.8E-02	NRWQC	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	7.5E-01 J	1.3E+00	UG/L	CAS04-SW03-1209	5/8	0.94 - 0.98	1.3E+00	N/A	4.8E+01 C	2.2E+00	NRWQC	NO	BSL
	218-01-9	Chrysene	8.0E-02 J	8.0E-02 J	UG/L	CAS04-SW04-1209	1/8	0.19 - 0.2	8.0E-02	N/A	2.9E+01 C	1.8E-02	NRWQC	NO	BSL
	206-44-0	Fluoranthene	1.3E-01 J	3.2E-01	UG/L	CAS04-SW04-1209	2/8	0.19 - 0.2	3.2E-01	9.5E-02	6.3E+02 N	1.4E+02	NRWQC	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	2.4E-01	UG/L	CAS04-SW04-1209	1/8	0.19 - 0.2	2.4E-01	N/A	2.9E-01 C	1.8E-02	NRWQC	NO	BSL
	91-20-3	Naphthalene	6.6E-02 J	6.6E-02 J	UG/L	CAA03-SW02-1209	1/8	0.19 - 0.2	6.6E-02	N/A	1.4E+00 C	N/A		NO	BSL
	85-01-8	Phenanthrene	6.8E-02 J	7.4E-02 J	UG/L	CAS04-SW04-1209	2/8	0.19 - 0.2	7.4E-02	1.4E-01	1.3E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	1.0E-01 J	2.9E-01	UG/L	CAS04-SW04-1209	2/8	0.19 - 0.2	2.9E-01	5.9E-02	8.7E+01 N	4.0E+03	NRWQC	NO	BSL
	7429-90-5	Aluminum	1.8E+02 J	2.7E+03	UG/L	CAS04-SW03-1209	5/8	300 - 300	2.7E+03	2.3E+02	1.6E+04 N	N/A		NO	BSL
	7440-38-2	**Arsenic**	**1.0E+01**	**1.0E+01**	**UG/L**	**CAS04-SW03-1209**	**1/8**	**5 - 5**	**1.0E+01**	**8.8E+00**	**4.5E-01 C**	**1.4E-01**	**NRWQC**	**YES**	**ASL**
	7440-39-3	Barium	2.3E+01	4.4E+01	UG/L	CAS04-SW03-1209	8/8	1 - 1	4.4E+01	2.7E+01	2.9E+03 N	N/A		NO	BSL
	7440-41-7	Beryllium	6.0E-02 J	1.2E-01 J	UG/L	CAS04-SW03-1209	2/8	1 - 1	1.2E-01	N/A	1.6E+01 N	N/A	NRWQC	NO	BSL
	7440-43-9	Cadmium	1.1E-01 J	8.2E-01 J	UG/L	CAS04-SW03-1209	7/8	1 - 1	8.2E-01	8.0E-02	6.9E+00 N	N/A	NRWQC	NO	BSL
	7440-70-2	Calcium	6.4E+04	1.1E+05	UG/L	CAS04-SW03-1209	8/8	50 - 50	1.1E+05	N/A	N/A	N/A		NO	NUT
	7440-48-4	Cobalt	2.8E-01 J	1.5E+00	UG/L	CAS04-SW03-1209	8/8	1 - 1	1.5E+00	N/A	4.7E+00 N	N/A		NO	BSL
	7440-50-8	Copper	3.0E+00	2.6E+01	UG/L	CAS04-SW03-1209	8/8	1 - 1	2.6E+01	N/A	6.2E+02 N	N/A		NO	BSL
	7439-89-6	**Iron**	**1.1E+03**	**1.9E+04**	**UG/L**	**CAS04-SW03-1209**	**8/8**	**100 - 100**	**1.9E+04**	**2.6E+03**	**1.1E+04 N**	N/A		**YES**	**ASL**
	7439-92-1	Lead	5.6E-01 J	5.9E+00	UG/L	CAS04-SW03-1209	6/8	1 - 1	5.9E+00	N/A	1.5E+01 N	N/A		NO	BSL
	7439-95-4	Magnesium	1.8E+03	3.0E+03	UG/L	CAS04-SW03-1209	8/8	50 - 50	3.0E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	4.3E+01	1.4E+02	UG/L	CAS04-SW03-1209	8/8	5 - 5	1.4E+02	1.6E+02	3.2E+02 N	1.0E+02	NRWQC	NO	BSL
	7440-02-0	Nickel	3.5E+00 J	3.5E+00 J	UG/L	CAS04-SW03-1209	1/8	40 - 40	3.5E+00	N/A	3.0E+02 N	4.6E+03	NRWQC	NO	BSL
	7440-09-7	Potassium	1.5E+03	1.9E+03	UG/L	CAS04-SW03-1209	8/8	1000 - 1000	1.9E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	8.6E-01 J	8.6E-01 J	UG/L	CAS04-SW04-1209	1/8	5 - 5	8.6E-01	2.5E+00	7.8E+01 N	4.2E+03	NRWQC	NO	BSL
	7440-22-4	Silver	5.0E-02 J	7.0E-02 J	UG/L	CAA03-SW04-1209	4/8	1 - 1	7.0E-02	N/A	7.1E+01 N	N/A		NO	BSL
	7440-23-5	Sodium	4.3E+03	6.0E+03	UG/L	CAS04-SW03-1209	8/8	1000 - 1000	6.0E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	8.3E+00	8.3E+00	UG/L	CAS04-SW03-1209	1/8	5 - 5	8.3E+00	1.5E+00	6.3E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	9.3E+00 J	6.5E+01	UG/L	CAS04-SW03-1209	8/8	25 - 25	6.5E+01	1.8E+00	4.7E+03 N	2.6E+04	NRWQC	NO	BSL

Table 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL of pooled values from Youth Pond, Upstream Pond, and Penniman Lake.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html.
Tap water RSLs were multiplied by 10 for exposures to surface water. Concentrations based on noncarcinogenic health effects are adjusted to an HQ=0.1
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
The tap water value of 15 ug/L for lead is the action level provided in the Drinking Water Regulations and Health Advisories.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
N/A = not available/not applicable
UG/L = micrograms per liter
NRWQC = National Recommended Water Quality Criteria (USEPA, 2009) for consumption of organisms.

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Channel															
to Upstream Pond	207-08-9	Benzo(k)fluoranthene	6.9E-02 J	6.9E-02 J	UG/L	CAS04-SW05-1209	1/5	0.19 - 0.19	6.9E-02	N/A	2.9E+00 C	1.8E-02	NRWQC	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	4.8E-01 J	1.5E+00	UG/L	CAS04-SW07P-1209 : CAS04-SW08-1209	3/5	0.94 - 0.96	1.5E+00	N/A	4.8E+01 C	2.2E+00	NRWQC	NO	BSL
	206-44-0	Fluoranthene	1.1E-01 J	1.8E-01 J	UG/L	CAS04-SW05-1209	2/5	0.19 - 0.19	1.8E-01	9.5E-02	6.3E+02 N	1.4E+02	NRWQC	NO	BSL
	85-01-8	Phenanthrene	6.9E-02 J	8.8E-02 J	UG/L	CAS04-SW05-1209	2/5	0.19 - 0.19	8.8E-02	1.4E-01	1.3E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	6.5E-02 J	2.9E-01 J	UG/L	CAS04-SW05-1209	3/5	0.19 - 0.19	2.9E-01	5.9E-02	8.7E+01 N	4.0E+03	NRWQC	NO	BSL
	7429-90-5	Aluminum	8.3E+01 J	1.1E+03	UG/L	CAS04-SW07P-1209	4/5	300 - 300	1.1E+03	2.3E+02	1.6E+04 N	N/A		NO	BSL
	7440-38-2	**Arsenic**	**5.8E+01**	**5.8E+01**	**UG/L**	**CAS04-SW09-1209**	**1/5**	**5 - 5**	**5.8E+01**	**8.8E+00**	**4.5E-01 C**	**1.4E-01**	**NRWQC**	**YES**	**ASL**
	7440-39-3	Barium	2.6E+01	4.3E+01	UG/L	CAS04-SW09-1209	5/5	1 - 1	4.3E+01	2.7E+01	2.9E+03 N	N/A		NO	BSL
	7440-41-7	Beryllium	6.0E-02 J	6.0E-02 J	UG/L	CAS04-SW07P-1209	1/5	1 - 1	6.0E-02	N/A	1.6E+01 N	N/A		NO	BSL
	7440-43-9	Cadmium	1.6E-01 J	4.5E-01 J	UG/L	CAS04-SW07P-1209	3/5	1 - 1	4.5E-01	8.0E-02	6.9E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.1E+05	1.3E+05	UG/L	CAS04-SW05-1209 : CAS04-SW07P-1209	5/5	50 - 50	1.3E+05	N/A	N/A	N/A		NO	NUT
	7440-48-4	Cobalt	2.9E-01 J	1.1E+00	UG/L	CAS04-SW07P-1209	5/5	1 - 1	1.1E+00	N/A	4.7E+00 N	N/A		NO	BSL
	7440-50-8	Copper	1.3E+00	7.0E+00	UG/L	CAS04-SW07P-1209	5/5	1 - 1	7.0E+00	N/A	6.2E+02 N	N/A		NO	BSL
	7439-89-6	**Iron**	**3.4E+02**	**3.0E+04**	**UG/L**	**CAS04-SW09-1209**	**5/5**	**100 - 100**	**3.0E+04**	**2.6E+03**	**1.1E+04 N**	**N/A**		**YES**	**ASL**
	7439-92-1	Lead	1.2E+00	2.6E+00	UG/L	CAS04-SW07P-1209	3/5	1 - 1	2.6E+00	N/A	1.5E+01 N	N/A		NO	BSL
	7439-95-4	Magnesium	2.0E+03	2.7E+03	UG/L	CAS04-SW09-1209	5/5	50 - 50	2.7E+03	N/A	N/A	N/A		NO	NUT
	7439-96-5	Manganese	1.2E+01	2.5E+02	UG/L	CAS04-SW09-1209	5/5	5 - 5	2.5E+02	1.6E+02	3.2E+02 N	1.0E+02	NRWQC	NO	BSL
	7440-02-0	Nickel	2.0E+00 J	2.0E+00 J	UG/L	CAS04-SW07P-1209	1/5	40 - 40	2.0E+00	N/A	3.0E+02 N	4.6E+03	NRWQC	NO	BSL
	7440-09-7	Potassium	1.7E+03	2.2E+03	UG/L	CAS04-SW07P-1209	3/5	1000 - 1000	2.2E+03	N/A	N/A	N/A		NO	NUT
	7782-49-2	Selenium	8.2E-01 J	1.3E+00 J	UG/L	CAS04-SW06-1209 : CAS04-SW07-1209	4/5	5 - 5	1.3E+00	2.5E+00	7.8E+01 N	4.2E+03	NRWQC	NO	BSL
	7440-23-5	Sodium	5.5E+03	8.3E+03	UG/L	CAS04-SW07-1209	5/5	1000 - 1000	8.3E+03	N/A	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	4.6E+00 J	4.6E+00 J	UG/L	CAS04-SW07P-1209	1/5	5 - 5	4.6E+00	1.5E+00	6.3E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	1.3E+01 J	3.1E+01	UG/L	CAS04-SW07P-1209	4/5	25 - 25	3.1E+01	1.8E+00	4.7E+03 N	2.6E+04	NRWQC	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL of pooled values from Youth Pond, Upstream Pond, and Penniman Lake.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html.
Tap water RSLs were multiplied by 10 for exposures to surface water. Concentrations based on noncarcinogenic health effects are adjusted to an HQ=0.1
RSL value for anthracene used as surrogate for phenanthrene.
The tap water value of 15 ug/L for lead is the action level provided in the Drinking Water Regulations and Health Advisories.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
N/A = not available/not applicable
UG/L = micrograms per liter
NRWQC = National Recommended Water Quality Criteria (USEPA, 2009) for consumption of organisms.

Table 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

Below Screening Level (BSL)

Table 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Channel to Upstream Pond	78-93-3	2-Butanone	1.4E-02 J	5.1E-02 J	MG/KG	CAS04-SD05-1209A	6/10	0.028 - 0.044	5.1E-02	5.9E-01	2.8E+04 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	8.7E-02 J	2.3E-01 J	MG/KG	CAS04-SD05-1209A	6/10	0.028 - 0.044	2.3E-01	2.5E+00	6.1E+04 N	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	1.0E-03 J	2.0E-03 J	MG/KG	CAS04-SD05-1209A	2/10	0.006 - 0.009	2.0E-03	2.6E-02	8.2E+02 N	N/A	N/A	NO	BSL
	127-18-4	Tetrachloroethene	2.0E-03 J	1.7E-02 J	MG/KG	CAS04-SD06-1209B	9/10	0.006 - 0.009	1.7E-02	N/A	8.6E+01 N	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	1.4E-05 J	1.2E-02 J	MG/KG	CAS04-SD05-1209A	6/13	0.000028 - 0.036	1.2E-02	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	208-96-8	Acenaphthylene	3.2E-06 J	3.0E-02 J	MG/KG	CAS04-SD05-1209A	6/13	0.000028 - 0.036	3.0E-02	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	120-12-7	Anthracene	3.1E-05	5.5E-02	MG/KG	CAS04-SD05-1209A	6/13	0.000028 - 0.036	5.5E-02	N/A	1.7E+04 N	N/A	N/A	NO	BSL
	56-55-3	Benzo(a)anthracene	1.1E-04	4.2E-01	MG/KG	CAS04-SD05-1209A	6/13	0.000028 - 0.036	4.2E-01	1.8E-02	1.5E+00 C	N/A	N/A	NO	BSL
	50-32-8	**Benzo(a)pyrene**	**1.2E-04**	**3.8E-01**	**MG/KG**	**CAS04-SD05-1209A**	**11/13**	**0.000028 - 0.036**	**3.8E-01**	**N/A**	**1.5E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	205-99-2	Benzo(b)fluoranthene	2.1E-04	6.9E-01	MG/KG	CAS04-SD05-1209A	6/13	0.000028 - 0.11	6.9E-01	3.0E-02	1.5E+00 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	5.6E-05	1.3E-01 L	MG/KG	CAS04-SD05-1209A	8/13	0.000028 - 0.036	1.3E-01	2.5E-02	1.7E+03 N	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	6.6E-05	1.5E-01	MG/KG	CAS04-SD05-1209A	9/13	0.000028 - 0.036	1.5E-01	N/A	1.5E+01 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	8.9E-02 J	1.0E-01 J	MG/KG	CAS04-SD05-1209B : CAS04-SD08-1209A	3/10	0.12 - 0.18	1.0E-01	N/A	3.5E+02 C	N/A	N/A	NO	BSL
	86-74-8	Carbazole	6.0E-03 J	2.3E-02 J	MG/KG	CAS04-SD05-1209A	8/10	0.024 - 0.036	2.3E-02	N/A	2.4E+01 C	N/A	N/A	NO	BSL
	218-01-9	Chrysene	1.6E-04	4.4E-01	MG/KG	CAS04-SD05-1209A	9/13	0.000028 - 0.036	4.4E-01	2.2E-02	1.5E+02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	2.0E-05 J	1.2E-01	MG/KG	CAS04-SD05-1209A	9/13	0.000028 - 0.036	1.2E-01	N/A	1.5E-01 C	N/A	N/A	NO	BSL
	206-44-0	Fluoranthene	2.4E-04 L	8.2E-01	MG/KG	CAS04-SD05-1209A	11/13	0.000028 - 0.11	8.2E-01	2.6E-02	2.3E+03 N	N/A	N/A	NO	BSL
	86-73-7	Fluorene	1.6E-05 J	3.0E-02 J	MG/KG	CAS04-SD05-1209A	4/13	0.000028 - 0.036	3.0E-02	N/A	2.3E+03 N	N/A	N/A	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	8.4E-05	3.0E-01	MG/KG	CAS04-SD05-1209A	11/13	0.000028 - 0.036	3.0E-01	N/A	1.5E+00 C	N/A	N/A	NO	BSL
	91-20-3	Naphthalene	5.6E-06 J	6.0E-03 J	MG/KG	CAS04-SD05-1209A	2/13	0.000028 - 0.036	6.0E-03	N/A	3.6E+01 C	N/A	N/A	NO	BSL
	87-86-5	Pentachlorophenol	1.9E-02 J	1.9E-02 J	MG/KG	CAS04-SD08-1209B	1/10	0.12 - 0.18	1.9E-02	N/A	8.9E+00 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	1.6E-04	3.4E-01	MG/KG	CAS04-SD05-1209A	11/13	0.000028 - 0.036	3.4E-01	3.0E-02	1.7E+04 N	N/A	N/A	NO	BSL
	129-00-0	Pyrene	2.4E-04	6.9E-01	MG/KG	CAS04-SD05-1209A	11/13	0.000028 - 0.11	6.9E-01	3.5E-02	1.7E+03 N	N/A	N/A	NO	BSL
	72-54-8	4,4'-DDD	1.6E-03 J	3.4E-02 J	MG/KG	CAS04-SD05-1209A	8/10	0.004 - 0.0059	3.4E-02	1.0E-02	2.0E+01 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.4E-03 J	1.3E-02 J	MG/KG	CAS04-SD09-1209A	7/10	0.004 - 0.0059	1.3E-02	4.4E-02	1.4E+01 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	8.3E-04 J	1.2E-01 J	MG/KG	CAS04-SD08-1209B	8/10	0.0041 - 0.02	1.2E-01	1.5E-03	1.7E+01 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	1.0E-03 J	1.0E-03 J	MG/KG	CAS04-SD08-1209A	1/10	0.0021 - 0.003	1.0E-03	N/A	2.9E-01 C	N/A	N/A	NO	BSL
	53469-21-9	Aroclor-1242	2.0E-02 J	5.2E-02 J	MG/KG	CAS04-SD06-1209A	2/13	0.021 - 0.032	5.2E-02	N/A	2.2E+00 C	N/A	N/A	NO	BSL
	11097-69-1	Aroclor-1254	6.3E-02	3.3E-01	MG/KG	CAS04-SD05-1209A	2/13	0.021 - 0.03	3.3E-01	N/A	1.1E+00 N	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	2.3E-02	5.0E-01	MG/KG	CAS04-SD16-1012	9/13	0.021 - 0.032	5.0E-01	N/A	2.2E+00 C	N/A	N/A	NO	BSL
	60-57-1	Dieldrin	3.3E-03 J	3.3E-03 J	MG/KG	CAS04-SD09-1209B	1/10	0.004 - 0.0059	3.3E-03	9.5E-04	3.0E-01 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	6.3E-04 J	9.4E-03 J	MG/KG	CAS04-SD05-1209A	4/10	0.0021 - 0.003	9.4E-03	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	33213-65-9	Endosulfan II	6.4E-04 J	9.4E-03 J	MG/KG	CAS04-SD05-1209A	6/10	0.004 - 0.0059	9.4E-03	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	1031-07-8	Endosulfan sulfate	2.0E-03 J	1.8E-02 J	MG/KG	CAS04-SD08-1209A	3/10	0.004 - 0.0059	1.8E-02	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	7421-93-4	Endrin aldehyde	3.6E-03 J	1.3E-02 J	MG/KG	CAS04-SD05-1209A	2/10	0.004 - 0.0059	1.3E-02	N/A	1.8E+01 N	N/A	N/A	NO	BSL
	58-89-9	gamma-BHC (Lindane)	7.8E-04 J	7.8E-04 J	MG/KG	CAS04-SD06-1209A	1/10	0.0021 - 0.003	7.8E-04	2.9E-03	5.2E+00 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	1.4E-03 J	1.2E-02 J	MG/KG	CAS04-SD05-1209A	5/10	0.0021 - 0.003	1.2E-02	1.1E-03	1.6E+01 C	N/A	N/A	NO	BSL
	76-44-8	Heptachlor	1.7E-03 J	1.7E-03 J	MG/KG	CAS04-SD05-1209A	1/10	0.0021 - 0.003	1.7E-03	N/A	1.1E+00 C	N/A	N/A	NO	BSL
	7429-90-5	Aluminum	3.2E+03	2.9E+04 J	MG/KG	CAS04-SD07-1209B	13/13	20 - 67	2.9E+04	2.3E+04	7.7E+04 N	N/A	N/A	NO	BSL
	7440-38-2	**Arsenic**	**2.3E+00 L**	**1.3E+01 L**	**MG/KG**	**CAS04-SD09-1209B**	**13/13**	**0.52 - 1.8**	**1.3E+01**	**1.1E+02**	**3.9E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-39-3	Barium	9.6E+00	6.8E+01 J	MG/KG	CAS04-SD07-1209B	10/13	0.32 - 1.1	6.8E+01	7.5E+01	1.5E+04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	2.1E-01 J	1.8E+00 J	MG/KG	CAS04-SD07-1209B	13/13	0.32 - 1.1	1.8E+00	1.4E+00	1.6E+02 N	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	7.0E-02 J	1.6E+00	MG/KG	CAS04-SD17-1012	13/13	0.065 - 0.44	1.6E+00	5.7E-01	7.0E+01 N	N/A	N/A	NO	BSL
	7440-70-2	Calcium	2.3E+03	2.0E+04	MG/KG	CAS04-SD08-1209B	12/13	4.1 - 14	2.0E+04	5.2E+01	N/A	N/A	N/A	NO	NUT

Table 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Channel to Upstream Pond (cont'd)	**7440-47-3**	**Chromium**	**9.4E+00 L**	**7.2E+01 L**	**MG/KG**	**CAS04-SD07-1209B**	**13/13**	**0.84 - 3.4**	**7.2E+01**	**5.2E+01**	**2.9E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	8.0E-01 J	6.8E+00 J	MG/KG	CAS04-SD07-1209B	13/13	0.84 - 6.7	6.8E+00	9.5E+00	2.3E+01 N	N/A	N/A	NO	BSL
	7440-50-8	Copper	2.5E+00 J	4.5E+01	MG/KG	CAS04-SD15-1012	13/13	0.21 - 2.2	4.5E+01	2.6E+01	3.1E+03 N	N/A	N/A	NO	BSL
	7439-89-6	Iron	4.3E+03	2.8E+04 J	MG/KG	CAS04-SD07-1209B	13/13	6.5 - 22	2.8E+04	4.6E+04	5.5E+04 N	N/A	N/A	NO	BSL
	7439-92-1	Lead	3.4E+00	2.3E+01	MG/KG	CAS04-SD17-1012	13/13	0.32 - 1.1	2.3E+01	4.2E+01	4.0E+02 NL	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	5.5E+02	4.1E+03	MG/KG	CAS04-SD07-1209B	13/13	3.2 - 11	4.1E+03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	1.6E+01	6.2E+01	MG/KG	CAS04-SD08-1209A	10/13	0.32 - 1.1	6.2E+01	3.7E+02	1.8E+03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	1.0E-02 J	1.3E-01	MG/KG	CAS04-SD17-1012	12/13	0.034 - 0.12	1.3E-01	2.6E-01	2.3E+01 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	2.7E+00 J	2.1E+01	MG/KG	CAS04-SD07-1209B	13/13	0.84 - 9	2.1E+01	1.7E+01	1.5E+03 N	N/A	N/A	NO	BSL
	7440-09-7	Potassium	5.0E+02 K	4.7E+03 K	MG/KG	CAS04-SD07-1209B	13/13	65 - 220	4.7E+03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	2.2E-01 J	8.7E-01 J	MG/KG	CAS04-SD05-1209A	9/13	0.65 - 2.2	8.7E-01	2.7E+00	3.9E+02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	3.4E-01 J	4.5E-01 J	MG/KG	CAS04-SD16-1012	3/13	0.84 - 3.4	4.5E-01	N/A	3.9E+02 N	N/A	N/A	NO	BSL
	7440-23-5	Sodium	1.4E+02	2.1E+02	MG/KG	CAS04-SD08-1209B	2/13	65 - 220	2.1E+02	N/A	N/A	N/A	N/A	NO	NUT
	7440-28-0	Thallium	5.0E-01 J	5.0E-01 J	MG/KG	CAS04-SD09-1209A	1/13	0.98 - 3.4	5.0E-01	6.5E+00	7.8E-01 N	N/A	N/A	NO	BSL
	7440-62-2	Vanadium	1.2E+01	8.2E+01	MG/KG	CAS04-SD07-1209B	13/13	0.84 - 5.6	8.2E+01	6.3E+01	3.9E+02 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	1.1E+01	1.3E+02	MG/KG	CAS04-SD17-1012	13/13	1.6 - 5.6	1.3E+02	1.1E+02	2.3E+04 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are UTL of pooled values from Youth Pond, Upstream Pond, and Penniman Lake.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Soil.
Residential soil RSLs were multiplied by 10 for exposures to sediment. Concentrations based on noncarcinogenic health effects are adjusted to a HQ=0.1
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.
RSL value for chlordane used as surrogate for gamma-chlordane.
RSL value for chromium(VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Youth Pond															
	78-93-3	2-Butanone	2.0E-03 J	3.3E-01 J	MG/KG	CAYP-SD12-1012	26/26	0.0035 - 0.056	3.3E-01	3.4E-01	2.8E+04 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	2.4E-02	1.2E+00 J	MG/KG	CAYP-SD12-1012	26/26	0.018 - 0.28	1.2E+00	1.4E+00	6.1E+04 N	N/A	N/A	NO	BSL
	108-87-2	Methylcyclohexane	7.0E-04 J	7.0E-04 J	MG/KG	CAYP-SSD08-1012	1/26	0.0014 - 0.022	7.0E-04	N/A	1.2E+02 SAT	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	6.5E-02	1.9E-01	MG/KG	CAYP-SSD11-1012	2/26	0.043 - 0.2	1.9E-01	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	208-96-8	Acenaphthylene	9.4E-02	3.2E-01	MG/KG	CAYP-SD11-1012	2/26	0.043 - 0.2	3.2E-01	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	120-12-7	Anthracene	4.4E-02 J	6.0E-01	MG/KG	CAYP-SD11-1012	3/26	0.043 - 0.2	6.0E-01	4.6E-03	1.7E+04 N	N/A	N/A	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**2.5E-02 J**	**2.4E+00**	**MG/KG**	**CAYP-SD11-1012**	**19/26**	**0.043 - 0.2**	**2.4E+00**	1.4E-02	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**1.9E-02 J**	**2.7E+00**	**MG/KG**	**CAYP-SD11-1012**	**17/26**	**0.043 - 0.2**	**2.7E+00**	1.5E-02	**1.5E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**3.2E-02 J**	**3.7E+00**	**MG/KG**	**CAYP-SD11-1012**	**17/26**	**0.043 - 0.2**	**3.7E+00**	2.5E-02	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	1.6E-02 J	1.6E+00	MG/KG	CAYP-SD11-1012	13/26	0.043 - 0.2	1.6E+00	1.2E-02	1.7E+03 N	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	2.9E-02 J	1.2E+00	MG/KG	CAYP-SD11-1012	11/26	0.043 - 0.2	1.2E+00	1.6E-02	1.5E+01 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	5.9E-01 J	5.9E-01 J	MG/KG	CAYP-SD01-1012	1/26	0.83 - 3.9	5.9E-01	N/A	3.5E+02 C	N/A	N/A	NO	BSL
	218-01-9	Chrysene	2.2E-02 J	2.4E+00	MG/KG	CAYP-SD11-1012	16/26	0.043 - 0.2	2.4E+00	2.2E-02	1.5E+02 C	N/A	N/A	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**1.7E-01**	**4.0E-01**	**MG/KG**	**CAYP-SD11-1012**	**2/26**	**0.043 - 0.2**	**4.0E-01**	**8.6E-03**	**1.5E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	117-84-0	Di-n-octylphthalate	4.4E-01 J	4.4E-01 J	MG/KG	CAYP-SD08-1012	1/26	0.83 - 3.9	4.4E-01	N/A	6.1E+02 N	N/A	N/A	NO	BSL
	206-44-0	Fluoranthene	3.5E-02 J	4.7E+00	MG/KG	CAYP-SD11-1012	17/26	0.043 - 0.2	4.7E+00	1.6E-02	2.3E+03 N	N/A	N/A	NO	BSL
	86-73-7	Fluorene	7.8E-02	1.3E-01	MG/KG	CAYP-SSD11-1012	2/26	0.043 - 0.2	1.3E-01	N/A	2.3E+03 N	N/A	N/A	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**2.7E-02 J**	**1.5E+00**	**MG/KG**	**CAYP-SD11-1012**	**7/26**	**0.043 - 0.2**	**1.5E+00**	**8.4E-03**	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	91-20-3	Naphthalene	3.6E-02 J	6.7E-02	MG/KG	CAYP-SD11-1012	2/26	0.043 - 0.2	6.7E-02	N/A	3.6E+01 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	5.2E-02 J	2.2E+00	MG/KG	CAYP-SD11-1012	11/26	0.043 - 0.2	2.2E+00	1.0E-02	1.7E+04 N	N/A	N/A	NO	BSL
	129-00-0	Pyrene	3.2E-02 J	4.5E+00	MG/KG	CAYP-SD11-1012	17/26	0.043 - 0.2	4.5E+00	1.6E-02	1.7E+03 N	N/A	N/A	NO	BSL
	72-54-8	4,4'-DDD	8.1E-03 L	1.1E-01 L	MG/KG	CAYP-SD05-1112	5/25	0.023 - 0.11	1.1E-01	4.2E-03	2.0E+01 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	1.4E-02 L	9.3E-02 L	MG/KG	CAYP-SD08-1012	2/25	0.023 - 0.11	9.3E-02	1.4E-02	1.4E+01 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	3.3E+00 L	3.3E+00 L	MG/KG	CAYP-SD05-1112	1/25	0.023 - 0.11	3.3E+00	1.5E-03	1.7E+01 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	4.8E-02 J	1.4E-01 J	MG/KG	CAYP-SD03-1012	7/25	0.1 - 0.48	1.4E-01	N/A	2.2E+00 C	N/A	N/A	NO	BSL
	7429-90-5	Aluminum	1.1E+03 K	2.0E+04	MG/KG	CAYP-SSD10-1012	26/26	29.8 - 203	2.0E+04	1.9E+04	7.7E+04 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	8.8E-01 J	3.7E+00 J	MG/KG	CAYP-SD12-1012	6/26	2.98 - 20.3	3.7E+00	1.7E+00	3.1E+01 N	N/A	N/A	NO	BSL
	7440-38-2	**Arsenic**	**9.8E-01 J**	**2.7E+02**	**MG/KG**	**CAYP-SD05-1112**	**26/26**	**2.98 - 46.6**	**2.7E+02**	**5.1E+01**	**6.1E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-39-3	Barium	9.9E+00	1.2E+02	MG/KG	CAYP-SSD09-1012	26/26	0.745 - 5.07	1.2E+02	7.5E+01	1.5E+04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.4E-01	1.4E+00	MG/KG	CAYP-SSD10-1012	26/26	0.0745 - 0.507	1.4E+00	9.6E-01	1.6E+02 N	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	1.0E-01 J	2.7E+00	MG/KG	CAYP-SD05-1112	25/26	0.149 - 1.01	2.7E+00	1.8E-01	7.0E+01 N	N/A	N/A	NO	BSL
	7440-70-2	Calcium	2.3E+02	3.4E+04	MG/KG	CAYP-SD13-1012	26/26	37.2 - 254	3.4E+04	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**3.1E+00**	**3.5E+01**	**MG/KG**	**CAYP-SSD10-1012**	**26/26**	**0.745 - 5.07**	**3.5E+01**	**2.6E+01**	**2.9E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	6.8E-01 J	4.7E+00	MG/KG	CAYP-SSD10-1012	26/26	0.745 - 5.07	4.7E+00	5.3E+00	2.3E+01 N	N/A	N/A	NO	BSL
	7440-50-8	Copper	2.3E+00	8.7E+01	MG/KG	CAYP-SD03-1012	26/26	0.745 - 5.07	8.7E+01	8.9E+00	3.1E+03 N	N/A	N/A	NO	BSL
	57-12-5	Cyanide	2.5E-01 J	3.3E-01 J	MG/KG	CAYP-SD02-1012	3/26	0.62 - 2.9	3.3E-01	N/A	2.2E+01 N	N/A	N/A	NO	BSL

Table 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration	Qualifier	Maximum [1] Concentration	Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Youth Pond	7439-89-6	Iron	2.1E+03		4.4E+04		MG/KG	CAYP-SD13-1012	26/26	14.9 - 172	4.4E+04	4.4E+04	5.5E+04	N	N/A	N/A	NO	BSL
(cont'd)	7439-92-1	Lead	4.2E+00	J	1.8E+02		MG/KG	CAYP-SD11-1012	26/26	2.98 - 22.4	1.8E+02	1.7E+01	4.0E+02	NL	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	1.8E+02		2.1E+03		MG/KG	CAYP-SSD10-1012	26/26	37.2 - 254	2.1E+03	N/A	N/A		N/A	N/A	NO	NUT
	7439-96-5	Manganese	9.3E+00		3.4E+02		MG/KG	CAYP-SD13-1012	26/26	1.49 - 17.2	3.4E+02	3.1E+02	1.8E+03	N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	5.2E-03	J	7.9E-01		MG/KG	CAYP-SD05-1112	23/26	0.0114 - 0.0544	7.9E-01	9.0E-02	2.3E+01	N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	8.7E-01	J	9.8E+00		MG/KG	CAYP-SD10-1012	26/26	0.745 - 5.07	9.8E+00	9.1E+00	1.5E+03	N	N/A	N/A	NO	BSL
	7440-09-7	Potassium	1.7E+02		1.8E+03		MG/KG	CAYP-SSD10-1012	26/26	74.5 - 507	1.8E+03	N/A	N/A		N/A	N/A	NO	NUT
	7782-49-2	Selenium	5.2E-01	J	6.5E+00	J	MG/KG	CAYP-SD12-1012	10/26	2.98 - 20.3	6.5E+00	2.5E+00	3.9E+02	N	N/A	N/A	NO	BSL
	7440-22-4	Silver	1.7E-01	J	1.8E-01	J	MG/KG	CAYP-SSD05-1112	2/26	0.745 - 5.07	1.8E-01	N/A	3.9E+02	N	N/A	N/A	NO	BSL
	7440-23-5	Sodium	1.5E+01	J	1.1E+02	J	MG/KG	CAYP-SSD10-1012	22/26	37.2 - 254	1.1E+02	N/A	N/A		N/A	N/A	NO	NUT
	7440-28-0	**Thallium**	**5.3E-01**	**J**	**1.9E+00**	**J**	**MG/KG**	**CAYP-SD05-1112**	**5/26**	**2.98 - 20.3**	**1.9E+00**	**6.5E+00**	**7.8E-01**	**N**	**N/A**	**N/A**	**YES**	**ASL**
	7440-62-2	Vanadium	3.5E+00		5.2E+01		MG/KG	CAYP-SD10-1012	26/26	1.49 - 10.1	5.2E+01	4.1E+01	3.9E+02	N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	1.1E+01		4.7E+02		MG/KG	CAYP-SD05-1112	26/26	1.49 - 23.3	4.7E+02	5.3E+01	2.3E+04	N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background UTL values are lower of surface and site 4/youth pond subsurface sediment background data sets.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Soil.
Residential soil RSLs were multiplied by 10 for exposures to sediment. Concentrations based on noncarcinogenic health effects are adjusted to a HQ=0.1
RSL value for cyclohexane used as a surrogate for methylcyclohexane.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chromium(VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
SAT = RSL exceeds soil saturation concentration, therefore, soil saturation concentration used as screening level
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 2.10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Upstream Pond															
	95-50-1	1,2-Dichlorobenzene	2.0E-03 J	2.0E-03 J	MG/KG	CAS04-SD04-1209B	1/24	0.005 - 0.55	2.0E-03	N/A	1.9E+03 N	N/A	N/A	NO	BSL
	106-46-7	1,4-Dichlorobenzene	6.0E-03 J	6.0E-03 J	MG/KG	CAS04-SD04-1209B	1/24	0.005 - 0.55	6.0E-03	N/A	2.4E+01 C	N/A	N/A	NO	BSL
	78-93-3	2-Butanone	9.0E-03 J	1.1E-01 J	MG/KG	CAA03-SD02-1209B	7/24	0.01389 - 0.11	1.1E-01	3.4E-01	2.8E+04 N	N/A	N/A	NO	BSL
	108-10-1	4-Methyl-2-pentanone	2.0E-03 J	2.0E-03 J	MG/KG	CAS004-4-SD03-01-1199	1/24	0.01389 - 0.11	2.0E-03	N/A	5.3E+03 N	N/A	N/A	NO	BSL
	67-64-1	Acetone	7.4E-02 J	4.2E-01 J	MG/KG	CAA03-SD02-1209B	9/24	0.01389 - 0.11	4.2E-01	1.4E+00	6.1E+04 N	N/A	N/A	NO	BSL
	75-15-0	Carbon disulfide	2.0E-03 J	3.0E-03 J	MG/KG	CAA03-SD04-1209A	2/24	0.005 - 0.021	3.0E-03	1.1E-02	8.2E+02 N	N/A	N/A	NO	BSL
	100-41-4	Ethylbenzene	2.0E-03 J	3.0E-03 J	MG/KG	CAS004-4-SD04-00-1199	2/24	0.005 - 0.021	3.0E-03	N/A	5.4E+01 C	N/A	N/A	NO	BSL
	79-20-9	Methyl acetate	4.0E-03 J	5.0E-03 J	MG/KG	CAA03-SD04-1209A	2/15	0.009 - 0.038	5.0E-03	N/A	7.8E+04 N	N/A	N/A	NO	BSL
	108-87-2	Methylcyclohexane	2.0E-03 J	4.0E-03 J	MG/KG	CAA03-SD02-1209A	2/16	0.005 - 0.021	4.0E-03	N/A	5.7E+02 N	N/A	N/A	NO	BSL
	127-18-4	Tetrachloroethene	5.0E-03 J	5.0E-02 J	MG/KG	CAA03-SD01-1209A	16/24	0.005 - 0.021	5.0E-02	N/A	8.6E+01 N	N/A	N/A	NO	BSL
	108-88-3	Toluene	3.0E-03 L	3.0E-03 L	MG/KG	CAS004-4-SD02-00-1199	1/24	0.005 - 0.021	3.0E-03	N/A	5.0E+03 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	1.0E-02 J	1.0E-02 J	MG/KG	CAS004-4-SD04-00-1199	1/24	0.01389 - 0.064	1.0E-02	N/A	6.3E+02 N	N/A	N/A	NO	BSL
	91-57-6	2-Methylnaphthalene	4.0E-03 L	2.9E-02 J	MG/KG	CAS04-SD18-1012	9/35	0.023 - 0.55	2.9E-02	N/A	2.3E+02 N	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	2.6E-03 J	3.0E-01	MG/KG	CAA03-SD02-1209A	18/35	0.023 - 0.55	3.0E-01	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	208-96-8	Acenaphthylene	1.8E-03 J	1.2E-01	MG/KG	CAS04-SD03-1209A	19/35	0.023 - 0.55	1.2E-01	N/A	3.4E+03 N	N/A	N/A	NO	BSL
	120-12-7	Anthracene	2.2E-03 J	2.6E-01	MG/KG	CAS04-SD03-1209A	25/35	0.023 - 0.55	2.6E-01	4.6E-03	1.7E+04 N	N/A	N/A	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**2.6E-02 J**	**1.5E+00**	**MG/KG**	**CAS04-SD04-1209A**	**25/35**	**0.023 - 1.2**	**1.5E+00**	**1.4E-02**	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**2.8E-02**	**2.1E+00**	**MG/KG**	**CAS04-SD03-1209A**	**28/35**	**0.023 - 1.6**	**2.1E+00**	**1.5E-02**	**1.5E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**5.7E-02 J**	**3.9E+00**	**MG/KG**	**CAS04-SD03-1209A**	**27/35**	**0.023 - 1.6**	**3.9E+00**	**2.5E-02**	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.7E-02 L	1.9E+00 L	MG/KG	CAS04-SD03-1209A	23/35	0.023 - 1.6	1.9E+00	1.2E-02	1.7E+03 N	N/A	N/A	NO	BSL
	207-08-9	Benzo(k)fluoranthene	2.4E-02 J	1.6E+00	MG/KG	CAS04-SD03-1209A	25/35	0.023 - 1.6	1.6E+00	1.6E-02	1.5E+01 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	5.9E-02 J	2.8E-01 J	MG/KG	CAS004-4-SD04-00D-1199	11/24	0.077 - 1.6	2.8E-01	N/A	3.5E+02 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	1.4E-01 J	1.4E-01 J	MG/KG	CAS04-SD03-1209B	1/24	0.38 - 1.4	1.4E-01	N/A	2.6E+03 C	N/A	N/A	NO	BSL
	86-74-8	Carbazole	1.9E-02 J	4.9E-02 K	MG/KG	CAS04-SD04-1209A	4/24	0.023 - 0.55	4.9E-02	N/A	2.4E+01 C	N/A	N/A	NO	BSL
	218-01-9	Chrysene	3.3E-03 J	2.7E+00	MG/KG	CAS04-SD03-1209A	34/35	0.023 - 1.6	2.7E+00	2.2E-02	1.5E+02 C	N/A	N/A	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**9.1E-03 J**	**6.6E-01**	**MG/KG**	**CAS04-SD03-1209A**	**16/35**	**0.023 - 0.59**	**6.6E-01**	**8.6E-03**	**1.5E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	6.1E-02 J	1.1E-01 J	MG/KG	CAS04-SD03-1209B	7/24	0.047 - 0.42	1.1E-01	N/A	6.1E+03 N	N/A	N/A	NO	BSL
	206-44-0	Fluoranthene	4.7E-03 J	1.8E+00	MG/KG	CAS04-SD04-1209A	35/35	0.023 - 1.2	1.8E+00	1.6E-02	2.3E+03 N	N/A	N/A	NO	BSL
	86-73-7	Fluorene	5.3E-03 J	4.2E-01	MG/KG	CAA03-SD02-1209A	12/35	0.023 - 0.55	4.2E-01	N/A	2.3E+03 N	N/A	N/A	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**3.4E-02**	**2.8E+00**	**MG/KG**	**CAS04-SD03-1209A**	**23/35**	**0.023 - 1.6**	**2.8E+00**	**8.4E-03**	**1.5E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	91-20-3	Naphthalene	4.0E-03 J	3.6E-01	MG/KG	CAS04-SD18-1012	11/35	0.023 - 0.55	3.6E-01	N/A	3.6E+01 C	N/A	N/A	NO	BSL
	87-86-5	Pentachlorophenol	2.4E-02 L	1.1E-01 J	MG/KG	CAA03-SD02-1209A	2/24	0.11 - 1.4	1.1E-01	N/A	8.9E+00 C	N/A	N/A	NO	BSL
	85-01-8	Phenanthrene	2.4E-03 J	5.9E-01	MG/KG	CAS04-SD23-1012	34/35	0.023 - 1.2	5.9E-01	1.0E-02	1.7E+04 N	N/A	N/A	NO	BSL
	129-00-0	Pyrene	4.6E-03 J	3.8E+00	MG/KG	CAS04-SD04-1209A	35/35	0.023 - 1.2	3.8E+00	1.6E-02	1.7E+03 N	N/A	N/A	NO	BSL
	72-54-8	4,4'-DDD	6.6E-03 J	3.8E-01 J	MG/KG	CAS04-SD03-1209A	8/24	0.0039 - 0.043	3.8E-01	4.2E-03	2.0E+01 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	9.2E-04 J	6.0E-01 J	MG/KG	CAS04-SD03-1209A	11/24	0.0039 - 0.1	6.0E-01	1.4E-02	1.4E+01 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	2.1E-03 J	1.6E+00 J	MG/KG	CAS04-SD03-1209A	10/24	0.0039 - 0.1	1.6E+00	1.5E-03	1.7E+01 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	8.5E-04 J	8.5E-04 J	MG/KG	CAA03-SD04-1209A	1/24	0.002 - 0.0071	8.5E-04	N/A	2.9E-01 C	N/A	N/A	NO	BSL

Table 2.10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Upstream Pond (cont'd)	5103-71-9	alpha-Chlordane	1.7E-03 J	1.7E-02 J	MG/KG	CAS04-SD03-1209A	4/24	0.002 - 0.0071	1.7E-02	N/A	1.6E+01 C	N/A	N/A	NO	BSL
	12672-29-6	Aroclor-1248	1.9E-02 L	3.3E-02 J	MG/KG	CAS004-4-SD02-01-1199	2/35	0.022 - 0.3	3.3E-02	N/A	2.2E+00 C	N/A	N/A	NO	BSL
	11097-69-1	**Aroclor-1254**	**2.4E-01**	**2.1E+01**	**MG/KG**	**CAS04-SD03-1209A**	**7/35**	**0.02 - 0.27**	**2.1E+01**	**N/A**	**1.1E+00 N**	**N/A**	**N/A**	**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**7.9E-03 J**	**2.4E+00**	**MG/KG**	**CAS04-SD10-1012 : CAS04-SD11-1012**	**30/35**	**0.021 - 0.28**	**2.4E+00**	**N/A**	**2.2E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	60-57-1	**Dieldrin**	**1.7E-03 J**	**1.4E+00 J**	**MG/KG**	**CAS04-SD03-1209A**	**6/24**	**0.0039 - 0.1**	**1.4E+00**	**9.5E-04**	**3.0E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	959-98-8	Endosulfan I	1.6E-03 J	5.8E-02 L	MG/KG	CAS04-SD03-1209A	4/24	0.002 - 0.0071	5.8E-02	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	33213-65-9	Endosulfan II	8.6E-04 J	8.3E-01 J	MG/KG	CAS04-SD03-1209A	6/24	0.0039 - 0.1	8.3E-01	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	1031-07-8	Endosulfan sulfate	3.2E-03 J	3.5E-02 J	MG/KG	CAA03-SD03-1209A	3/24	0.0039 - 0.014	3.5E-02	N/A	3.7E+02 N	N/A	N/A	NO	BSL
	72-20-8	Endrin	9.6E-03	1.2E+00	MG/KG	CAS04-SD03-1209A	6/24	0.0039 - 0.1	1.2E+00	8.6E-03	1.8E+01 N	N/A	N/A	NO	BSL
	7421-93-4	Endrin aldehyde	3.3E-03 J	2.9E-01 J	MG/KG	CAS04-SD03-1209A	4/24	0.0039 - 0.1	2.9E-01	N/A	1.8E+01 N	N/A	N/A	NO	BSL
	53494-70-5	Endrin ketone	1.4E-01 J	1.4E-01 J	MG/KG	CAS04-SD03-1209B	1/24	0.0039 - 0.086	1.4E-01	N/A	1.8E+01 N	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	7.5E-04 J	7.8E-01 J	MG/KG	CAS04-SD03-1209A	9/24	0.002 - 0.053	7.8E-01	1.1E-03	1.6E+01 C	N/A	N/A	NO	BSL
	76-44-8	Heptachlor	6.9E-04 J	6.9E-04 J	MG/KG	CAA03-SD04-1209A	1/24	0.002 - 0.0071	6.9E-04	N/A	1.1E+00 C	N/A	N/A	NO	BSL
	1024-57-3	**Heptachlor epoxide**	**7.1E-04 J**	**5.4E-01 J**	**MG/KG**	**CAS04-SD03-1209A**	**3/24**	**0.002 - 0.053**	**5.4E-01**	**N/A**	**5.3E-01 C**	**N/A**	**N/A**	**YES**	**ASL**
	72-43-5	Methoxychlor	2.3E-01 J	5.2E-01 J	MG/KG	CAS04-SD03-1209A	2/24	0.02 - 0.53	5.2E-01	N/A	3.1E+02 N	N/A	N/A	NO	BSL
	7429-90-5	Aluminum	1.5E+03 L	3.1E+04	MG/KG	CAS04-SD10P-1012	35/35	21 - 100	3.1E+04	1.9E+04	7.7E+04 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	1.0E-01 L	2.2E+00 L	MG/KG	CAA03-SD02-1209A	19/35	0.43 - 22.7	2.2E+00	1.7E+00	3.1E+01 N	N/A	N/A	NO	BSL
	7440-38-2	**Arsenic**	**9.8E-01 J**	**1.1E+02**	**MG/KG**	**CAS04-SD18-1012**	**35/35**	**0.64 - 3.8**	**1.1E+02**	**5.1E+01**	**6.1E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-39-3	Barium	8.4E+00	1.7E+02	MG/KG	CAS04-SD04-1209A	33/35	0.35 - 75.7	1.7E+02	7.5E+01	1.5E+04 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.4E-01 J	1.6E+00	MG/KG	CAS04-SD10P-1012	33/35	0.35 - 1.9	1.6E+00	9.6E-01	1.6E+02 N	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	5.0E-02 J	9.6E+00	MG/KG	CAS04-SD10P-1012	35/35	0.069 - 1.7	9.6E+00	1.8E-01	7.0E+01 N	N/A	N/A	NO	BSL
	7440-70-2	Calcium	7.0E+02	2.5E+04	MG/KG	CAS004-4-SED01-00-1199	33/35	4.4 - 1893.5	2.5E+04	N/A	N/A	N/A	N/A	NO	NUT
	7440-47-3	**Chromium**	**5.5E+00**	**5.7E+01**	**MG/KG**	**CAS04-SD10P-1012**	**35/35**	**0.8 - 4.1**	**5.7E+01**	**2.6E+01**	**2.9E+00 C**	**N/A**	**N/A**	**YES**	**ASL**
	7440-48-4	Cobalt	7.6E-01 J	9.6E+00	MG/KG	CAS04-SD10P-1012	30/35	0.8 - 18.9	9.6E+00	5.3E+00	2.3E+01 N	N/A	N/A	NO	BSL
	7440-50-8	Copper	2.8E+00	2.0E+02	MG/KG	CAS04-SD10P-1012	32/35	0.23 - 9.5	2.0E+02	8.9E+00	3.1E+03 N	N/A	N/A	NO	BSL
	7439-89-6	Iron	4.0E+03	4.4E+04	MG/KG	CAS04-SD10P-1012	35/35	6.9 - 37.9	4.4E+04	4.4E+04	5.5E+04 N	N/A	N/A	NO	BSL
	7439-92-1	**Lead**	**4.2E+00**	**4.2E+02**	**MG/KG**	**CAS04-SD03-1209A**	**35/35**	**0.4 - 1.6**	**4.2E+02**	**1.7E+01**	**4.0E+02 NL**	**N/A**	**N/A**	**YES**	**ASL**
	7439-95-4	Magnesium	4.1E+02 J	6.0E+03	MG/KG	CAS04-SD10P-1012	33/35	4.3 - 1893.5	6.0E+03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	1.2E+01	2.9E+02	MG/KG	CAS04-SD10P-1012	35/35	0.4 - 5.7	2.9E+02	3.1E+02	1.8E+03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	1.0E-02 J	6.2E-01	MG/KG	CAS04-SD03-1209A	28/35	0.02 - 0.2	6.2E-01	9.0E-02	2.3E+01 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	1.7E+00 J	2.7E+01	MG/KG	CAS04-SD10P-1012	34/35	0.8 - 15.1	2.7E+01	9.1E+00	1.5E+03 N	N/A	N/A	NO	BSL
	7440-09-7	Potassium	3.5E+02 K	4.4E+03 K	MG/KG	CAA03-SD03-1209B	31/35	69 - 1893.5	4.4E+03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	4.1E-01 J	1.4E+00 J	MG/KG	CAA03-SD02-1209A	3/35	0.59 - 3.3	1.4E+00	2.5E+00	3.9E+02 N	N/A	N/A	NO	BSL
	7440-22-4	Silver	5.0E-02 J	6.1E+00	MG/KG	CAS04-SD03-1209A	23/35	0.8 - 4.1	6.1E+00	N/A	3.9E+02 N	N/A	N/A	NO	BSL
	7440-23-5	Sodium	5.1E+01 J	2.4E+02 J	MG/KG	CAA03-SD02-1209A	11/35	69 - 1893.5	2.4E+02	N/A	N/A	N/A	N/A	NO	NUT
	7440-28-0	Thallium	1.5E-01 J	5.3E-01 J	MG/KG	CAA03-SD01-1209A	4/35	0.47 - 5	5.3E-01	6.5E+00	7.8E-01 N	N/A	N/A	NO	BSL
	7440-62-2	Vanadium	5.3E+00	7.3E+01	MG/KG	CAS04-SD10P-1012	35/35	0.8 - 18.9	7.3E+01	4.1E+01	3.9E+02 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	1.2E+01 K	6.3E+02	MG/KG	CAS04-SD10P-1012	32/35	1.6 - 7.6	6.3E+02	5.3E+01	2.3E+04 N	N/A	N/A	NO	BSL

Table 2.10

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background UTL values are lower of surface and site 4/youth pond subsurface sediment background data sets.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Soil.
Residential soil RSLs were multiplied by 10 for exposures to sediment. Concentrations based on noncarcinogenic health effects are adjusted to a HQ=0.1
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for n-hexane used as surrogate for methylcyclohexane.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium(VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.
RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted for sediment or by dividing by 10.
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 2.11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/Surface Soil
Exposure Medium: Sediment/Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Ditches															
to Youth Pond	78-93-3	2-Butanone	3.5E-03 J	6.4E-03	MG/KG	CAYP-SD14-1012	2/6	0.0047 - 0.0076	6.4E-03	N/A	2.8E+03 N	1.0E+00	SSL	NO	BSL
outside Fenced	67-64-1	Acetone	5.4E-03 J	4.5E-02	MG/KG	CAYP-SS03-1012	4/6	0.024 - 0.038	4.5E-02	N/A	6.1E+03 N	2.4E+00	SSL	NO	BSL
Area	108-88-3	Toluene	4.0E-04 J	4.0E-04 J	MG/KG	CAYP-SD14-1012	1/6	0.0019 - 0.0031	4.0E-04	N/A	5.0E+02 N	5.9E-01	SSL	NO	BSL
	83-32-9	Acenaphthene	3.6E-02 J	3.6E-02 J	MG/KG	CAYP-SS05-1012	1/6	0.039 - 0.043	3.6E-02	N/A	3.4E+02 N	4.1E+00	SSL	NO	BSL
	208-96-8	Acenaphthylene	7.0E-02	7.0E-02	MG/KG	CAYP-SS05-1012	1/6	0.039 - 0.043	7.0E-02	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	2.2E-02 J	1.2E-01	MG/KG	CAYP-SS05-1012	3/6	0.039 - 0.043	1.2E-01	N/A	1.7E+03 N	4.2E+01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**2.5E-02 J**	**4.5E-01**	**MG/KG**	**CAYP-SS05-1012**	**6/6**	**0.039 - 0.043**	**4.5E-01**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**1.7E-02 J**	**4.5E-01**	**MG/KG**	**CAYP-SS05-1012**	**6/6**	**0.039 - 0.043**	**4.5E-01**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**3.3E-02 J**	**8.1E-01**	**MG/KG**	**CAYP-SS05-1012**	**6/6**	**0.039 - 0.043**	**8.1E-01**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.8E-02 J	1.9E-01	MG/KG	CAYP-SS05-1012	5/6	0.039 - 0.043	1.9E-01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	Benzo(k)fluoranthene	3.0E-02 J	2.6E-01	MG/KG	CAYP-SS05-1012	5/6	0.039 - 0.043	2.6E-01	N/A	1.5E+00 C	3.5E-01	SSL	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.9E-01 J	3.5E+00 L	MG/KG	CAYP-SS05-1012	2/6	0.41 - 0.84	3.5E+00	N/A	3.5E+01 C	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	7.4E+00	7.4E+00	MG/KG	CAYP-SD15-1012	1/6	0.41 - 0.84	7.4E+00	N/A	2.6E+02 C	2.0E-01	SSL	NO	BSL
	218-01-9	Chrysene	1.7E-02 J	5.8E-01	MG/KG	CAYP-SS05-1012	6/6	0.039 - 0.043	5.8E-01	N/A	1.5E+01 C	1.1E+00	SSL	NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**5.4E-02**	**5.4E-02**	**MG/KG**	**CAYP-SS05-1012**	**1/6**	**0.039 - 0.043**	**5.4E-02**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	206-44-0	Fluoranthene	3.6E-02 J	1.1E+00	MG/KG	CAYP-SS05-1012	6/6	0.039 - 0.043	1.1E+00	N/A	2.3E+02 N	7.0E+01	SSL	NO	BSL
	86-73-7	Fluorene	6.7E-02	6.7E-02	MG/KG	CAYP-SS05-1012	1/6	0.039 - 0.043	6.7E-02	N/A	2.3E+02 N	4.0E+00	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**2.6E-02 J**	**1.9E-01**	**MG/KG**	**CAYP-SS05-1012**	**5/6**	**0.039 - 0.043**	**1.9E-01**	**N/A**	**1.5E-01 C**	**2.0E-01**	**SSL**	**YES**	**ASL**
	91-20-3	Naphthalene	2.8E-02 J	2.8E-02 J	MG/KG	CAYP-SS05-1012	1/6	0.039 - 0.043	2.8E-02	N/A	3.6E+00 C	4.7E-04	SSL	NO	BSL
	85-01-8	Phenanthrene	2.2E-02 J	7.0E-01	MG/KG	CAYP-SS05-1012	6/6	0.039 - 0.043	7.0E-01	N/A	1.7E+03 N	N/A		NO	BSL
	129-00-0	Pyrene	3.1E-02 J	8.9E-01	MG/KG	CAYP-SS05-1012	6/6	0.039 - 0.043	8.9E-01	N/A	1.7E+02 N	9.5E+00	SSL	NO	BSL
	50-29-3	4,4'-DDT	2.0E-02 J	2.0E-02 J	MG/KG	CAYP-SS05-1012	1/6	0.02 - 0.043	2.0E-02	N/A	1.7E+00 C	6.7E-02	SSL	NO	BSL
	11096-82-5	Aroclor-1260	2.6E-02 L	2.6E-02 L	MG/KG	CAYP-SS05-1012	1/6	0.048 - 0.1	2.6E-02	N/A	2.2E-01 C	2.4E-02	SSL	NO	BSL
	7429-90-5	Aluminum	1.6E+03	6.9E+03	MG/KG	CAYP-SS03P-1012	6/6	23.9 - 47.4	6.9E+03	1.2E+04	7.7E+03 N	2.3E+04	SSL	NO	BSL
	7440-36-0	Antimony	5.6E-01 J	5.6E-01 J	MG/KG	CAYP-SS05-1012	1/6	2.39 - 4.74	5.6E-01	1.1E+01	3.1E+00 N	2.7E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**1.5E+00 J**	**7.7E+00**	**MG/KG**	**CAYP-SS03-1012**	**6/6**	**2.39 - 4.74**	**7.7E+00**	**6.4E+00**	**6.1E-01 C**	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	9.3E+00	4.1E+01	MG/KG	CAYP-SS03-1012 : CAYP-SS03P-1012	6/6	0.598 - 1.18	4.1E+01	5.3E+01	1.5E+03 N	1.2E+02	SSL	NO	BSL
	7440-41-7	Beryllium	1.9E-01	7.5E-01	MG/KG	CAYP-SS03-1012	6/6	0.0598 - 0.118	7.5E-01	5.9E-01	1.6E+01 N	1.3E+01	SSL	NO	BSL
	7440-43-9	Cadmium	1.5E-01 J	1.0E+00	MG/KG	CAYP-SS03P-1012	6/6	0.12 - 0.237	1.0E+00	1.5E+00	7.0E+00 N	5.2E-01	SSL	NO	BSL
	7440-70-2	Calcium	2.3E+02	1.6E+03	MG/KG	CAYP-SS03P-1012	6/6	29.9 - 59.2	1.6E+03	2.3E+03	N/A	N/A		NO	NUT
	18540-29-9	Chromium (hexavalent)	2.4E-01 J	2.4E-01 J	MG/KG	CAYP-SS06-1012	1/2	0.48 - 0.5	2.4E-01	N/A	2.9E-01 C	5.9E-04	SSL	NO	BSL
	7440-47-3	Chromium	3.8E+00	1.8E+01	MG/KG	CAYP-SS05-1012	6/6	0.598 - 1.18	1.8E+01	1.8E+01	1.2E+04 N	2.8E+07	SSL	NO	BSL
	7440-48-4	**Cobalt**	**5.6E-01 J**	**2.7E+00**	**MG/KG**	**CAYP-SS04-1012**	**6/6**	**0.598 - 1.18**	**2.7E+00**	**9.9E+00**	**2.3E+00 N**	**2.1E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	3.3E+00	3.4E+01	MG/KG	CAYP-SS03P-1012	6/6	0.598 - 1.18	3.4E+01	4.3E+00	3.1E+02 N	2.2E+01	SSL	NO	BSL
	7439-89-6	**Iron**	**2.9E+03**	**1.1E+04**	**MG/KG**	**CAYP-SS04-1012**	**6/6**	**12 - 23.7**	**1.1E+04**	**2.0E+04**	**5.5E+03 N**	**2.7E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	Lead	5.1E+00	7.2E+01	MG/KG	CAYP-SS05-1012	6/6	3.1 - 12	7.2E+01	1.7E+01	4.0E+02 NL	1.4E+01	SSL	NO	BSL

Table 2.11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/Surface Soil
Exposure Medium: Sediment/Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Drainage Ditches	7439-95-4	Magnesium	2.0E+02	9.3E+02	MG/KG	CAYP-SS05-1012	6/6	29.9 - 59.2	9.3E+02	1.1E+03	N/A	N/A		NO	NUT
to Youth Pond	**7439-96-5**	**Manganese**	**1.2E+01**	**2.2E+02**	**MG/KG**	**CAYP-SS03-1012**	**6/6**	**1.2 - 2.37**	**2.2E+02**	**3.2E+02**	**1.8E+02 N**	**2.1E+01**	**SSL**	**YES**	**ASL**
outside Fenced	7439-97-6	Mercury	5.9E-03 J	3.5E-02	MG/KG	CAYP-SS05-1012	4/6	0.012 - 0.013	3.5E-02	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
Area	7440-02-0	Nickel	1.2E+00	5.6E+00	MG/KG	CAYP-SS03P-1012	6/6	0.598 - 1.18	5.6E+00	9.5E+00	1.5E+02 N	2.0E+01	SSL	NO	BSL
(cont'd)	7440-09-7	Potassium	1.8E+02	9.3E+02	MG/KG	CAYP-SS05-1012	6/6	59.8 - 118	9.3E+02	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	6.6E-01 J	6.6E-01 J	MG/KG	CAYP-SS05-1012	1/6	2.39 - 4.74	6.6E-01	5.1E-01	3.9E+01 N	4.0E-01	SSL	NO	BSL
	7440-23-5	Sodium	9.5E+00 J	2.1E+01 J	MG/KG	CAYP-SS03P-1012	4/6	29.9 - 59.2	2.1E+01	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	4.6E+00	1.5E+01	MG/KG	CAYP-SS05-1012	6/6	1.2 - 2.37	1.5E+01	2.8E+01	3.9E+01 N	N/A		NO	BSL
	7440-66-6	Zinc	5.2E+01	2.7E+02	MG/KG	CAYP-SS04-1012	6/6	1.2 - 2.37	2.7E+02	2.7E+01	2.3E+03 N	2.9E+02	SSL	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex background surface soil samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/whatsnew.html. Adjusted (noncarcinogenic RSLs adjusted by dividing by 10) residential soil RSLs.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chromium (III) insoluble salts used for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.
MG/KG = milligrams per kilogram
SSL = Soil Screening Levels from RSL table (not adjusted for noncarcinogenic constituents)
N/A = not available/not applicable

Table 2.12

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration	Qualifier	Maximum [1] Concentration	Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Fish from Youth Pond and Upstream Pond	**11097-69-1**	**Aroclor-1254**	**8.2E-02**	**J**	**8.2E-02**	**J**	**MG/KG**	**CAS04-TS13-F-1012**	**1/2**	**0.048 - 0.05**	**8.2E-02**	**N/A**	**1.6E-03**	**C**	**N/A**		**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**5.8E-02**		**4.2E-01**		**MG/KG**	**CAS04-TS13-F-1012**	**2/2**	**0.048 - 0.05**	**4.2E-01**	**N/A**	**1.6E-03**	**C**	**N/A**		**YES**	**ASL**
	PCBDioxin	**Dioxin-Like PCB TEQ**	**2.0E-06**		**8.1E-06**		**MG/KG**	**CAS04-TS13-F-1012**	**2/2**	**--**	**8.1E-06**	**N/A**	**2.4E-08**	**C**	**N/A**		**YES**	**ASL**
	7429-90-5	Aluminum	1.1E+00	J	1.1E+00	J	MG/KG	CAS04-TS13-F-1012	1/2	19 - 29	1.1E+00	N/A	1.4E+02	N	N/A		NO	BSL
	7440-39-3	Barium	5.0E-02	J	5.0E-02	J	MG/KG	CAYP-TS08-F-1012	1/2	0.19 - 0.32	5.0E-02	N/A	2.7E+01	N	N/A		NO	BSL
	7440-70-2	Calcium	2.8E+02		6.2E+02		MG/KG	CAS04-TS13-F-1012	2/2	6.4 - 9.7	6.2E+02	N/A	N/A		N/A		NO	NUT
	7440-47-3	**Chromium**	**1.4E-01**	**J**	**1.4E-01**	**J**	**MG/KG**	**CAYP-TS08-F-1012**	**1/2**	**0.48 - 0.64**	**1.4E-01**	**N/A**	**6.3E-03**	**C**	**N/A**		**YES**	**ASL**
	7440-50-8	Copper	2.2E-01	J	2.2E-01	J	MG/KG	CAYP-TS08-F-1012	1/2	0.29 - 1.6	2.2E-01	N/A	5.4E+00	N	N/A		NO	BSL
	7439-89-6	Iron	1.6E+00	J	1.6E+00	J	MG/KG	CAS04-TS13-F-1012	1/2	6.4 - 9.7	1.6E+00	N/A	9.5E+01	N	N/A		NO	BSL
	7439-95-4	Magnesium	2.7E+02		3.1E+02		MG/KG	CAS04-TS13-F-1012	2/2	6.4 - 9.7	3.1E+02	N/A	N/A		N/A		NO	NUT
	7439-97-6	**Mercury**	**3.0E-02**		**9.0E-02**		**MG/KG**	**CAYP-TS08-F-1012**	**2/2**	**0.022 - 0.027**	**9.0E-02**	**N/A**	**4.1E-02**	**N**	**N/A**		**YES**	**ASL**
	7440-09-7	Potassium	3.4E+03		3.6E+03		MG/KG	CAS04-TS13-F-1012	2/2	64 - 97	3.6E+03	N/A	N/A		N/A		NO	NUT
	7782-49-2	Selenium	1.5E-01	J	1.5E-01	J	MG/KG	CAYP-TS08-F-1012	1/2	0.48 - 0.64	1.5E-01	N/A	6.8E-01	N	N/A		NO	BSL
	7440-23-5	Sodium	5.8E+02		6.3E+02		MG/KG	CAYP-TS08-F-1012	2/2	64 - 97	6.3E+02	N/A	N/A		N/A		NO	NUT
	7440-66-6	Zinc	4.4E+00		4.6E+00		MG/KG	CAYP-TS08-F-1012	2/2	0.97 - 1.3	4.6E+00	N/A	4.1E+01	N	N/A		NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].
Fish screening level calculated using RSL calculation tool for fish and default assumptions. RSLs based on noncarcinogenic health effects are adjusted using HQ=0.1.
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
RSL value for 2,3,7,8-TCDD (dioxin) was used for Dioxin-like PCB TEQ concentration.
RSL value for Aroclor-1260 used for Nondioxin-like total PCB concentration.
RSL value for Aroclor-1254 used for total PCB concentration.
RSL value for Chromium(VI) used as surrogate for chromium.

[5] RSL value for Mercury (inorganic salts) used as surrogate for mercury.
Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic

Table 2.12a

PCB Concentration Calculations, Fish Tissue

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

StationID		CAS04-TS13				CAYP-TS08			
SampleID		CAS04-TS13-F-1012				CAYP-TS08-F-1012			
SampleDate		10/4/2012				10/5/2012			
AnalyteName									
Dioxin-Like PCBs	**TEF**			**TEC (Detects Only)**	**TEC (All; 1/2 ND)**			**TEC (Detects Only)**	**TEC (All; 1/2 ND)**
PCBCONG(PG/G)									
3,3',4,4'-Tetrachlorobiphenyl (77)	0.0001	240	X	0.024	0.024	10	X	0.001	0.001
3,4,4',5-Tetrachlorobiphenyl (81)	0.0003	20	X	0.006	0.006	100	U	0	0.03
2,3,3',4,4'-Pentachlorobiphenyl (105)	0.00003	3200		0.096	0.096	210		0.0063	0.0063
2,3,4,4',5-Pentachlorobiphenyl (114)	0.00003	110	X	0.0033	0.0033	9.5	X	0.000285	0.000285
2,3',4,4',5-Pentachlorobiphenyl (118)	0.00003	10000		0.3	0.3	770		0.0231	0.0231
2,3',4,4',5'-Pentachlorobiphenyl (123)	0.00003	150	X	0.0045	0.0045	6.4	X	0.000192	0.000192
3,3',4,4',5-Pentachlorobiphenyl (126)	0.1	63	J	6.3	6.3	16	X	1.6	1.6
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	0.00003	1400		0.042	0.042	330		0.0099	0.0099
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	0.03	42	X	1.26	1.26	9.8	X	0.294	0.294
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	0.00003	370		0.0111	0.0111	150		0.0045	0.0045
Congeners (156/157)	0.00003	1300		0.039	0.039	530		0.0159	0.0159
Dioxin TEQ Concentration - detects				**8.1**				**2.0**	
Dioxin TEQ Concentration - all (with 1/2 ND)					**8.1**				**2.0**

Table 2.13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil* from															
inside and	78-93-3	2-Butanone	8.0E-03 J	2.4E-02 J	MG/KG	CAA03-SS09-1109	3/40	0.008 - 0.034	2.4E-02	N/A	2.8E+03 N	1.0E+00	SSL	NO	BSL
outside the	67-64-1	Acetone	9.4E-02 J	6.4E-01 J	MG/KG	CAA03-SS09-1109	9/40	0.01124 - 0.043	6.4E-01	N/A	6.1E+03 N	2.4E+00	SSL	NO	BSL
Fenced Area	67-66-3	Chloroform	6.0E-04 J	1.0E-03 J	MG/KG	CAA03-SB05-1109A : CAS04-SB04-1109	6/40	0.006 - 0.02041	1.0E-03	N/A	2.9E-01 C	5.3E-05	SSL	NO	BSL
	100-41-4	Ethylbenzene	2.0E-03 J	2.0E-03 J	MG/KG	CAS004-4-HA02-02-1199	1/40	0.002 - 0.02041	2.0E-03	N/A	5.4E+00 C	1.5E-03	SSL	NO	BSL
	75-09-2	Methylene chloride	9.0E-03 J	1.6E-02 J	MG/KG	CAA03-SB03-1109A	7/41	0.007 - 0.034	1.6E-02	N/A	3.6E+01 N	2.5E-03	SSL	NO	BSL
	100-42-5	Styrene	1.0E-03 J	1.0E-02 J	MG/KG	CAA03-SS10-1109	5/40	0.005 - 0.02041	1.0E-02	N/A	6.3E+02 N	1.2E+00	SSL	NO	BSL
	127-18-4	Tetrachloroethene	3.0E-03 J	3.0E-03 J	MG/KG	CAS004-4-HA03-02-1199	1/40	0.003 - 0.02041	3.0E-03	N/A	8.6E+00 N	4.4E-03	SSL	NO	BSL
	108-88-3	Toluene	2.0E-03 J	5.0E-03 J	MG/KG	CAA03-SB08P-1109	5/40	0.005 - 0.02041	5.0E-03	N/A	5.0E+02 N	5.9E-01	SSL	NO	BSL
	1330-20-7	Xylene, total	2.0E-03 J	2.0E-03 J	MG/KG	CAS004-4HA02-00-1199	1/40	0.01124 - 0.02041	2.0E-03	N/A	6.3E+01 N	1.9E-01	SSL	NO	BSL
	92-52-4	1,1-Biphenyl	3.8E+00	3.8E+00	MG/KG	CAA03-SS06-1109	1/30	0.29 - 0.42	3.8E+00	N/A	5.1E+00 N	8.7E-03	SSL	NO	BSL
	105-67-9	2,4-Dimethylphenol	4.2E-01 J	4.2E-01 J	MG/KG	CAA03-SS06-1109	1/41	0.38 - 17	4.2E-01	N/A	1.2E+02 N	3.2E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	2.5E-03 J	1.2E-01 J	MG/KG	CAA03-SB01-1109	12/51	0.018 - 49	1.2E-01	N/A	2.3E+01 N	1.4E-01	SSL	NO	BSL
	95-48-7	2-Methylphenol	4.4E-01 J	4.4E-01 J	MG/KG	CAA03-SS06-1109	1/41	0.38 - 17	4.4E-01	N/A	3.1E+02 N	5.8E-01	SSL	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	1.2E+00	1.2E+00	MG/KG	CAA03-SS06-1109	1/30	0.51 - 0.73	1.2E+00	N/A	6.1E+02 N	1.2E+00	SSL	NO	BSL
	83-32-9	Acenaphthene	3.0E-03 J	2.4E+01 J	MG/KG	CAA03-SS06-1109	18/51	0.018 - 49	2.4E+01	N/A	3.4E+02 N	4.1E+00	SSL	NO	BSL
	208-96-8	Acenaphthylene	3.0E-03 J	4.1E+00 J	MG/KG	CAA03-SS06-1109	16/51	0.018 - 49	4.1E+00	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	1.7E-03 J	1.4E+02	MG/KG	CAA03-SS06-1109	28/51	0.018 - 49	1.4E+02	N/A	1.7E+03 N	4.2E+01	SSL	NO	BSL
	100-52-7	Benzaldehyde	2.0E-01 J	2.0E-01 J	MG/KG	CAA03-SS08P-1109	1/30	0.32 - 0.46	2.0E-01	N/A	7.8E+02 N	3.3E-01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**2.7E-03 J**	**1.8E+02**	**MG/KG**	**CAA03-SS06-1109**	**41/51**	**0.018 - 49**	**1.8E+02**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**4.4E-03 J**	**1.3E+02**	**MG/KG**	**CAA03-SS06-1109**	**36/51**	**0.018 - 49**	**1.3E+02**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**8.9E-03 J**	**2.0E+02**	**MG/KG**	**CAA03-SS06-1109**	**36/51**	**0.018 - 49**	**2.0E+02**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	2.4E-03 J	6.6E+01 L	MG/KG	CAA03-SS06-1109	27/48	0.019 - 49	6.6E+01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**3.7E-03 J**	**8.1E+01**	**MG/KG**	**CAA03-SS06-1109**	**31/51**	**0.018 - 49**	**8.1E+01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**ASL**
	117-81-7	**bis(2-Ethylhexyl)phthalate**	**4.1E-02 J**	**6.3E+01 J**	**MG/KG**	**CAS004-4-HA03-02-1199**	**5/41**	**0.049 - 240**	**6.3E+01**	**N/A**	**3.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**ASL**
	85-68-7	Butylbenzylphthalate	2.8E+00	2.8E+00	MG/KG	CAA03-SS07-1109	1/41	0.29 - 17	2.8E+00	N/A	2.6E+02 C	2.0E-01	SSL	NO	BSL
	86-74-8	**Carbazole**	**2.1E-03 J**	**1.2E+02 J**	**MG/KG**	**CAA03-SS06-1109**	**20/41**	**0.018 - 49**	**1.2E+02**	**N/A**	**2.4E+01 C**	**3.2E-02**	**SSL**	**YES**	**ASL**
	218-01-9	**Chrysene**	**2.2E-03 J**	**2.1E+02**	**MG/KG**	**CAA03-SS06-1109**	**35/51**	**0.018 - 49**	**2.1E+02**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**ASL**
	53-70-3	**Dibenz(a,h)anthracene**	**3.6E-03 J**	**2.2E+01 K**	**MG/KG**	**CAA03-SS06-1109**	**26/51**	**0.018 - 49**	**2.2E+01**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	132-64-9	**Dibenzofuran**	**1.2E-01 J**	**1.9E+01**	**MG/KG**	**CAA03-SS06-1109**	**3/41**	**0.29 - 17**	**1.9E+01**	**N/A**	**7.8E+00 N**	**1.1E-01**	**SSL**	**YES**	**ASL**
	84-74-2	Di-n-butylphthalate	9.0E+01 J	9.0E+01 J	MG/KG	CAS004-4-HA04-01-1199	1/41	0.048 - 240	9.0E+01	N/A	6.1E+02 N	1.7E+00	SSL	NO	BSL
	117-84-0	Di-n-octylphthalate	7.7E-01	7.7E-01	MG/KG	CAA03-SS07-1109	1/41	0.38 - 17	7.7E-01	N/A	6.1E+01 N	5.3E+01	SSL	NO	BSL
	206-44-0	**Fluoranthene**	**2.7E-03 J**	**5.0E+02**	**MG/KG**	**CAA03-SS06-1109**	**39/51**	**0.018 - 49**	**5.0E+02**	**N/A**	**2.3E+02 N**	**7.0E+01**	**SSL**	**YES**	**ASL**
	86-73-7	Fluorene	4.7E-03 J	4.0E+01 J	MG/KG	CAA03-SS06-1109	18/51	0.018 - 49	4.0E+01	N/A	2.3E+02 N	4.0E+00	SSL	NO	BSL
	118-74-1	Hexachlorobenzene	7.2E-03 J	7.2E-03 J	MG/KG	CAA03-SB08P-1109	1/41	0.018 - 49	7.2E-03	N/A	3.0E-01 C	5.3E-04	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**3.7E-03 J**	**6.9E+01 J**	**MG/KG**	**CAA03-SS06-1109**	**33/51**	**0.018 - 49**	**6.9E+01**	**N/A**	**1.5E-01 C**	**2.0E-01**	**SSL**	**YES**	**ASL**
	91-20-3	**Naphthalene**	**6.6E-03 J**	**2.6E+01 J**	**MG/KG**	**CAA03-SS06-1109**	**13/51**	**0.018 - 49**	**2.6E+01**	**N/A**	**3.6E+00 C**	**4.7E-04**	**SSL**	**YES**	**ASL**

Table 2.13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil* from	85-01-8	Phenanthrene	3.2E-03 J	4.7E+02	MG/KG	CAA03-SS06-1109	34/51	0.018 - 49	4.7E+02	N/A	1.7E+03 N	N/A		NO	BSL
inside and	108-95-2	Phenol	6.0E-01	6.0E-01	MG/KG	CAA03-SS06-1109	1/41	0.38 - 17	6.0E-01	N/A	1.8E+03 N	2.6E+00	SSL	NO	BSL
outside the	**129-00-0**	**Pyrene**	**3.8E-03 J**	**3.9E+02**	**MG/KG**	**CAA03-SS06-1109**	**39/51**	**0.018 - 49**	**3.9E+02**	**N/A**	**1.7E+02 N**	**9.5E+00**	**SSL**	**YES**	**ASL**
Fenced Area	72-54-8	4,4'-DDD	1.1E-03 J	2.8E-01 J	MG/KG	CAA03-SS06-1109	17/41	0.0032 - 0.078	2.8E-01	N/A	2.0E+00 C	6.4E-03	SSL	NO	BSL
(cont'd)	72-55-9	4,4'-DDE	8.0E-04 J	8.3E-02	MG/KG	CAA03-SS02-1109	20/41	0.0032 - 0.078	8.3E-02	N/A	1.4E+00 C	4.6E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	1.6E-03 J	2.2E-01 K	MG/KG	CAS004-4HA05-00-1199	22/41	0.0032 - 0.15	2.2E-01	N/A	1.7E+00 C	6.7E-02	SSL	NO	BSL
	309-00-2	**Aldrin**	**1.1E-03 J**	**3.3E-02 K**	**MG/KG**	**CAS004-4HA05-00-1199**	**3/41**	**0.0016 - 0.04**	**3.3E-02**	**N/A**	**2.9E-02 C**	**6.5E-04**	**SSL**	**YES**	**ASL**
	5103-71-9	alpha-Chlordane	5.4E-04 J	2.4E-03 J	MG/KG	CAS004-4-HA05-01-1199	4/41	0.0016 - 0.04	2.4E-03	N/A	1.6E+00 C	1.3E-02	SSL	NO	BSL
	53469-21-9	**Aroclor-1242**	**1.0E+00 K**	**2.3E+00 L**	**MG/KG**	**CAS004-4-HA05-01-1199**	**2/51**	**0.016 - 2.3**	**2.3E+00**	**N/A**	**2.2E-01 C**	**5.3E-03**	**SSL**	**YES**	**ASL**
	11096-82-5	**Aroclor-1260**	**1.9E-02 J**	**2.7E+00 K**	**MG/KG**	**CAS004-4HA05-00-1199**	**13/51**	**0.016 - 1.6**	**2.7E+00**	**N/A**	**2.2E-01 C**	**2.4E-02**	**SSL**	**YES**	**ASL**
	319-86-8	delta-BHC	1.4E-03 J	1.4E-01 J	MG/KG	CAA03-SS06-1109	2/41	0.0016 - 0.04	1.4E-01	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**6.5E-04 J**	**6.5E-01 J**	**MG/KG**	**CAA03-SS06-1109**	**8/41**	**0.0032 - 0.027**	**6.5E-01**	**N/A**	**3.0E-02 C**	**6.1E-05**	**SSL**	**YES**	**ASL**
	959-98-8	Endosulfan I	9.1E-04 J	2.2E+00 J	MG/KG	CAA03-SS06-1109	2/41	0.0016 - 0.014	2.2E+00	N/A	3.7E+01 N	N/A		NO	BSL
	33213-65-9	Endosulfan II	4.4E-03 J	6.5E-03 K	MG/KG	CAS004-4-HA03-02-1199	3/41	0.0032 - 0.078	6.5E-03	N/A	3.7E+01 N	N/A		NO	BSL
	1031-07-8	Endosulfan sulfate	1.9E-03 J	9.2E-03 J	MG/KG	CAA03-SB07-1109	3/41	0.0032 - 0.078	9.2E-03	N/A	3.7E+01 N	N/A		NO	BSL
	72-20-8	Endrin	3.5E-03 J	1.3E-01 J	MG/KG	CAA03-SS06-1109	12/41	0.0032 - 0.078	1.3E-01	N/A	1.8E+00 N	6.8E-02	SSL	NO	BSL
	7421-93-4	Endrin aldehyde	1.0E-03 J	7.7E-02 K	MG/KG	CAS004-4HA05-00-1199	8/41	0.0032 - 0.078	7.7E-02	N/A	1.8E+00 N	6.8E-02	SSL	NO	BSL
	53494-70-5	Endrin ketone	8.8E-04 J	8.7E-02 K	MG/KG	CAS004-4HA05-00-1199	5/41	0.0032 - 0.078	8.7E-02	N/A	1.8E+00 N	6.8E-02	SSL	NO	BSL
	58-89-9	**gamma-BHC (Lindane)**	**5.7E-04 J**	**8.6E-01**	**MG/KG**	**CAA03-SS06-1109**	**8/41**	**0.0018 - 0.078**	**8.6E-01**	**N/A**	**5.2E-01 C**	**2.1E-04**	**SSL**	**YES**	**ASL**
	5103-74-2	gamma-Chlordane	1.0E-03 J	2.3E-02 J	MG/KG	CAA03-SB07-1109	4/41	0.016 - 0.040	2.3E-02	N/A	1.6E+00 C	1.3E-02	SSL	NO	BSL
	76-44-8	Heptachlor	9.9E-03 J	9.9E-03 J	MG/KG	CAS004-4-HA05-01-1199	1/41	0.0016 - 0.04	9.9E-03	N/A	1.1E-01 C	1.4E-04	SSL	NO	BSL
	72-43-5	Methoxychlor	2.5E-02 J	2.5E-02 J	MG/KG	CAS004-4-HA05-01-1199	1/41	0.016 - 0.4	2.5E-02	N/A	3.1E+01 N	1.5E+00	SSL	NO	BSL
	7429-90-5	**Aluminum**	**3.6E+03 L**	**3.2E+04**	**MG/KG**	**CAS04-SB07-1012**	**51/51**	**19 - 9660**	**3.2E+04**	**1.2E+04**	**7.7E+03 N**	**2.3E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	4.0E-02 J	6.7E-01 J	MG/KG	CAS004-4HA04-00-1199	35/51	0.065 - 18	6.7E-01	N/A	3.1E+00 N	2.7E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**6.2E-01**	**3.5E+02 J**	**MG/KG**	**CAS04-SS13-1012**	**51/51**	**0.32 - 4.2**	**3.5E+02**	**5.5E+00**	**6.1E-01 C**	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	1.1E+01	2.5E+02	MG/KG	CAS004-4-HA04-01-1199	51/51	0.31 - 247	2.5E+02	5.3E+01	1.5E+03 N	1.2E+02	SSL	NO	BSL
	7440-41-7	Beryllium	1.9E-01 J	9.5E-01	MG/KG	CAA03-SB07-1109	40/51	0.31 - 1.5	9.5E-01	5.9E-01	1.6E+01 N	1.3E+01	SSL	NO	BSL
	7440-43-9	Cadmium	3.0E-02 J	3.3E+00	MG/KG	CAS004-4HA05-00-1199	18/51	0.07 - 2.2	3.3E+00	N/A	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.1E+02	1.9E+04	MG/KG	CAA03-SS06-1109 : CAS04-SS08-1012	51/51	4.6 - 5970	1.9E+04	2.3E+03	N/A	N/A		NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**4.3E-01 J**	**4.3E-01 J**	**MG/KG**	**CAS04-SB16-1012**	**1/4**	**0.42 - 0.49**	**4.3E-01**	**N/A**	**2.9E-01 C**	**5.9E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	5.8E+00	6.3E+01 J	MG/KG	CAS04-SS13-1012	55/55	0.5 - 29.2	6.3E+01	1.8E+01	1.2E+04 N	2.8E+07	SSL	NO	BSL
	7440-48-4	**Cobalt**	**7.2E-01**	**1.2E+01 J**	**MG/KG**	**CAS04-SS13-1012**	**50/51**	**0.065 - 15**	**1.2E+01**	**5.2E+00**	**2.3E+00 N**	**2.1E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	1.4E+00 J	1.5E+02	MG/KG	CAS004-4HA05-00-1199	45/51	1.6 - 40.4	1.5E+02	3.2E+00	3.1E+02 N	2.2E+01	SSL	NO	BSL
	57-12-5	Cyanide	7.0E-02 L	4.4E-01 L	MG/KG	CAS004-4-HA04-01-1199	4/41	0.02 - 0.84	4.4E-01	N/A	2.2E+00 N	1.4E-02	SSL	NO	BSL
	7439-89-6	**Iron**	**3.4E+03**	**1.2E+05 J**	**MG/KG**	**CAS04-SS13-1012**	**51/51**	**6.4 - 28000**	**1.2E+05**	**2.0E+04**	**5.5E+03 N**	**2.7E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	**Lead**	**3.8E+00**	**7.9E+02**	**MG/KG**	**CAA03-SS06-1109**	**47/51**	**0.32 - 45.3**	**7.9E+02**	**8.8E+00**	**4.0E+02 NL**	**1.4E+01**	**SSL**	**YES**	**ASL**
	7439-95-4	Magnesium	3.3E+02 J	4.1E+03	MG/KG	CAA03-SS07-1109	51/51	3.2 - 1730	4.1E+03	1.1E+03	N/A	N/A		NO	NUT

Table 2.13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil* from	**7439-96-5**	**Manganese**	**1.9E+01**	**5.1E+02 J**	**MG/KG**	**CAS04-SS13-1012**	**51/51**	**0.32 - 120**	**5.1E+02**	**1.8E+02**	**1.8E+02 N**	**2.1E+01**	**SSL**	**YES**	**ASL**
inside and	7439-97-6	Mercury	1.0E-02 J	9.1E-01	MG/KG	CAS004-4-HA03-02-1199	48/51	0.027 - 0.91	9.1E-01	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
outside the	7440-02-0	Nickel	1.8E+00 J	4.7E+01 J	MG/KG	CAS04-SS13-1012	46/51	0.64 - 20.4	4.7E+01	9.5E+00	1.5E+02 N	2.0E+01	SSL	NO	BSL
Fenced Area	7440-09-7	Potassium	2.4E+02	3.7E+03	MG/KG	CAA03-SB09-1109	49/51	62 - 1700	3.7E+03	7.1E+02	N/A	N/A		NO	NUT
(cont'd)	7782-49-2	Selenium	1.6E-01 J	1.0E+00 J	MG/KG	CAS004-4HA04-00-1199	37/51	0.32 - 4	1.0E+00	5.1E-01	3.9E+01 N	4.0E-01	SSL	NO	BSL
	7440-22-4	Silver	9.0E-02 J	2.1E+01 L	MG/KG	CAS004-4HA06-00-1199	12/51	0.64 - 8.5	2.1E+01	N/A	3.9E+01 N	6.0E-01	SSL	NO	BSL
	7440-23-5	Sodium	1.3E+01 J	1.8E+02 K	MG/KG	CAA03-SS06-1109	31/51	11.6 - 1502.4	1.8E+02	5.2E+02	N/A	N/A		NO	NUT
	7440-28-0	**Thallium**	**3.3E-01**	**1.1E+00 L**	**MG/KG**	**CAS004-4HA06-00-1199**	**3/51**	**0.13 - 6**	**1.1E+00**	N/A	**7.8E-02 N**	**1.1E-02**	**SSL**	**YES**	**ASL**
	7440-62-2	**Vanadium**	**6.5E+00**	**6.4E+01**	**MG/KG**	**CAS04-SB07-1012**	**50/51**	**0.32 - 20.8**	**6.4E+01**	**2.8E+01**	**3.9E+01 N**	**7.8E+01**	**SSL**	**YES**	**ASL**
	7440-66-6	Zinc	7.8E+00 K	3.7E+02	MG/KG	CAS004-4-HA04-01-1199	48/51	1.2 - 373	3.7E+02	2.7E+01	2.3E+03 N	2.9E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are the lower of surface and subsurface 95% UTL from Cheatham Annex/Yorktown background samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Soil. Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1

Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.

RSL value for cresols used for 3- and 4-methylphenol.

RSL value for acenapthene used as surrogate for acenaphthylene.

RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.

RSL value for anthracene used as surrogate for phenanthrene.

RSL value for technical-HCH used as surrogate for delta-BHC.

RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.

RSL value for chromium (III) insoluble salts used for chromium.

RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

RSL value for endosulfan used as surrogate for endosulfan I, endosulfan II, and endosulfan sulfate.

RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

N = Noncarcinogenic

NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.

MG/KG = milligrams per kilogram

SSL = Risk Based Soil Screening Levels from RSL table (not adjusted for noncarcinogenic constituents)

N/A = not available/not applicable

Table 2.14

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from															
Soil* from	78-93-3	2-Butanone	5.1E-04 J	1.5E-03 J	ug/m^3	CAA03-SS09-1109	3/40	N/A	1.5E-03	N/A	5.2E+02 N	N/A	N/A	NO	BSL
inside and	67-64-1	Acetone	5.3E-03 J	3.6E-02 J	ug/m^3	CAA03-SS09-1109	9/40	N/A	3.6E-02	N/A	3.2E+03 N	N/A	N/A	NO	BSL
outside the	67-66-3	Chloroform	1.8E-04 J	2.9E-04 J	ug/m^3	CAA03-SB05-1109A : CAS04-SB04-1109	6/40	N/A	2.9E-04	N/A	1.1E-01 C	N/A	N/A	NO	BSL
Fenced Area	100-41-4	Ethylbenzene	2.7E-04 J	2.7E-04 J	ug/m^3	CAS004-4-HA02-02-1199	1/40	N/A	2.7E-04	N/A	9.7E-01 C	N/A	N/A	NO	BSL
	75-09-2	Methylene chloride	3.2E-03 J	5.6E-03 J	ug/m^3	CAA03-SB03-1109A	7/41	N/A	5.6E-03	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	100-42-5	Styrene	8.3E-05 J	8.3E-04 J	ug/m^3	CAA03-SS10-1109	5/40	N/A	8.3E-04	N/A	1.0E+02 N	N/A	N/A	NO	BSL
	127-18-4	Tetrachloroethene	9.9E-04 J	9.9E-04 J	ug/m^3	CAS004-4-HA03-02-1199	1/40	N/A	9.9E-04	N/A	4.2E+00 N	N/A	N/A	NO	BSL
	108-88-3	Toluene	3.6E-04 J	9.0E-04 J	ug/m^3	CAA03-SB08P-1109	5/40	N/A	9.0E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
	1330-20-7	Xylene, total	2.7E-04 J	2.7E-04 J	ug/m^3	CAS004-4HA02-00-1199	1/40	N/A	2.7E-04	N/A	1.0E+01 N	N/A	N/A	NO	BSL
	92-52-4	1,1-Biphenyl	2.6E-02	2.6E-02	ug/m^3	CAA03-SS06-1109	1/30	N/A	2.6E-02	N/A	4.2E-02 N	N/A	N/A	NO	BSL
	105-67-9	2,4-Dimethylphenol	3.1E-07 J	3.1E-07 J	ug/m^3	CAA03-SS06-1109	1/41	N/A	3.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-57-6	2-Methylnaphthalene	3.3E-05 J	1.6E-03 J	ug/m^3	CAA03-SB01-1109	12/51	N/A	1.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	95-48-7	2-Methylphenol	3.2E-07 J	3.2E-07 J	ug/m^3	CAA03-SS06-1109	1/41	N/A	3.2E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	8.8E-07	8.8E-07	ug/m^3	CAA03-SS06-1109	1/30	N/A	8.8E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	1.6E-05 J	1.3E-01 J	ug/m^3	CAA03-SS06-1109	18/51	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.6E-05 J	2.3E-02 J	ug/m^3	CAA03-SS06-1109	16/51	N/A	2.3E-02	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	2.5E-06 J	2.1E-01	ug/m^3	CAA03-SS06-1109	28/51	N/A	2.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	100-52-7	Benzaldehyde	6.9E-03 J	6.9E-03 J	ug/m^3	CAA03-SS08P-1109	1/30	N/A	6.9E-03	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	2.0E-09 J	1.3E-04	ug/m^3	CAA03-SS06-1109	41/51	N/A	1.3E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	3.2E-09 J	9.6E-05	ug/m^3	CAA03-SS06-1109	36/51	N/A	9.6E-05	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	6.5E-09 J	1.5E-04	ug/m^3	CAA03-SS06-1109	36/51	N/A	1.5E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	1.8E-09 J	4.9E-05 L	ug/m^3	CAA03-SS06-1109	27/48	N/A	4.9E-05	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	2.7E-09 J	6.0E-05	ug/m^3	CAA03-SS06-1109	31/51	N/A	6.0E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	4.6E-05 J	ug/m^3	CAS004-4-HA03-02-1199	5/41	N/A	4.6E-05	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	2.1E-06	2.1E-06	ug/m^3	CAA03-SS07-1109	1/41	N/A	2.1E-06	N/A	N/A	N/A	N/A	NO	NTX
	86-74-8	Carbazole	1.5E-09 J	8.8E-05 J	ug/m^3	CAA03-SS06-1109	20/41	N/A	8.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	1.6E-09 J	1.5E-04	ug/m^3	CAA03-SS06-1109	35/51	N/A	1.5E-04	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	2.6E-09 J	1.6E-05 K	ug/m^3	CAA03-SS06-1109	26/51	N/A	1.6E-05	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	132-64-9	Dibenzofuran	4.7E-04 J	7.5E-02	ug/m^3	CAA03-SS06-1109	3/41	N/A	7.5E-02	N/A	N/A	N/A	N/A	NO	NTX
	84-74-2	Di-n-butylphthalate	6.6E-05 J	6.6E-05 J	ug/m^3	CAS004-4-HA04-01-1199	1/41	N/A	6.6E-05	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	5.7E-07	5.7E-07	ug/m^3	CAA03-SS07-1109	1/41	N/A	5.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	2.0E-09 J	3.7E-04	ug/m^3	CAA03-SS06-1109	39/51	N/A	3.7E-04	N/A	N/A	N/A	N/A	NO	NTX
	86-73-7	Fluorene	1.3E-05 J	1.1E-01 J	ug/m^3	CAA03-SS06-1109	18/51	N/A	1.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	118-74-1	Hexachlorobenzene	5.3E-09 J	5.3E-09 J	ug/m^3	CAA03-SB08P-1109	1/41	N/A	5.3E-09	N/A	5.3E-03 C	N/A	N/A	NO	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	2.7E-09 J	5.1E-05 J	ug/m^3	CAA03-SS06-1109	33/51	N/A	5.1E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	91-20-3	**Naphthalene**	**1.1E-04 J**	**4.3E-01 J**	**ug/m^3**	**CAA03-SS06-1109**	**13/51**	**N/A**	**4.3E-01**	**N/A**	**7.2E-02 C**	**N/A**	**N/A**	**YES**	**ASL**

Table 2.14

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from	85-01-8	Phenanthrene	4.7E-06 J	6.9E-01	ug/m^3	CAA03-SS06-1109	34/51	N/A	6.9E-01	N/A	N/A	N/A	N/A	NO	NTX
Soil* from	108-95-2	Phenol	4.4E-07	4.4E-07	ug/m^3	CAA03-SS06-1109	1/41	N/A	4.4E-07	N/A	2.1E+01 N	N/A	N/A	NO	BSL
inside and	129-00-0	Pyrene	1.2E-06 J	1.3E-01	ug/m^3	CAA03-SS06-1109	39/51	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
outside the	72-54-8	4,4'-DDD	8.1E-10 J	2.1E-07 J	ug/m^3	CAA03-SS06-1109	17/41	N/A	2.1E-07	N/A	3.5E-02 C	N/A	N/A	NO	BSL
Fenced Area	72-55-9	4,4'-DDE	5.9E-10 J	6.1E-08	ug/m^3	CAA03-SS02-1109	20/41	N/A	6.1E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
(cont'd)	50-29-3	4,4'-DDT	1.2E-09 J	1.6E-07 K	ug/m^3	CAS004-4HA05-00-1199	22/41	N/A	1.6E-07	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	309-00-2	Aldrin	8.1E-10 J	2.4E-08 K	ug/m^3	CAS004-4HA05-00-1199	3/41	N/A	2.4E-08	N/A	5.0E-04 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	4.0E-10 J	1.8E-09 J	ug/m^3	CAS004-4-HA05-01-1199	4/41	N/A	1.8E-09	N/A	2.4E-02 C	N/A	N/A	NO	BSL
	53469-21-9	Aroclor-1242	7.4E-07 K	1.7E-06 L	ug/m^3	CAS004-4-HA05-01-1199	2/51	N/A	1.7E-06	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	11096-82-5	Aroclor-1260	1.4E-08 J	2.0E-06 K	ug/m^3	CAS004-4HA05-00-1199	13/51	N/A	2.0E-06	N/A	4.3E-03 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.0E-09 J	1.0E-07 J	ug/m^3	CAA03-SS06-1109	2/41	N/A	1.0E-07	N/A	4.8E-03 C	N/A	N/A	NO	BSL
	60-57-1	Dieldrin	4.8E-10 J	4.8E-07 J	ug/m^3	CAA03-SS06-1109	8/41	N/A	4.8E-07	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	6.7E-10 J	1.6E-06 J	ug/m^3	CAA03-SS06-1109	2/41	N/A	1.6E-06	N/A	N/A	N/A	N/A	NO	NTX
	33213-65-9	Endosulfan II	3.2E-09 J	4.8E-09 K	ug/m^3	CAS004-4-HA03-02-1199	3/41	N/A	4.8E-09	N/A	N/A	N/A	N/A	NO	NTX
	1031-07-8	Endosulfan sulfate	1.4E-09 J	6.8E-09 J	ug/m^3	CAA03-SB07-1109	3/41	N/A	6.8E-09	N/A	N/A	N/A	N/A	NO	NTX
	72-20-8	Endrin	2.6E-09 J	9.6E-08 J	ug/m^3	CAA03-SS06-1109	12/41	N/A	9.6E-08	N/A	N/A	N/A	N/A	NO	NTX
	7421-93-4	Endrin aldehyde	7.4E-10 J	5.7E-08 K	ug/m^3	CAS004-4HA05-00-1199	8/41	N/A	5.7E-08	N/A	N/A	N/A	N/A	NO	NTX
	53494-70-5	Endrin ketone	6.5E-10 J	6.4E-08 K	ug/m^3	CAS004-4HA05-00-1199	5/41	N/A	6.4E-08	N/A	N/A	N/A	N/A	NO	NTX
	58-89-9	gamma-BHC (Lindane)	4.2E-10 J	6.3E-07	ug/m^3	CAA03-SS06-1109	8/41	N/A	6.3E-07	N/A	7.8E-03 C	N/A	N/A	NO	BSL
	5103-74-2	gamma-Chlordane	7.4E-10 J	1.7E-08 J	ug/m^3	CAA03-SB07-1109	4/41	N/A	1.7E-08	N/A	2.4E-02 C	N/A	N/A	NO	BSL
	76-44-8	Heptachlor	7.3E-09 J	7.3E-09 J	ug/m^3	CAS004-4-HA05-01-1199	1/41	N/A	7.3E-09	N/A	1.9E-03 C	N/A	N/A	NO	BSL
	72-43-5	Methoxychlor	1.8E-08 J	1.8E-08 J	ug/m^3	CAS004-4-HA05-01-1199	1/41	N/A	1.8E-08	N/A		N/A	N/A	NO	BSL
	7429-90-5	Aluminum	2.6E-03 L	2.3E-02	ug/m^3	CAS04-SB07-1012	51/51	N/A	2.3E-02	N/A	5.2E-01 N	N/A	N/A	NO	BSL
	7440-36-0	Antimony	2.9E-08 J	4.9E-07 J	ug/m^3	CAS004-4HA04-00-1199	35/51	N/A	4.9E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	4.6E-07	2.5E-04 J	ug/m^3	CAS04-SS13-1012	51/51	N/A	2.5E-04	N/A	5.7E-04 C	N/A	N/A	NO	BSL
	7440-39-3	Barium	8.3E-06	1.8E-04	ug/m^3	CAS004-4-HA04-01-1199	51/51	N/A	1.8E-04	N/A	5.2E-02 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	1.4E-07 J	7.0E-07	ug/m^3	CAA03-SB07-1109	40/51	N/A	7.0E-07	N/A	1.0E-03 C	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	2.2E-08 J	2.4E-06	ug/m^3	CAS004-4HA05-00-1199	18/51	N/A	2.4E-06	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	7440-70-2	Calcium	7.9E-05	1.4E-02	ug/m^3	CAA03-SS06-1109 : CAS04-SS08-1012	51/51	N/A	1.4E-02	N/A	N/A	N/A	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	3.2E-07 J	3.2E-07 J	ug/m^3	CAS04-SB16-1012	1/4	N/A	3.2E-07	N/A	1.1E-05 C	N/A	N/A	NO	BSL
	7440-47-3	Chromium	4.3E-06	4.6E-05 J	ug/m^3	CAS04-SS13-1012	55/55	N/A	4.6E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-48-4	Cobalt	5.3E-07	8.5E-06 J	ug/m^3	CAS04-SS13-1012	50/51	N/A	8.5E-06	N/A	2.7E-04 C	N/A	N/A	NO	BSL
	7440-50-8	Copper	1.0E-06 J	1.1E-04	ug/m^3	CAS004-4HA05-00-1199	45/51	N/A	1.1E-04	N/A	N/A	N/A	N/A	NO	NTX
	57-12-5	Cyanide	5.1E-08 L	3.2E-07 L	ug/m^3	CAS004-4-HA04-01-1199	4/41	N/A	3.2E-07	N/A	8.3E-02 N	N/A	N/A	NO	BSL
	7439-89-6	Iron	2.5E-03	8.5E-02 J	ug/m^3	CAS04-SS13-1012	51/51	N/A	8.5E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	2.8E-06	5.8E-04	ug/m^3	CAA03-SS06-1109	47/51	N/A	5.8E-04	N/A	1.5E-01 N	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	2.4E-04 J	3.0E-03	ug/m^3	CAA03-SS07-1109	51/51	N/A	3.0E-03	N/A	N/A	N/A	N/A	NO	NUT

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Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from	7439-96-5	Manganese	1.4E-05	3.8E-04 J	ug/m^3	CAS04-SS13-1012	51/51	N/A	3.8E-04	N/A	5.2E-03 N	N/A	N/A	NO	BSL
Soil* from	7439-97-6	Mercury	7.4E-09 J	6.7E-07	ug/m^3	CAS004-4-HA03-02-1199	48/51	N/A	6.7E-07	N/A	3.1E-02 N	N/A	N/A	NO	BSL
inside and	7440-02-0	Nickel	1.3E-06 J	3.4E-05 J	ug/m^3	CAS04-SS13-1012	46/51	N/A	3.4E-05	N/A	9.4E-03 C	N/A	N/A	NO	BSL
outside the	7440-09-7	Potassium	1.7E-04	2.7E-03	ug/m^3	CAA03-SB09-1109	49/51	N/A	2.7E-03	N/A	N/A	N/A	N/A	NO	NUT
Fenced Area	7782-49-2	Selenium	1.2E-07 J	7.4E-07 J	ug/m^3	CAS004-4HA04-00-1199	37/51	N/A	7.4E-07	N/A	2.1E+00 N	N/A	N/A	NO	BSL
(cont'd)	7440-22-4	Silver	6.6E-08 J	1.5E-05 L	ug/m^3	CAS004-4HA06-00-1199	12/51	N/A	1.5E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-23-5	Sodium	9.4E-06 J	1.3E-04 K	ug/m^3	CAA03-SS06-1109	31/51	N/A	1.3E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-28-0	Thallium	2.4E-07	8.1E-07 L	ug/m^3	CAS004-4HA06-00-1199	3/51	N/A	8.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-62-2	Vanadium	4.8E-06	4.7E-05	ug/m^3	CAS04-SB07-1012	50/51	N/A	4.7E-05	N/A	1.0E-02 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	5.7E-06 K	2.7E-04	ug/m^3	CAS004-4-HA04-01-1199	48/51	N/A	2.7E-04	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as Cair = Csoil*1000 ug/mg*(1/PEF + 1/VF).
PEF = 1.36E+09 m3/kg. VF calculated for volatile constituents only, on Table 2.4a. PEF from USEPA's Supplemental Guidance for Developing Soil Levels for Superfund Sites, 2002.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Air.
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL value for cresols used for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chlordane used as surrogate for alpha - and gamma-chlordane.
RSL value for chromium (III) insoluble salts used for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
ug/m^3 = micrograms per cubic meter
N/A = not available/not applicable

Table 2.15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil* from															
within Fenced	75-09-2	Methylene chloride	1.3E-02 J	1.3E-02 J	MG/KG	CAA03-SB01-1109 : CAA03-SS06-1109	2/8	0.011 - 0.029	1.3E-02	N/A	3.6E+01 N	2.5E-03	SSL	NO	BSL
Area of Youth	108-88-3	Toluene	2.0E-03 J	2.0E-03 J	MG/KG	CAA03-SB06-1109	1/8	0.0023 - 0.006	2.0E-03	N/A	5.0E+02 N	5.9E-01	SSL	NO	BSL
Pond/Site 4	92-52-4	1,1-Biphenyl	3.8E+00	3.8E+00	MG/KG	CAA03-SS06-1109	1/8	0.34 - 0.87	3.8E+00	N/A	5.1E+00 N	8.7E-03	SSL	NO	BSL
	105-67-9	2,4-Dimethylphenol	4.2E-01 J	4.2E-01 J	MG/KG	CAA03-SS06-1109	1/8	0.42 - 0.87	4.2E-01	N/A	1.2E+02 N	3.2E-01	SSL	NO	BSL
	91-57-6	2-Methylnaphthalene	2.5E-03 J	1.2E-01 J	MG/KG	CAA03-SB01-1109	6/9	0.019 - 49	1.2E-01	N/A	2.3E+01 N	1.4E-01	SSL	NO	BSL
	95-48-7	2-Methylphenol	4.4E-01 J	4.4E-01 J	MG/KG	CAA03-SS06-1109	1/8	0.42 - 0.87	4.4E-01	N/A	3.1E+02 N	5.8E-01	SSL	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	1.2E+00	1.2E+00	MG/KG	CAA03-SS06-1109	1/8	0.42 - 0.87	1.2E+00	N/A	6.1E+02 N	1.2E+00	SSL	NO	BSL
	83-32-9	Acenaphthene	7.5E-03 J	2.4E+01 J	MG/KG	CAA03-SS06-1109	7/9	0.019 - 49	2.4E+01	N/A	3.4E+02 N	4.1E+00	SSL	NO	BSL
	208-96-8	Acenaphthylene	3.0E-03 J	4.1E+00 J	MG/KG	CAA03-SS06-1109	6/9	0.019 - 49	4.1E+00	N/A	3.4E+02 N	N/A		NO	BSL
	120-12-7	Anthracene	1.9E-02 J	1.4E+02	MG/KG	CAA03-SS06-1109	8/9	0.019 - 49	1.4E+02	N/A	1.7E+03 N	4.2E+01	SSL	NO	BSL
	56-55-3	**Benzo(a)anthracene**	**9.2E-02**	**1.8E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**1.8E+02**	**N/A**	**1.5E-01 C**	**1.0E-02**	**SSL**	**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**7.9E-02**	**1.3E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**1.3E+02**	**N/A**	**1.5E-02 C**	**3.5E-03**	**SSL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**1.6E-01**	**2.0E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**2.0E+02**	**N/A**	**1.5E-01 C**	**3.5E-02**	**SSL**	**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	4.3E-02	6.6E+01 L	MG/KG	CAA03-SS06-1109	9/9	0.019 - 49	6.6E+01	N/A	1.7E+02 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**5.8E-02**	**8.1E+01**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**8.1E+01**	**N/A**	**1.5E+00 C**	**3.5E-01**	**SSL**	**YES**	**ASL**
	117-81-7	bis(2-Ethylhexyl)phthalate	4.1E-02 J	7.8E-01 J	MG/KG	CAA03-SS07-1109	3/8	0.11 - 240	7.8E-01	N/A	3.5E+01 C	1.1E+00	SSL	NO	BSL
	85-68-7	Butylbenzylphthalate	2.8E+00	2.8E+00	MG/KG	CAA03-SS07-1109	1/8	0.34 - 0.87	2.8E+00	N/A	2.6E+02 C	2.0E-01	SSL	NO	BSL
	86-74-8	**Carbazole**	**9.0E-02 J**	**1.2E+02 J**	**MG/KG**	**CAA03-SS06-1109**	**7/8**	**0.021 - 49**	**1.2E+02**	**N/A**	**2.4E+01 C**	**3.2E-02**	**SSL**	**YES**	**ASL**
	218-01-9	**Chrysene**	**1.2E-01**	**2.1E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**2.1E+02**	**N/A**	**1.5E+01 C**	**1.1E+00**	**SSL**	**YES**	**ASL**
	53-70-3	**Dibenz(a,h)anthracene**	**1.7E-02 J**	**2.2E+01 K**	**MG/KG**	**CAA03-SS06-1109**	**8/9**	**0.019 - 49**	**2.2E+01**	**N/A**	**1.5E-02 C**	**1.1E-02**	**SSL**	**YES**	**ASL**
	132-64-9	**Dibenzofuran**	**1.2E-01 J**	**1.9E+01**	**MG/KG**	**CAA03-SS06-1109**	**4/8**	**0.34 - 2**	**1.9E+01**	**N/A**	**7.8E+00 N**	**1.1E-01**	**SSL**	**YES**	**ASL**
	117-84-0	Di-n-octylphthalate	7.7E-01	7.7E-01	MG/KG	CAA03-SS07-1109	1/8	0.42 - 0.87	7.7E-01	N/A	6.1E+01 N	5.3E+01	SSL	NO	BSL
	206-44-0	**Fluoranthene**	**7.5E-02**	**5.0E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**5.0E+02**	**N/A**	**2.3E+02 N**	**7.0E+01**	**SSL**	**YES**	**ASL**
	86-73-7	Fluorene	1.0E-02 J	4.0E+01 J	MG/KG	CAA03-SS06-1109	7/9	0.019 - 49	4.0E+01	N/A	2.3E+02 N	4.0E+00	SSL	NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.2E-02**	**6.9E+01 J**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**6.9E+01**	**N/A**	**1.5E-01 C**	**2.0E-01**	**SSL**	**YES**	**ASL**
	91-20-3	**Naphthalene**	**6.6E-03 J**	**2.6E+01 J**	**MG/KG**	**CAA03-SS06-1109**	**7/9**	**0.019 - 49**	**2.6E+01**	**N/A**	**3.6E+00 C**	**4.7E-04**	**SSL**	**YES**	**ASL**
	85-01-8	Phenanthrene	1.7E-01	4.7E+02	MG/KG	CAA03-SS06-1109	8/9	0.019 - 49	4.7E+02	N/A	1.7E+03 N	N/A		NO	BSL
	108-95-2	Phenol	6.0E-01	6.0E-01	MG/KG	CAA03-SS06-1109	1/8	0.42 - 0.87	6.0E-01	N/A	1.8E+03 N	2.6E+00	SSL	NO	BSL
	129-00-0	**Pyrene**	**7.9E-02**	**3.9E+02**	**MG/KG**	**CAA03-SS06-1109**	**9/9**	**0.019 - 49**	**3.9E+02**	**N/A**	**1.7E+02 N**	**9.5E+00**	**SSL**	**YES**	**ASL**
	72-54-8	4,4'-DDD	2.3E-03 J	2.8E-01 J	MG/KG	CAA03-SS06-1109	6/8	0.0032 - 0.078	2.8E-01	N/A	2.0E+00 C	6.4E-03	SSL	NO	BSL
	72-55-9	4,4'-DDE	1.2E-03 J	5.2E-02 J	MG/KG	CAA03-SS06-1109	3/8	0.0032 - 0.078	5.2E-02	N/A	1.4E+00 C	4.6E-02	SSL	NO	BSL
	50-29-3	4,4'-DDT	1.3E-02 J	8.8E-02 J	MG/KG	CAA03-SS06-1109	3/8	0.0032 - 0.078	8.8E-02	N/A	1.7E+00 C	6.7E-02	SSL	NO	BSL
	5103-71-9	alpha-Chlordane	8.9E-04 J	8.9E-04 J	MG/KG	CAA03-SB07-1109	1/8	0.0016 - 0.04	8.9E-04	N/A	1.6E+00 C	N/A		NO	BSL
	319-86-8	delta-BHC	1.4E-03 J	1.4E-01 J	MG/KG	CAA03-SS06-1109	2/8	0.0016 - 0.04	1.4E-01	N/A	2.7E-01 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**6.5E-01 J**	**6.5E-01 J**	**MG/KG**	**CAA03-SS06-1109**	**1/8**	**0.0032 - 0.022**	**6.5E-01**	**N/A**	**3.0E-02 C**	**6.1E-05**	**SSL**	**YES**	**ASL**
	959-98-8	Endosulfan I	2.2E+00 J	2.2E+00 J	MG/KG	CAA03-SS06-1109	1/8	0.0016 - 0.022	2.2E+00	N/A	3.7E+01 N	N/A		NO	BSL

Table 2.15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Soil* from	1031-07-8	Endosulfan sulfate	1.9E-03 J	9.2E-03 J	MG/KG	CAA03-SB07-1109	2/8	0.0032 - 0.078	9.2E-03	N/A	3.7E+01 N	N/A		NO	BSL
within Fenced	72-20-8	Endrin	1.3E-01 J	1.3E-01 J	MG/KG	CAA03-SS06-1109	1/8	0.0032 - 0.078	1.3E-01	N/A	1.8E+00 N	6.8E-02	SSL	NO	BSL
Area of Youth	**58-89-9**	**gamma-BHC (Lindane)**	**4.1E-03 J**	**8.6E-01**	**MG/KG**	**CAA03-SS06-1109**	**4/8**	**0.0016 - 0.04**	**8.6E-01**	**N/A**	**5.2E-01 C**	**2.1E-04**	**SSL**	**YES**	**ASL**
Pond/Site 4	5103-74-2	gamma-Chlordane	2.3E-02 J	2.3E-02 J	MG/KG	CAA03-SB07-1109	1/8	0.0016 - 0.04	2.3E-02	N/A	1.6E+00 C	N/A		NO	BSL
(cont'd)	**7429-90-5**	**Aluminum**	**5.3E+03**	**1.3E+04**	**MG/KG**	**CAA03-SS01-1109**	**9/9**	**21 - 42.1**	**1.3E+04**	**1.2E+04**	**7.7E+03 N**	**2.3E+04**	**SSL**	**YES**	**ASL**
	7440-36-0	Antimony	7.0E-02 J	2.1E-01 L	MG/KG	CAA03-SS06-1109	6/9	0.07 - 4.21	2.1E-01	N/A	3.1E+00 N	2.7E-01	SSL	NO	BSL
	7440-38-2	**Arsenic**	**2.4E+00**	**7.3E+00**	**MG/KG**	**CAA03-SS01-1109**	**9/9**	**0.35 - 4.21**	**7.3E+00**	**5.5E+00**	**6.1E-01 C**	**1.3E-03**	**SSL**	**YES**	**ASL**
	7440-39-3	Barium	3.2E+01 J	5.7E+01	MG/KG	CAA03-SS07-1109	9/9	0.35 - 1.05	5.7E+01	5.3E+01	1.5E+03 N	1.2E+02	SSL	NO	BSL
	7440-41-7	Beryllium	3.1E-01	9.5E-01	MG/KG	CAA03-SB07-1109	9/9	0.0852 - 0.52	9.5E-01	5.9E-01	1.6E+01 N	1.3E+01	SSL	NO	BSL
	7440-43-9	Cadmium	3.0E-02 J	7.0E-01 J	MG/KG	CAA03-SS07-1109	7/9	0.17 - 1.4	7.0E-01	N/A	7.0E+00 N	N/A		NO	BSL
	7440-70-2	Calcium	1.8E+03	1.9E+04	MG/KG	CAA03-SS06-1109 : CAS04-SS08-1012	9/9	4.9 - 52.6	1.9E+04	2.3E+03	N/A	N/A		NO	NUT
	18540-29-9	**Chromium (hexavalent)**	**5.3E-01**	**5.3E-01**	**MG/KG**	**CAYP-SS02-1012**	**1/1**	**0.49 - 0.49**	**5.3E-01**	**N/A**	**2.9E-01 C**	**5.9E-04**	**SSL**	**YES**	**ASL**
	7440-47-3	Chromium	1.1E+01	2.5E+01 K	MG/KG	CAA03-SS01-1109	9/9	0.71 - 2.1	2.5E+01	1.8E+01	1.2E+04 N	2.8E+07	SSL	NO	BSL
	7440-48-4	**Cobalt**	**1.5E+00**	**4.9E+00**	**MG/KG**	**CAA03-SS07-1109**	**9/9**	**0.07 - 1.05**	**4.9E+00**	**5.2E+00**	**2.3E+00 N**	**2.1E-01**	**SSL**	**YES**	**ASL**
	7440-50-8	Copper	3.3E+00	3.7E+01	MG/KG	CAS04-SS08-1012	9/9	0.852 - 2.6	3.7E+01	3.2E+00	3.1E+02 N	2.2E+01	SSL	NO	BSL
	7439-89-6	**Iron**	**8.0E+03**	**1.9E+04**	**MG/KG**	**CAYP-SS02-1012**	**9/9**	**7 - 21**	**1.9E+04**	**2.0E+04**	**5.5E+03 N**	**2.7E+02**	**SSL**	**YES**	**ASL**
	7439-92-1	**Lead**	**9.4E+00 K**	**7.9E+02**	**MG/KG**	**CAA03-SS06-1109**	**8/9**	**0.35 - 4.21**	**7.9E+02**	**8.8E+00**	**4.0E+02 NL**	**N/A**		**YES**	**ASL**
	7439-95-4	Magnesium	6.7E+02	4.1E+03	MG/KG	CAA03-SS07-1109	9/9	4.1 - 52.6	4.1E+03	1.1E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**4.7E+01 J**	**3.2E+02**	**MG/KG**	**CAA03-SS07-1109**	**9/9**	**0.35 - 2.1**	**3.2E+02**	**1.8E+02**	**1.8E+02 N**	**2.1E+01**	**SSL**	**YES**	**ASL**
	7439-97-6	Mercury	1.0E-02 J	8.0E-02	MG/KG	CAS04-SS08-1012	7/9	0.0111 - 0.042	8.0E-02	1.1E-01	2.3E+00 N	3.3E-02	SSL	NO	BSL
	7440-02-0	Nickel	2.5E+00	9.0E+00	MG/KG	CAA03-SS06-1109	9/9	0.71 - 5.6	9.0E+00	9.5E+00	1.5E+02 N	2.0E+01	SSL	NO	BSL
	7440-09-7	Potassium	4.2E+02	2.8E+03	MG/KG	CAA03-SS07-1109	9/9	70 - 105	2.8E+03	7.1E+02	N/A	N/A		NO	NUT
	7782-49-2	Selenium	1.6E-01 J	8.4E-01	MG/KG	CAA03-SS06-1109	7/9	0.35 - 4.21	8.4E-01	5.1E-01	3.9E+01 N	4.0E-01	SSL	NO	BSL
	7440-23-5	Sodium	1.7E+01 J	1.8E+02 K	MG/KG	CAA03-SS06-1109	9/9	42.6 - 100	1.8E+02	5.2E+02	N/A	N/A		NO	NUT
	7440-62-2	Vanadium	1.4E+01	2.7E+01	MG/KG	CAYP-SS02-1012	9/9	0.35 - 2.1	2.7E+01	2.8E+01	3.9E+01 N	7.8E+01	SSL	NO	BSL
	7440-66-6	Zinc	1.6E+01	1.6E+02	MG/KG	CAYP-SS01-1012	9/9	1.4 - 2.6	1.6E+02	2.7E+01	2.3E+03 N	2.9E+02	SSL	NO	BSL

* Surface soil & subsurface soil combined

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values are the lower of surface and subsurface 95% UTL from Cheatham Annex/Yorktown background samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Soil. Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1

Screening value for carbazole calculated using RSL calculator, and oral cancer slope factor of 2.0E-02 (mg/kg-day)-1 from USEPA's Health Affects Assessment Summary Tables, July 2007.

RSL value for cresols used for 3- and 4-methylphenol.

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

N = Noncarcinogenic

NL = Noncarcinogenic lead residential soil RSL not adjusted by dividing by 10.

Table 2.15

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for technical-HCH used as surrogate for delta-BHC.
RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.
RSL value for chromium (III) insoluble salts used for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.
RSL value for endosulfan used as surrogate for endosulfan I and endosulfan sulfate.

MG/KG = milligrams per kilogram
SSL = Risk Based Soil Screening Levels from RSL table (not adjusted for noncarcinogenic constituents)
N/A = not available/not applicable

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Table 2.16

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from															
Soil* from	75-09-2	Methylene chloride	4.6E-03 J	4.6E-03 J	ug/m^3	CAA03-SB01-1109 : CAA03-SS06-1109	2/8	N/A	4.6E-03	N/A	6.3E+01 N	N/A	N/A	NO	BSL
within Fenced	108-88-3	Toluene	3.6E-04 J	3.6E-04 J	ug/m^3	CAA03-SB06-1109	1/8	N/A	3.6E-04	N/A	5.2E+02 N	N/A	N/A	NO	BSL
Area of Youth	92-52-4	1,1-Biphenyl	2.6E-02	2.6E-02	ug/m^3	CAA03-SS06-1109	1/8	N/A	2.6E-02	N/A	4.2E-02 N	N/A	N/A	NO	BSL
Pond/Site 4	105-67-9	2,4-Dimethylphenol	3.1E-07 J	3.1E-07 J	ug/m^3	CAA03-SS06-1109	1/8	N/A	3.1E-07	N/A	N/A	N/A	N/A	NO	NTX
	91-57-6	2-Methylnaphthalene	3.3E-05 J	1.6E-03 J	ug/m^3	CAA03-SB01-1109	6/9	N/A	1.6E-03	N/A	N/A	N/A	N/A	NO	NTX
	95-48-7	2-Methylphenol	3.2E-07 J	3.2E-07 J	ug/m^3	CAA03-SS06-1109	1/8	N/A	3.2E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	m&pCRESOL	3- and 4-Methylphenol	8.8E-07	8.8E-07	ug/m^3	CAA03-SS06-1109	1/8	N/A	8.8E-07	N/A	6.3E+01 N	N/A	N/A	NO	BSL
	83-32-9	Acenaphthene	4.1E-05 J	1.3E-01 J	ug/m^3	CAA03-SS06-1109	7/9	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	208-96-8	Acenaphthylene	1.6E-05 J	2.3E-02 J	ug/m^3	CAA03-SS06-1109	6/9	N/A	2.3E-02	N/A	N/A	N/A	N/A	NO	NTX
	120-12-7	Anthracene	2.8E-05 J	2.1E-01	ug/m^3	CAA03-SS06-1109	8/9	N/A	2.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	56-55-3	Benzo(a)anthracene	6.8E-08	1.3E-04	ug/m^3	CAA03-SS06-1109	9/9	N/A	1.3E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	50-32-8	Benzo(a)pyrene	5.8E-08	9.6E-05	ug/m^3	CAA03-SS06-1109	9/9	N/A	9.6E-05	N/A	8.7E-04 C	N/A	N/A	NO	BSL
	205-99-2	Benzo(b)fluoranthene	1.2E-07	1.5E-04	ug/m^3	CAA03-SS06-1109	9/9	N/A	1.5E-04	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	191-24-2	Benzo(g,h,i)perylene	3.2E-08	4.9E-05 L	ug/m^3	CAA03-SS06-1109	9/9	N/A	4.9E-05	N/A	N/A	N/A	N/A	NO	NTX
	207-08-9	Benzo(k)fluoranthene	4.3E-08	6.0E-05	ug/m^3	CAA03-SS06-1109	9/9	N/A	6.0E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	3.0E-08 J	5.7E-07 J	ug/m^3	CAA03-SS07-1109	3/8	N/A	5.7E-07	N/A	1.0E+00 C	N/A	N/A	NO	BSL
	85-68-7	Butylbenzylphthalate	2.1E-06	2.1E-06	ug/m^3	CAA03-SS07-1109	1/8	N/A	2.1E-06	N/A	N/A	N/A	N/A	NO	NTX
	86-74-8	Carbazole	6.6E-08 J	8.8E-05 J	ug/m^3	CAA03-SS06-1109	7/8	N/A	8.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	218-01-9	Chrysene	8.8E-08	1.5E-04	ug/m^3	CAA03-SS06-1109	9/9	N/A	1.5E-04	N/A	8.7E-02 C	N/A	N/A	NO	BSL
	53-70-3	Dibenz(a,h)anthracene	1.3E-08 J	1.6E-05 K	ug/m^3	CAA03-SS06-1109	8/9	N/A	1.6E-05	N/A	8.0E-04 C	N/A	N/A	NO	BSL
	132-64-9	Dibenzofuran	4.7E-04 J	7.5E-02	ug/m^3	CAA03-SS06-1109	4/8	N/A	7.5E-02	N/A	N/A	N/A	N/A	NO	NTX
	117-84-0	Di-n-octylphthalate	5.7E-07	5.7E-07	ug/m^3	CAA03-SS07-1109	1/8	N/A	5.7E-07	N/A	N/A	N/A	N/A	NO	NTX
	206-44-0	Fluoranthene	5.5E-08	3.7E-04	ug/m^3	CAA03-SS06-1109	9/9	N/A	3.7E-04	N/A	N/A	N/A	N/A	NO	NTX
	86-73-7	Fluorene	2.8E-05 J	1.1E-01 J	ug/m^3	CAA03-SS06-1109	7/9	N/A	1.1E-01	N/A	N/A	N/A	N/A	NO	NTX
	193-39-5	Indeno(1,2,3-cd)pyrene	3.1E-08	5.1E-05 J	ug/m^3	CAA03-SS06-1109	9/9	N/A	5.1E-05	N/A	8.7E-03 C	N/A	N/A	NO	BSL
	91-20-3	**Naphthalene**	**1.1E-04 J**	**4.3E-01 J**	**ug/m^3**	**CAA03-SS06-1109**	**7/9**	**N/A**	**4.3E-01**	**N/A**	**7.2E-02 C**	**N/A**	**N/A**	**YES**	**ASL**
	85-01-8	Phenanthrene	2.5E-04	6.9E-01	ug/m^3	CAA03-SS06-1109	8/9	N/A	6.9E-01	N/A	N/A	N/A	N/A	NO	NTX
	108-95-2	Phenol	4.4E-07	4.4E-07	ug/m^3	CAA03-SS06-1109	1/8	N/A	4.4E-07	N/A	2.1E+01 N	N/A	N/A	NO	BSL
	129-00-0	Pyrene	2.6E-05	1.3E-01	ug/m^3	CAA03-SS06-1109	9/9	N/A	1.3E-01	N/A	N/A	N/A	N/A	NO	NTX
	72-54-8	4,4'-DDD	1.7E-09 J	2.1E-07 J	ug/m^3	CAA03-SS06-1109	6/8	N/A	2.1E-07	N/A	3.5E-02 C	N/A	N/A	NO	BSL
	72-55-9	4,4'-DDE	8.8E-10 J	3.8E-08 J	ug/m^3	CAA03-SS06-1109	3/8	N/A	3.8E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	50-29-3	4,4'-DDT	9.6E-09 J	6.5E-08 J	ug/m^3	CAA03-SS06-1109	3/8	N/A	6.5E-08	N/A	2.5E-02 C	N/A	N/A	NO	BSL
	5103-71-9	alpha-Chlordane	6.5E-10 J	6.5E-10 J	ug/m^3	CAA03-SB07-1109	1/8	N/A	6.5E-10	N/A	2.4E-02 C	N/A	N/A	NO	BSL
	319-86-8	delta-BHC	1.0E-09 J	1.0E-07 J	ug/m^3	CAA03-SS06-1109	2/8	N/A	1.0E-07	N/A	4.8E-03 C	N/A	N/A	NO	BSL
	60-57-1	Dieldrin	4.8E-07 J	4.8E-07 J	ug/m^3	CAA03-SS06-1109	1/8	N/A	4.8E-07	N/A	5.3E-04 C	N/A	N/A	NO	BSL
	959-98-8	Endosulfan I	1.6E-06 J	1.6E-06 J	ug/m^3	CAA03-SS06-1109	1/8	N/A	1.6E-06	N/A	N/A	N/A	N/A	NO	NTX

Table 2.16

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Emissions from	1031-07-8	Endosulfan sulfate	1.4E-09 J	6.8E-09 J	ug/m^3	CAA03-SB07-1109	2/8	N/A	6.8E-09	N/A	N/A	N/A	N/A	NO	NTX
Soil* from	72-20-8	Endrin	9.6E-08 J	9.6E-08 J	ug/m^3	CAA03-SS06-1109	1/8	N/A	9.6E-08	N/A	N/A	N/A	N/A	NO	NTX
within Fenced	58-89-9	gamma-BHC (Lindane)	3.0E-09 J	6.3E-07	ug/m^3	CAA03-SS06-1109	4/8	N/A	6.3E-07	N/A	7.8E-03 C	N/A	N/A	NO	BSL
Area of Youth	5103-74-2	gamma-Chlordane	1.7E-08 J	1.7E-08 J	ug/m^3	CAA03-SB07-1109	1/8	N/A	1.7E-08	N/A	2.4E-02 C	N/A	N/A	NO	BSL
Pond/Site 4	7429-90-5	Aluminum	3.9E-03	9.3E-03	ug/m^3	CAA03-SS01-1109	9/9	N/A	9.3E-03	N/A	5.2E-01 N	N/A	N/A	NO	BSL
(cont'd)	7440-36-0	Antimony	5.1E-08 J	1.5E-07 L	ug/m^3	CAA03-SS06-1109	6/9	N/A	1.5E-07	N/A	N/A	N/A	N/A	NO	NTX
	7440-38-2	Arsenic	1.8E-06	5.4E-06	ug/m^3	CAA03-SS01-1109	9/9	N/A	5.4E-06	N/A	5.7E-04 C	N/A	N/A	NO	BSL
	7440-39-3	Barium	2.3E-05 J	4.2E-05	ug/m^3	CAA03-SS07-1109	9/9	N/A	4.2E-05	N/A	5.2E-02 N	N/A	N/A	NO	BSL
	7440-41-7	Beryllium	2.3E-07	7.0E-07	ug/m^3	CAA03-SB07-1109	9/9	N/A	7.0E-07	N/A	1.0E-03 C	N/A	N/A	NO	BSL
	7440-43-9	Cadmium	2.2E-08 J	5.1E-07 J	ug/m^3	CAA03-SS07-1109	7/9	N/A	5.1E-07	N/A	1.4E-03 C	N/A	N/A	NO	BSL
	7440-70-2	Calcium	1.3E-03	1.4E-02	ug/m^3	CAA03-SS06-1109 : CAS04-SS08-1012	9/9	N/A	1.4E-02	N/A	N/A	N/A	N/A	NO	NUT
	18540-29-9	Chromium (hexavalent)	3.9E-07	3.9E-07	ug/m^3	CAYP-SS02-1012	1/1	N/A	3.9E-07	N/A	1.1E-05 C	N/A	N/A	NO	BSL
	7440-47-3	Chromium	8.0E-06	1.8E-05 K	ug/m^3	CAA03-SS01-1109	9/9	N/A	1.8E-05	N/A	N/A	N/A	N/A	NO	NTX
	7440-48-4	Cobalt	1.1E-06	3.6E-06	ug/m^3	CAA03-SS07-1109	9/9	N/A	3.6E-06	N/A	2.7E-04 C	N/A	N/A	NO	BSL
	7440-50-8	Copper	2.4E-06	2.7E-05	ug/m^3	CAS04-SS08-1012	9/9	N/A	2.7E-05	N/A	N/A	N/A	N/A	NO	NTX
	7439-89-6	Iron	5.9E-03	1.4E-02	ug/m^3	CAYP-SS02-1012	9/9	N/A	1.4E-02	N/A	N/A	N/A	N/A	NO	NTX
	7439-92-1	Lead	6.9E-06 K	5.8E-04	ug/m^3	CAA03-SS06-1109	8/9	N/A	5.8E-04	N/A	1.5E-01 N	N/A	N/A	NO	BSL
	7439-95-4	Magnesium	4.9E-04	3.0E-03	ug/m^3	CAA03-SS07-1109	9/9	N/A	3.0E-03	N/A	N/A	N/A	N/A	NO	NUT
	7439-96-5	Manganese	3.4E-05 J	2.3E-04	ug/m^3	CAA03-SS07-1109	9/9	N/A	2.3E-04	N/A	5.2E-03 N	N/A	N/A	NO	BSL
	7439-97-6	Mercury	7.4E-09 J	5.9E-08	ug/m^3	CAS04-SS08-1012	7/9	N/A	5.9E-08	N/A	3.1E-02 N	N/A	N/A	NO	BSL
	7440-02-0	Nickel	1.8E-06	6.6E-06	ug/m^3	CAA03-SS06-1109	9/9	N/A	6.6E-06	N/A	9.4E-03 C	N/A	N/A	NO	BSL
	7440-09-7	Potassium	3.1E-04	2.1E-03	ug/m^3	CAA03-SS07-1109	9/9	N/A	2.1E-03	N/A	N/A	N/A	N/A	NO	NUT
	7782-49-2	Selenium	1.2E-07 J	6.2E-07	ug/m^3	CAA03-SS06-1109	7/9	N/A	6.2E-07	N/A	2.1E+00 N	N/A	N/A	NO	BSL
	7440-23-5	Sodium	1.2E-05 J	1.3E-04 K	ug/m^3	CAA03-SS06-1109	9/9	N/A	1.3E-04	N/A	N/A	N/A	N/A	NO	NUT
	7440-62-2	Vanadium	9.9E-06	2.0E-05	ug/m^3	CAYP-SS02-1012	9/9	N/A	2.0E-05	N/A	1.0E-02 N	N/A	N/A	NO	BSL
	7440-66-6	Zinc	1.1E-05	1.2E-04	ug/m^3	CAYP-SS01-1012	9/9	N/A	1.2E-04	N/A	N/A	N/A	N/A	NO	NTX

* Surface soil & subsurface soil combined

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as Cair = Csoil*1000 ug/mg*(1/PEF + 1/VF).
PEF = 1.36E+09 m3/kg. VF calculated for volatile constituents only, on Table 2.16a. PEF from USEPA's Supplemental Guidance for Developing Soil Levels for Superfund Sites, 2002.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Residential Air.
Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL value for cresols used for 3- and 4-methylphenol.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
ug/m^3 = micrograms per cubic meter

Table 2.16

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

RSL value for acenapthene used as surrogate for acenaphthylene.

RSL value for chlordane used as surrogate for alpha- and gamma-chlordane.

RSL value for technical-HCH used as surrogate for delta-BHC.

RSL value for chromium (III) insoluble salts used for chromium.

RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

N/A = not available/not applicable

USEPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

Table 2.16a
Calculation of Volatilization Factor - Soil
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)
Methylene chloride	1.0E-01	1.3E-01	1.3E-05	2.2E+01	1.3E-01	1.3E+04	2.8E-03	2.8E+03
Toluene	7.8E-02	2.7E-01	9.2E-06	2.3E+02	1.4E+00	5.3E+02	7.2E-04	5.5E+03
1,1-Biphenyl	4.7E-02	1.3E-02	7.6E-06	5.1E+03	3.1E+01	6.9E+00	1.0E-06	1.5E+05
2-Methylnaphthalene	5.2E-02	2.1E-02	7.8E-06	2.5E+03	1.5E+01	2.5E+01	4.0E-06	7.5E+04
Acenaphthene	5.1E-02	7.5E-03	8.3E-06	5.0E+03	3.0E+01	3.9E+00	6.7E-07	1.8E+05
Acenaphthylene	5.1E-02	7.5E-03	8.3E-06	5.0E+03	3.0E+01	3.9E+00	6.7E-07	1.8E+05
Anthracene	3.9E-02	2.3E-03	7.9E-06	1.6E+04	9.8E+01	4.3E-02	4.9E-08	6.8E+05
Dibenzofuran	4.1E-02	8.7E-03	7.4E-06	9.2E+03	5.5E+01	3.1E+00	3.5E-07	2.5E+05
Fluorene	4.4E-02	3.9E-03	7.9E-06	9.2E+03	5.5E+01	1.7E+00	1.7E-07	3.6E+05
Naphthalene	6.0E-02	1.8E-02	8.4E-06	1.5E+03	9.3E+00	3.1E+01	6.2E-06	6.0E+04
Phenanthrene	3.9E-02	2.3E-03	7.9E-06	1.6E+04	9.8E+01	4.3E-02	4.9E-08	6.8E+05
Pyrene	2.8E-02	4.9E-04	7.2E-06	5.4E+04	3.3E+02	1.4E-01	2.3E-09	3.1E+06

Volatilization factor (VF) = (m^3/kg)

$$\frac{\Theta/C * (3.14 * D_A * T)^{1/2} * 10^{-4}\ m^2/cm^2}{2 * \rho_b * D_A}$$

Apparent Diffusivity (D_A) = (cm^2/s)

$$\frac{[(\Theta_a^{10/3} * D_i * H' + \Theta_w^{10/3} * D_w)/n^2]}{(\rho_b * K_d + \Theta_w + \Theta_a * H')}$$

Parameters	Values
Θ/Cvol - Inverse of the geometric mean air concentration to of a 0.5-acre-square source (Harrisburg, PA) (g/m2-s per kg/m3)	81.9
T - Exposure interval(s)	9.5E+08
ρ_b - Soil bulk density (g/cm^3)	1.5
Q_a - Air-filled soil porosity (L_{air}/L_{water}) = n - Q_w	0.28
n - Total soil porosity (Lpore/Lsoil) = 1 - (r_b/r_s)	0.43
Θ_w - Water-filled soil porosity (Lwater/Lsoil)	0.15
ρ_s - Soil particle density (g/cm^3)	2.65
f_{oc} - fraction organic carbon in soil (g/g)	0.006

Equations from USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
Physical/chemical properties from Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Acenapthene used as surrogate for acenaphthylene
Anthracene used as surrogate for phenanthrene

Table 2.17

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Shallow Aquifer -															
Tap Water and	95-50-1	1,2-Dichlorobenzene	2.0E-01 J	2.0E-01 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E-01	N/A	2.8E+01 N	6.0E+02	MCL	NO	BSL
Water in	**106-46-7**	**1,4-Dichlorobenzene**	**2.0E+00 J**	**2.0E+00 J**	**UG/L**	**CAA03-GW03-1109**	**1/14**	**1 - 1**	**2.0E+00**	**N/A**	**4.2E-01 C**	**7.5E+01**	**MCL**	**YES**	**ASL**
Excavation Trench	67-64-1	Acetone	2.6E+00 J	2.6E+00 J	UG/L	CAS04-GW08-1212	1/14	5 - 7	2.6E+00	N/A	1.2E+03 N	N/A		NO	BSL
	71-43-2	**Benzene**	**1.4E+01**	**1.4E+01**	**UG/L**	**CAA03-GW05-1109**	**1/14**	**1 - 1**	**1.4E+01**	**N/A**	**3.9E-01 C**	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-15-0	Carbon disulfide	2.9E-01 J	8.6E-01 J	UG/L	CAS04-GW07-1212	4/14	1 - 1	8.6E-01	N/A	7.2E+01 N	N/A		NO	BSL
	110-82-7	Cyclohexane	1.2E+01	1.2E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.2E+01	N/A	1.3E+03 N	N/A		NO	BSL
	100-41-4	**Ethylbenzene**	**2.0E-01 J**	**1.0E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**1 - 1**	**1.0E+01**	**N/A**	**1.3E+00 C**	**7.0E+02**	**MCL**	**YES**	**ASL**
	98-82-8	Isopropylbenzene	4.0E+00	4.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	4.0E+00	N/A	3.9E+01 N	N/A		NO	BSL
	m&pXYLENE	**m- and p-Xylene**	**1.0E+00 J**	**2.0E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**2 - 2**	**2.0E+01**	**N/A**	**1.9E+01 N**	**N/A**		**YES**	**ASL**
	108-87-2	Methylcyclohexane	1.1E+01	1.1E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.1E+01	N/A	2.5E+01 N	N/A		NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	3.0E+00	3.0E+00	UG/L	CAA03-GW01-1109	1/14	1 - 2	3.0E+00	N/A	1.2E+01 C	N/A		NO	BSL
	95-47-6	o-Xylene	4.0E-01 J	5.0E+00	UG/L	CAA03-GW05-1109	2/14	1 - 1	5.0E+00	N/A	1.9E+01 N	N/A		NO	BSL
	100-42-5	Styrene	5.0E-01 J	5.0E-01 J	UG/L	CAA03-GW05-1109	1/14	1 - 1	5.0E-01	N/A	1.1E+02 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	2.0E+00	2.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	2.0E+00	N/A	8.6E+01 N	1.0E+03	MCL	NO	BSL
	79-01-6	**Trichloroethene**	**4.0E-01 J**	**4.0E-01 J**	**UG/L**	**CAS04-GW03-1009**	**1/14**	**1 - 1**	**4.0E-01**	**N/A**	**2.6E-01 N**	**5.0E+00**	**MCL**	**YES**	**ASL**
	1330-20-7	**Xylene, total**	**2.0E+00 J**	**2.5E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**3 - 3**	**2.5E+01**	**N/A**	**1.9E+01 N**	**1.0E+04**	**MCL**	**YES**	**ASL**
	92-52-4	**1,1-Biphenyl**	**8.0E+00 J**	**8.0E+00 J**	**UG/L**	**CAA03-GW05-1109**	**1/8**	**9 - 12**	**8.0E+00**	**N/A**	**8.3E-02 N**	**N/A**		**YES**	**ASL**
	105-67-9	**2,4-Dimethylphenol**	**2.9E+01**	**2.9E+01**	**UG/L**	**CAA03-GW05-1109**	**1/8**	**13 - 17**	**2.9E+01**	**N/A**	**2.7E+01 N**	**N/A**		**YES**	**ASL**
	91-57-6	**2-Methylnaphthalene**	**1.5E+00**	**3.2E+01**	**UG/L**	**CAA03-GW05-1109**	**3/14**	**0.19 - 29**	**3.2E+01**	**N/A**	**2.7E+00 N**	**N/A**		**YES**	**ASL**
	m&pCRESOL	3- and 4-Methylphenol	1.2E+01 J	1.2E+01 J	UG/L	CAA03-GW05-1109	1/8	16 - 20	1.2E+01	N/A	1.4E+02 N	N/A		NO	BSL
	83-32-9	Acenaphthene	5.4E-01	8.9E+00 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	8.9E+00	N/A	4.0E+01 N	N/A		NO	BSL
	208-96-8	Acenaphthylene	2.6E-01 J	4.8E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	4.8E+00	N/A	4.0E+01 N	N/A		NO	BSL
	120-12-7	Anthracene	2.6E-01	6.7E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.7E+00	N/A	1.3E+02 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	2.0E+00	N/A	1.5E+02 N	N/A		NO	BSL
	56-55-3	**Benzo(a)anthracene**	**2.9E-01**	**2.9E+00**	**UG/L**	**CAA03-GW05-1109**	**3/14**	**0.19 - 0.57**	**2.9E+00**	**N/A**	**2.9E-02 C**	**N/A**		**YES**	**ASL**
	50-32-8	**Benzo(a)pyrene**	**1.0E-01 J**	**2.0E+00**	**UG/L**	**CAA03-GW05-1109**	**4/14**	**0.19 - 0.57**	**2.0E+00**	**N/A**	**2.9E-03 C**	**2.0E-01**	**MCL**	**YES**	**ASL**
	205-99-2	**Benzo(b)fluoranthene**	**1.5E-01 J**	**2.7E+00**	**UG/L**	**CAA03-GW05-1109**	**3/14**	**0.19 - 0.85**	**2.7E+00**	**N/A**	**2.9E-02 C**	**N/A**		**YES**	**ASL**
	191-24-2	Benzo(g,h,i)perylene	8.3E-02 J	1.2E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	1.2E+00	N/A	8.7E+00 N	N/A		NO	BSL
	207-08-9	**Benzo(k)fluoranthene**	**9.2E-01**	**9.4E-01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**0.19 - 0.57**	**9.4E-01**	**N/A**	**2.9E-01 C**	**N/A**		**YES**	**ASL**
	86-74-8	Carbazole	4.3E+00	8.6E+00 J	UG/L	CAA03-GW04-1109	2/8	0.19 - 1.7	8.6E+00	N/A	N/A	N/A		NO	NTX
	218-01-9	Chrysene	2.1E+00	2.1E+00	UG/L	CAA03-GW05-1109	1/14	0.19 - 0.57	2.1E+00	N/A	2.9E+00 C	N/A		NO	BSL
	53-70-3	**Dibenz(a,h)anthracene**	**2.1E-01 J**	**2.6E-01 J**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**0.19 - 0.71**	**2.6E-01**	**N/A**	**2.9E-03 C**	**N/A**		**YES**	**ASL**
	132-64-9	**Dibenzofuran**	**3.0E+00 J**	**1.9E+01**	**UG/L**	**CAA03-GW05-1109**	**2/8**	**9 - 12**	**1.9E+01**	**N/A**	**5.8E-01 N**	**N/A**		**YES**	**ASL**
	206-44-0	Fluoranthene	5.2E-01	8.6E+00 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 29	8.6E+00	N/A	6.3E+01 N	N/A		NO	BSL
	86-73-7	Fluorene	9.8E-01	2.1E+01 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	2.1E+01	N/A	2.2E+01 N	N/A		NO	BSL
	193-39-5	**Indeno(1,2,3-cd)pyrene**	**1.2E+00 J**	**1.2E+00 J**	**UG/L**	**CAA03-GW05-1109**	**1/14**	**0.19 - 0.57**	**1.2E+00**	**N/A**	**2.9E-02 C**	**N/A**		**YES**	**ASL**

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OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Shallow Aquifer -	**91-20-3**	**Naphthalene**	**6.3E-02 J**	**5.6E+02**	**UG/L**	**CAA03-GW05-1109**	**4/14**	**0.19 - 23**	**5.6E+02**	**N/A**	**1.4E-01 C**	**N/A**		**YES**	**ASL**
Tap Water and	85-01-8	Phenanthrene	1.6E+00	3.6E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	3.6E+01	N/A	1.3E+02 N	N/A		NO	BSL
Water in	108-95-2	Phenol	5.0E+00 J	5.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	5.0E+00	N/A	4.5E+02 N	N/A		NO	BSL
Excavation Trench	129-00-0	Pyrene	4.2E-01	6.3E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.3E+00	N/A	8.7E+00 N	N/A		NO	BSL
(cont'd)	72-55-9	4,4'-DDE	1.3E-02 J	1.3E-02 J	UG/L	CAA03-GW04-1109	1/8	0.098 - 0.12	1.3E-02	N/A	2.0E-01 C	N/A		NO	BSL
	60-57-1	**Dieldrin**	**1.7E-02 J**	**1.7E-02 J**	**UG/L**	**CAA03-GW04-1109**	**1/8**	**0.098 - 0.12**	**1.7E-02**	**N/A**	**1.5E-03 C**	**N/A**		**YES**	**ASL**
	7429-90-5	**Aluminum**	**5.2E+01 J**	**2.3E+04**	**UG/L**	**CAA03-GW03-1109**	**13/14**	**300 - 300**	**2.3E+04**	**2.2E+03**	**1.6E+03 N**	**50 - 200**	**SMCL**	**YES**	**ASL**
	7440-36-0	**Antimony**	**1.7E-01 J**	**6.7E-01 J**	**UG/L**	**CAA03-GW02-1109**	**8/14**	**1 - 8**	**6.7E-01**	**N/A**	**6.0E-01 N**	**6.0E+00**	**MCL**	**YES**	**ASL**
	7440-38-2	**Arsenic**	**1.8E+00 J**	**5.4E+01**	**UG/L**	**CAA03-GW03-1109**	**8/14**	**5 - 8**	**5.4E+01**	**2.3E+00**	**4.5E-02 C**	**1.0E+01**	**MCL**	**YES**	**ASL**
	7440-39-3	**Barium**	**1.2E+01**	**3.0E+02**	**UG/L**	**CAA03-GW05-1109**	**14/14**	**5 - 5**	**3.0E+02**	**1.2E+02**	**2.9E+02 N**	**2.0E+03**	**MCL**	**YES**	**ASL**
	7440-41-7	Beryllium	1.1E-01 J	1.4E+00	UG/L	CAA03-GW03-1109	5/14	1 - 5	1.4E+00	2.5E+00	1.6E+00 N	4.0E+00	MCL	NO	BSL
	7440-43-9	Cadmium	7.0E-02 J	3.1E-01 J	UG/L	CAA03-GW01-1109	6/14	1 - 5	3.1E-01	6.1E-01	6.9E-01 N	5.0E+00	MCL	NO	BSL
	7440-70-2	Calcium	8.3E+04	1.6E+05	UG/L	CAS04-GW05P-1212	14/14	50 - 100	1.6E+05	1.6E+05	N/A	N/A		NO	NUT
	7440-47-3	**Chromium**	**7.2E-01 J**	**4.5E+01**	**UG/L**	**CAA03-GW03-1109**	**14/14**	**10 - 15**	**4.5E+01**	**1.5E+01**	**3.1E-02 C**	**1.0E+02**	**MCL**	**YES**	**ASL**
	7440-48-4	**Cobalt**	**2.7E-01 J**	**5.1E+00 J**	**UG/L**	**CAA03-GW03-1109**	**8/14**	**10 - 30**	**5.1E+00**	**2.1E+01**	**4.7E-01 N**	**N/A**		**YES**	**ASL**
	7440-50-8	Copper	1.1E+00 J	1.4E+01 J	UG/L	CAA03-GW01-1109	10/14	25 - 25	1.4E+01	N/A	6.2E+01 N	1.3E+03	MCL	NO	BSL
	7439-89-6	**Iron**	**3.0E+02**	**3.9E+04**	**UG/L**	**CAA03-GW05-1109**	**12/14**	**100 - 100**	**3.9E+04**	**3.6E+03**	**1.1E+03 N**	**3.0E+02**	**SMCL**	**YES**	**ASL**
	7439-92-1	**Lead**	**1.6E+00 J**	**1.9E+01**	**UG/L**	**CAA03-GW02-1109**	**6/14**	**5 - 5**	**1.9E+01**	**N/A**	**1.5E+01**	**1.5E+01**	**MCL**	**YES**	**ASL**
	7439-95-4	Magnesium	9.5E+02	2.0E+04	UG/L	CAA03-GW02-1109	14/14	50 - 100	2.0E+04	3.6E+03	N/A	N/A		NO	NUT
	7439-96-5	**Manganese**	**2.7E+01**	**6.4E+02**	**UG/L**	**CAA03-GW02-1109**	**14/14**	**5 - 5**	**6.4E+02**	**5.8E+01**	**3.2E+01 N**	**5.0E+01**	**SMCL**	**YES**	**ASL**
	7439-97-6	**Mercury**	**3.0E-02 J**	**2.3E+00**	**UG/L**	**CAA03-GW05-1109**	**3/14**	**0.2 - 0.2**	**2.3E+00**	**N/A**	**4.3E-01 N**	**2.0E+00**	**MCL**	**YES**	**ASL**
	7440-02-0	Nickel	2.9E-01 J	1.3E+01 J	UG/L	CAA03-GW03-1109	13/14	10 - 40	1.3E+01	1.1E+01	3.0E+01 N	N/A		NO	BSL
	7440-09-7	Potassium	4.2E+02 J	1.7E+04	UG/L	CAA03-GW02-1109	14/14	1000 - 1000	1.7E+04	3.5E+03	N/A	N/A		NO	NUT
	7782-49-2	Selenium	3.1E+00 J	3.1E+00 J	UG/L	CAS04-GW05-1212	1/14	10 - 10	3.1E+00	N/A	7.8E+00 N	5.0E+01	MCL	NO	BSL
	7440-22-4	Silver	8.4E-01 J	2.2E+00 J	UG/L	CAA03-GW05-1109	3/14	10 - 15	2.2E+00	N/A	7.1E+00 N	N/A		NO	BSL
	7440-23-5	Sodium	2.2E+03	3.6E+04	UG/L	CAA03-GW02-1109	14/14	1000 - 1000	3.6E+04	9.9E+03	N/A	N/A		NO	NUT
	7440-28-0	**Thallium**	**1.1E+00 J**	**1.1E+00 J**	**UG/L**	**CAS04-GW08-1212**	**1/14**	**2 - 15**	**1.1E+00**	**N/A**	**1.6E-02 N**	**2.0E+00**	**MCL**	**YES**	**ASL**
	7440-62-2	**Vanadium**	**3.6E-01 J**	**5.5E+01**	**UG/L**	**CAA03-GW03-1109**	**10/14**	**10 - 25**	**5.5E+01**	**2.6E+01**	**6.3E+00 N**	**N/A**		**YES**	**ASL**
	7440-66-6	Zinc	4.0E+00 J	5.6E+01	UG/L	CAA03-GW02-1109	7/14	20 - 25	5.6E+01	4.5E+00	4.7E+02 N	5.0E+03	SMCL	NO	BSL

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Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentration. Unfiltered results for metals since in general no significant difference between filtered and unfiltered results of aluminum, iron, and manganese in any of the monitoring wells.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background groundwater samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water Available: http://epa-prgs.ornl.gov/chemicals/index.shtml
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL value for cresols used for 3- and 4-methylphenol.
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
RSL value for chromium(VI) used as surrogate for chromium.
RSL value for mercuric chloride (and other mercury salts) used as surrogate for mercury.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
UG/L = micrograms per liter
MCL = Maximum Contaminant Level
SMCL = Maximum Contaminant Level, Secondary Drinking Water Standards

Table 2.18

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Water Vapors at Showerhead and in Excavation Trench	95-50-1	1,2-Dichlorobenzene	2.0E-01 J	2.0E-01 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E-01	N/A	2.8E+01 N	6.0E+02	MCL	NO	BSL
	106-46-7	**1,4-Dichlorobenzene**	**2.0E+00 J**	**2.0E+00 J**	**UG/L**	**CAA03-GW03-1109**	**1/14**	**1 - 1**	**2.0E+00**	**N/A**	**4.2E-01 C**	**7.5E+01**	**MCL**	**YES**	**ASL**
	67-64-1	Acetone	2.6E+00 J	2.6E+00 J	UG/L	CAS04-GW08-1212	1/14	5 - 7	2.6E+00	N/A	1.2E+03 N	N/A		NO	BSL
	71-43-2	**Benzene**	**1.4E+01**	**1.4E+01**	**UG/L**	**CAA03-GW05-1109**	**1/14**	**1 - 1**	**1.4E+01**	**N/A**	**3.9E-01 C**	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-15-0	Carbon disulfide	2.9E-01 J	8.6E-01 J	UG/L	CAS04-GW07-1212	4/14	1 - 1	8.6E-01	N/A	7.2E+01 N	N/A		NO	BSL
	110-82-7	Cyclohexane	1.2E+01	1.2E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.2E+01	N/A	1.3E+03 N	N/A		NO	BSL
	100-41-4	**Ethylbenzene**	**2.0E-01 J**	**1.0E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**1 - 1**	**1.0E+01**	**N/A**	**1.3E+00 C**	**7.0E+02**	**MCL**	**YES**	**ASL**
	98-82-8	Isopropylbenzene	4.0E+00	4.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	4.0E+00	N/A	3.9E+01 N	N/A		NO	BSL
	m&pXYLENE	**m- and p-Xylene**	**1.0E+00 J**	**2.0E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**2 - 2**	**2.0E+01**	**N/A**	**1.9E+01 N**	**N/A**		**YES**	**ASL**
	108-87-2	Methylcyclohexane	1.1E+01	1.1E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.1E+01	N/A	2.5E+01 N	N/A		NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	3.0E+00	3.0E+00	UG/L	CAA03-GW01-1109	1/14	1 - 2	3.0E+00	N/A	1.2E+01 C	N/A		NO	BSL
	95-47-6	o-Xylene	4.0E-01 J	5.0E+00	UG/L	CAA03-GW05-1109	2/14	1 - 1	5.0E+00	N/A	1.9E+01 N	N/A		NO	BSL
	100-42-5	Styrene	5.0E-01 J	5.0E-01 J	UG/L	CAA03-GW05-1109	1/14	1 - 1	5.0E-01	N/A	1.1E+02 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	2.0E+00	2.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	2.0E+00	N/A	8.6E+01 N	1.0E+03	MCL	NO	BSL
	79-01-6	**Trichloroethene**	**4.0E-01 J**	**4.0E-01 J**	**UG/L**	**CAS04-GW03-1009**	**1/14**	**1 - 1**	**4.0E-01**	**N/A**	**2.6E-01 N**	**5.0E+00**	**MCL**	**YES**	**ASL**
	1330-20-7	**Xylene, total**	**2.0E+00 J**	**2.5E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**3 - 3**	**2.5E+01**	**N/A**	**1.9E+01 N**	**1.0E+04**	**MCL**	**YES**	**ASL**
	92-52-4	**1,1-Biphenyl**	**8.0E+00 J**	**8.0E+00 J**	**UG/L**	**CAA03-GW05-1109**	**1/8**	**9 - 12**	**8.0E+00**	**N/A**	**8.3E-02 N**	**N/A**		**YES**	**ASL**
	91-57-6	**2-Methylnaphthalene[6]**	**1.5E+00**	**3.2E+01**	**UG/L**	**CAA03-GW05-1109**	**3/14**	**0.19 - 29**	**3.2E+01**	**N/A**	**2.7E+00 N**	**N/A**		**YES**	**ASL**
	83-32-9	Acenaphthene	5.4E-01	8.9E+00 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	8.9E+00	N/A	4.0E+01 N	N/A		NO	BSL
	208-96-8	Acenaphthylene	2.6E-01 J	4.8E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	4.8E+00	N/A	4.0E+01 N	N/A		NO	BSL
	120-12-7	Anthracene	2.6E-01	6.7E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.7E+00	N/A	1.3E+02 N	N/A		NO	BSL
	100-52-7	Benzaldehyde	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	2.0E+00	N/A	1.5E+02 N	N/A		NO	BSL
	191-24-2	Benzo(g,h,i)perylene	8.3E-02 J	1.2E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	1.2E+00	N/A	8.7E+00 N	2.0E-01	MCL	NO	BSL
	132-64-9	**Dibenzofuran[6]**	**3.0E+00 J**	**1.9E+01**	**UG/L**	**CAA03-GW05-1109**	**2/8**	**9 - 12**	**1.9E+01**	**N/A**	**5.8E-01 N**	**N/A**		**YES**	**ASL**
	86-73-7	Fluorene	9.8E-01	2.1E+01 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	2.1E+01	N/A	2.2E+01 N	N/A		NO	BSL
	91-20-3	**Naphthalene**	**6.3E-02 J**	**5.6E+02**	**UG/L**	**CAA03-GW05-1109**	**4/14**	**0.19 - 23**	**5.6E+02**	**N/A**	**1.4E-01 C**	**N/A**		**YES**	**ASL**
	85-01-8	Phenanthrene	1.6E+00	3.6E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	3.6E+01	N/A	1.3E+02 N	N/A		NO	BSL
	129-00-0	Pyrene	4.2E-01	6.3E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.3E+00	N/A	8.7E+00 N	N/A		NO	BSL

Table 2.18

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentration.

[2] Maximum concentration is used for screening.

[3] Background values are 95% UTL from Cheatham Annex/Yorktown background groundwater samples, June 2012.

[4] Oak Ridge National Laboratory (ORNL). May 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites.
Tap Water RSLs (based on 10^{-6} for carcinogens and HQ of 0.1 for noncarcinogens). [Online]. Available: http://epa-prgs.ornl.gov/chemicals/index.shtml
Concentrations based on noncarcinogenic health effects are adjusted using HQ=0.1
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for cresols used for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

[6] Not quantified in HHRA because there are no inhalation toxicity values available for this constituent.

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
UG/L = micrograms per liter
MCL = Maximum Contaminant Level

Table 2.19

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Residential)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Shallow Aquifer - Indoor Air	95-50-1	1,2-Dichlorobenzene	2.0E-01 J	2.0E-01 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E-01	N/A	4.4E+03 N	6.0E+02	MCL	NO	BSL
	106-46-7	1,4-Dichlorobenzene	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E+00	N/A	3.6E+00 C	7.5E+01	MCL	NO	BSL
	67-64-1	Acetone	2.6E+00 J	2.6E+00 J	UG/L	CAS04-GW08-1212	1/14	5 - 7	2.6E+00	N/A	3.1E+07 N	N/A		NO	BSL
	71-43-2	**Benzene**	**1.4E+01**	**1.4E+01**	**UG/L**	**CAA03-GW05-1109**	**1/14**	**1 - 1**	**1.4E+01**	**N/A**	1.9E+00 C	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-15-0	Carbon disulfide	2.9E-01 J	8.6E-01 J	UG/L	CAS04-GW07-1212	4/14	1 - 1	8.6E-01	N/A	1.7E+03 N	N/A		NO	BSL
	110-82-7	Cyclohexane	1.2E+01	1.2E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.2E+01	N/A	1.4E+03 N	N/A		NO	BSL
	100-41-4	**Ethylbenzene**	**2.0E-01 J**	**1.0E+01**	**UG/L**	**CAA03-GW05-1109**	**2/14**	**1 - 1**	**1.0E+01**	**N/A**	4.7E+00 C	**7.0E+02**	**MCL**	**YES**	**ASL**
	98-82-8	Isopropylbenzene	4.0E+00	4.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	4.0E+00	N/A	1.5E+03 N	N/A		NO	BSL
	m&pXYLENE	m- and p-Xylene	1.0E+00 J	2.0E+01	UG/L	CAA03-GW05-1109	2/14	2 - 2	2.0E+01	N/A	5.5E+02 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	1.1E+01	1.1E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.1E+01	N/A	1.4E+03 N	N/A		NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	3.0E+00	3.0E+00	UG/L	CAA03-GW01-1109	1/14	1 - 2	3.0E+00	N/A	5.3E+02 C	N/A		NO	BSL
	95-47-6	o-Xylene	4.0E-01 J	5.0E+00	UG/L	CAA03-GW05-1109	2/14	1 - 1	5.0E+00	N/A	7.6E+02 N	N/A		NO	BSL
	100-42-5	Styrene	5.0E-01 J	5.0E-01 J	UG/L	CAA03-GW05-1109	1/14	1 - 1	5.0E-01	N/A	1.5E+04 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	2.0E+00	2.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	2.0E+00	N/A	2.8E+04 N	1.0E+03	MCL	NO	BSL
	79-01-6	Trichloroethene	4.0E-01 J	4.0E-01 J	UG/L	CAS04-GW03-1009	1/14	1 - 1	4.0E-01	N/A	1.5E+00 C	5.0E+00	MCL	NO	BSL
	1330-20-7	Xylene, total	2.0E+00 J	2.5E+01	UG/L	CAA03-GW05-1109	2/14	3 - 3	2.5E+01	N/A	7.6E+02 N	1.0E+04	MCL	NO	BSL
	92-52-4	1,1-Biphenyl	8.0E+00 J	8.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	8.0E+00	N/A	6.0E+01 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	1.5E+00	3.2E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 29	3.2E+01	N/A	N/A	N/A		NO	NTX
	83-32-9	Acenaphthene	5.4E-01	8.9E+00 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	8.9E+00	N/A	N/A	N/A		NO	NTX
	208-96-8	Acenaphthylene	2.6E-01 J	4.8E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	4.8E+00	N/A	N/A	N/A		NO	NTX
	120-12-7	Anthracene	2.6E-01	6.7E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.7E+00	N/A	N/A	N/A		NO	NTX
	100-52-7	Benzaldehyde	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	2.0E+00	N/A	N/A	N/A		NO	NTX
	191-24-2	Benzo(g,h,i)perylene	8.3E-02 J	1.2E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	1.2E+00	N/A	N/A	2.0E-01	MCL	NO	NTX
	132-64-9	Dibenzofuran	3.0E+00 J	1.9E+01	UG/L	CAA03-GW05-1109	2/8	9 - 12	1.9E+01	N/A	N/A	N/A		NO	NTX
	86-73-7	Fluorene	9.8E-01	2.1E+01 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	2.1E+01	N/A	N/A	N/A		NO	NTX
	91-20-3	**Naphthalene**	**6.3E-02 J**	**5.6E+02**	**UG/L**	**CAA03-GW05-1109**	**4/14**	**0.19 - 23**	**5.6E+02**	**N/A**	**6.9E+00 C**	**N/A**		**YES**	**ASL**
	85-01-8	Phenanthrene	1.6E+00	3.6E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	3.6E+01	N/A	N/A	N/A		NO	NTX
	129-00-0	Pyrene	4.2E-01	6.3E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.3E+00	N/A	N/A	N/A		NO	NTX

Table 2.19

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Residential)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentration.
[2] Maximum concentration is used for screening.
[3] Background values not available.
[4] Vapor Intrusion Groundwater Screening Levels. See Table 2.19 Supplement A
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for m-xylene used as surrogate for m- and p-xylene.
RSL value for p-Cresol used as surrogate for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
UG/L = micrograms per liter
MCL = Maximum Contaminant Level

OSWER VAPOR INTRUSION ASSESSMENT

Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, May 2013 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	17.58	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

	CAS	Chemical Name	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1	Is Target Ground Water Conc. < MCL?	Pure Phase Vapor Conc. @ 25°C	Groundwater Vapor Conc.	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
			Cvp > Cia,target?	Chc > Cia,target?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Cvp	Chc	Tgw or 25	LEL		IUR		RfC		i	Cia,c	Cia,nc
			Yes/No	Yes/No	(ug/m³)	C/NC	(ug/m³)	(ug/L)	Yes/No (MCL ug/L)	(ug/m³)	(ug/m³)	C	(% by vol)		(ug/m³)⁻¹		(mg/m³)			(ug/m³)	(ug/m³)
	83-32-9	Acenaphthene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	1.78E+04	1.47E+04	17.58	0.6	M							
	67-64-1	Acetone	Yes	Yes	3.2E+04	NC	3.2E+05	3.1E+07	--	7.25E+08	1.04E+09	17.58	2.6	E			3.10E+01	A			3.2E+04
	120-12-7	Anthracene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	6.26E+01	4.51E+01	17.58	0.6	M							
	100-52-7	Benzaldehyde	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	7.25E+06	4.14E+06	17.58	1.4	M							
x	71-43-2	Benzene	Yes	Yes	3.1E-01	C	3.1E+00	1.9E+00	Yes (5)	3.98E+08	2.87E+08	17.58	1.2	N	7.80E-06	I	3.00E-02	I		3.1E-01	3.1E+01
	92-52-4	Biphenyl, 1,1'-	Yes	Yes	4.2E-01	NC	4.2E+00	6.0E+01	--	7.41E+04	4.79E+04	17.58	0.6	N			4.00E-04	X			4.2E-01
x	75-15-0	Carbon Disulfide	Yes	Yes	7.3E+02	NC	7.3E+03	1.7E+03	--	1.47E+09	9.55E+08	17.58	1.3	N			7.00E-01	I			7.3E+02
	98-82-8	Cumene	Yes	Yes	4.2E+02	NC	4.2E+03	1.5E+03	--	2.91E+07	1.68E+07	17.58	0.9	N			4.00E-01	I			4.2E+02
	110-82-7	Cyclohexane	Yes	Yes	6.3E+03	NC	6.3E+04	1.4E+03	--	4.39E+08	2.40E+08	17.58					6.00E+00	I			6.3E+03
	132-64-9	Dibenzofuran	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	2.24E+04	6.29E+02	17.58									
	95-50-1	Dichlorobenzene, 1,2-	Yes	Yes	2.1E+02	NC	2.1E+03	4.4E+03	No (600)	1.16E+07	7.42E+06	17.58	2.2	N			2.00E-01	H			2.1E+02
x	106-46-7	Dichlorobenzene, 1,4-	Yes	Yes	2.2E-01	C	2.2E+00	3.6E+00	Yes (75)	1.38E+07	4.95E+06	17.58	2.5	N	1.10E-05	CA	8.00E-01	I		2.2E-01	8.3E+02
	100-41-4	Ethylbenzene	Yes	Yes	9.7E-01	C	9.7E+00	4.7E+00	Yes (700)	5.48E+07	3.53E+07	17.58	0.8	N	2.50E-06	CA	1.00E+00	I		9.7E-01	1.0E+03
	86-73-7	Fluorene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	5.37E+03	3.32E+03	17.58									
	110-54-3	Hexane, N-	Yes	Yes	7.3E+02	NC	7.3E+03	1.4E+01	--	7.00E+08	5.03E+08	17.58	1.1	N			7.00E-01	I			7.3E+02
	1634-04-4	Methyl tert-Butyl Ether (MTBE)	Yes	Yes	9.4E+00	C	9.4E+01	5.3E+02	--	1.19E+09	8.97E+08	17.58	1.6	M	2.60E-07	CA	3.00E+00	I		9.4E+00	3.1E+03
	91-57-6	Methylnaphthalene, 2-	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	4.21E+05	2.60E+05	17.58									
	91-20-3	Naphthalene	Yes	Yes	7.2E-02	C	7.2E-01	6.9E+00	--	5.86E+05	3.21E+05	17.58	0.9	N	3.40E-05	CA	3.00E-03	I		7.2E-02	3.1E+00
	129-00-0	Pyrene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	4.90E+01	2.67E+01	17.58									
	100-42-5	Styrene	Yes	Yes	1.0E+03	NC	1.0E+04	1.5E+04	No (100)	3.59E+07	2.23E+07	17.58	1.1	E			1.00E+00	I			1.0E+03
x	108-88-3	Toluene	Yes	Yes	5.2E+03	NC	5.2E+04	2.8E+04	No (1000)	1.41E+08	9.65E+07	17.58	1.1	N			5.00E+00	I			5.2E+03
x	79-01-6	Trichloroethylene	Yes	Yes	4.3E-01	C	4.3E+00	1.5E+00	Yes (5)	4.88E+08	3.58E+08	17.58	8	N	see note	I	2.00E-03	I	TCE	4.3E-01	2.1E+00
	108-38-3	Xylene, m-	Yes	Yes	1.0E+02	NC	1.0E+03	5.5E+02	--	4.74E+07	3.05E+07	17.58	1.1	N			1.00E-01	S			1.0E+02
x	95-47-6	Xylene, o-	Yes	Yes	1.0E+02	NC	1.0E+03	7.6E+02	--	4.56E+07	2.43E+07	17.58	0.9	N			1.00E-01	S			1.0E+02
x	106-42-3	Xylene, P-	Yes	Yes	1.0E+02	NC	1.0E+03	5.7E+02	--	5.05E+07	2.95E+07	17.58	1	N			1.00E-01	S			1.0E+02
x	1330-20-7	Xylenes	Yes	Yes	1.0E+02	NC	1.0E+03	7.6E+02	Yes (10000)	4.78E+07	1.45E+07	17.58					1.00E-01	I			1.0E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	30	ATnc_C	25	ATnc	30
Exposure duration	(yrs)	ED_R	30	ED_C	25	ED	30
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	350
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
Groundwater	(-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R	0.1	AFss_C	0.1	AFss	0.1

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)

Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)

Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	1.00E-06
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 30 years	14	1
Mutagenic-mode-of-action (MMOA) adjustment factor		76

This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium

C = Carcinogenic

NC = noncarcinogenic

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html

P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml

A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html

CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp

H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml

S = See RSL User Guide, Section 5

X = PPRTV Appendix

E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html

N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: http://www.cdc.gov/niosh/npg/default.html http://www.cdc.gov/niosh/npg/default.html

M = Chemical-specific MSDS

Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).

VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).

TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).

Yellow highlighting indicates site-specific parameters that may be edited by the user.

Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.

**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

Table 2.20

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Industrial)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Shallow Aquifer - Indoor Air	95-50-1	1,2-Dichlorobenzene	2.0E-01 J	2.0E-01 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E-01	N/A	1.8E+04 N	6.0E+02	MCL	NO	BSL
	106-46-7	1,4-Dichlorobenzene	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW03-1109	1/14	1 - 1	2.0E+00	N/A	1.8E+01 C	7.5E+01	MCL	NO	BSL
	67-64-1	Acetone	2.6E+00 J	2.6E+00 J	UG/L	CAS04-GW08-1212	1/14	5 - 7	2.6E+00	N/A	1.3E+08 N	N/A		NO	BSL
	71-43-2	**Benzene**	**1.4E+01**	**1.4E+01**	**UG/L**	**CAA03-GW05-1109**	**1/14**	**1 - 1**	**1.4E+01**	**N/A**	9.8E+00 C	**5.0E+00**	**MCL**	**YES**	**ASL**
	75-15-0	Carbon disulfide	2.9E-01 J	8.6E-01 J	UG/L	CAS04-GW07-1212	4/14	1 - 1	8.6E-01	N/A	6.9E+03 N	N/A		NO	BSL
	110-82-7	Cyclohexane	1.2E+01	1.2E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.2E+01	N/A	6.0E+03 N	N/A		NO	BSL
	100-41-4	Ethylbenzene	2.0E-01 J	1.0E+01	UG/L	CAA03-GW05-1109	2/14	1 - 1	1.0E+01	N/A	2.4E+01 C	7.0E+02	MCL	NO	BSL
	98-82-8	Isopropylbenzene	4.0E+00	4.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	4.0E+00	N/A	6.4E+03 N	N/A		NO	BSL
	m&pXYLENE	m- and p-Xylene	1.0E+00 J	2.0E+01	UG/L	CAA03-GW05-1109	2/14	2 - 2	2.0E+01	N/A	2.3E+03 N	N/A		NO	BSL
	108-87-2	Methylcyclohexane	1.1E+01	1.1E+01	UG/L	CAA03-GW05-1109	1/14	1 - 1	1.1E+01	N/A	5.8E+01 N	N/A		NO	BSL
	1634-04-4	Methyl-tert-butyl ether (MTBE)	3.0E+00	3.0E+00	UG/L	CAA03-GW01-1109	1/14	1 - 2	3.0E+00	N/A	2.7E+03 C	N/A		NO	BSL
	95-47-6	o-Xylene	4.0E-01 J	5.0E+00	UG/L	CAA03-GW05-1109	2/14	1 - 1	5.0E+00	N/A	3.2E+03 N	N/A		NO	BSL
	100-42-5	Styrene	5.0E-01 J	5.0E-01 J	UG/L	CAA03-GW05-1109	1/14	1 - 1	5.0E-01	N/A	6.1E+04 N	1.0E+02	MCL	NO	BSL
	108-88-3	Toluene	2.0E+00	2.0E+00	UG/L	CAA03-GW05-1109	1/14	1 - 1	2.0E+00	N/A	1.2E+05 N	1.0E+03	MCL	NO	BSL
	79-01-6	Trichloroethene	4.0E-01 J	4.0E-01 J	UG/L	CAS04-GW03-1009	1/14	1 - 1	4.0E-01	N/A	1.1E+01 C	5.0E+00	MCL	NO	BSL
	1330-20-7	Xylene, total	2.0E+00 J	2.5E+01	UG/L	CAA03-GW05-1109	2/14	3 - 3	2.5E+01	N/A	3.2E+03 N	1.0E+04	MCL	NO	BSL
	92-52-4	1,1-Biphenyl	8.0E+00 J	8.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	8.0E+00	N/A	2.5E+02 N	N/A		NO	BSL
	91-57-6	2-Methylnaphthalene	1.5E+00	3.2E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 29	3.2E+01	N/A	N/A	N/A		NO	NTX
	83-32-9	Acenaphthene	5.4E-01	8.9E+00 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	8.9E+00	N/A	N/A	N/A		NO	NTX
	208-96-8	Acenaphthylene	2.6E-01 J	4.8E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	4.8E+00	N/A	N/A	N/A		NO	NTX
	120-12-7	Anthracene	2.6E-01	6.7E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.7E+00	N/A	N/A	N/A		NO	NTX
	100-52-7	Benzaldehyde	2.0E+00 J	2.0E+00 J	UG/L	CAA03-GW05-1109	1/8	9 - 12	2.0E+00	N/A	N/A	N/A		NO	NTX
	191-24-2	Benzo(g,h,i)perylene	8.3E-02 J	1.2E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	1.2E+00	N/A	N/A	2.0E-01	MCL	NO	NTX
	132-64-9	Dibenzofuran	3.0E+00 J	1.9E+01	UG/L	CAA03-GW05-1109	2/8	9 - 12	1.9E+01	N/A	N/A	N/A		NO	NTX
	86-73-7	Fluorene	9.8E-01	2.1E+01 J	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	2.1E+01	N/A	N/A	N/A		NO	NTX
	91-20-3	**Naphthalene**	**6.3E-02 J**	**5.6E+02**	**UG/L**	**CAA03-GW05-1109**	**4/14**	**0.19 - 23**	**5.6E+02**	**N/A**	**3.5E+01 C**	**N/A**		**YES**	**ASL**
	85-01-8	Phenanthrene	1.6E+00	3.6E+01	UG/L	CAA03-GW05-1109	3/14	0.19 - 23	3.6E+01	N/A	N/A	N/A		NO	NTX
	129-00-0	Pyrene	4.2E-01	6.3E+00	UG/L	CAA03-GW05-1109	3/14	0.19 - 0.57	6.3E+00	N/A	N/A	N/A		NO	NTX

Table 2.20

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air (Industrial)

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

[1] Minimum/Maximum detected concentration.
[2] Maximum concentration is used for screening.
[3] Background values not available.
[4] Vapor Intrusion Groundwater Screening Levels. See Table 2.20 Supplement A
RSL for n-hexane used as surrogate for methylcyclohexane.
RSL value for m-xylene used as surrogate for m- and p-xylene.
RSL value for cresols used for 3- and 4-methylphenol.
RSL value for acenapthene used as surrogate for acenaphthylene.
RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.
RSL value for anthracene used as surrogate for phenanthrene.
[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
C = Carcinogenic
N = Noncarcinogenic
UG/L = micrograms per liter
MCL = Maximum Contaminant Level

OSWER VAPOR INTRUSION ASSESSMENT
Vapor Intrusion Screening Level (VISL) Calculator Version 3.0, May 2013 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	17.58	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

	CAS	Chemical Name	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1	Is Target Ground Water Conc. < MCL?	Pure Phase Vapor Conc. @ 25°C	Groundwater Vapor Conc.	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
			Cvp > Cia,target?	Chc > Cia,target?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Cvp	Chc	Tgw or 25	LEL		IUR		RfC		i	Cia,c	Cia,nc
			Yes/No	Yes/No	(ug/m³)	C/NC	(ug/m³)	(ug/L)	Yes/No (MCL ug/L)	(ug/m³)	(ug/m³)	C	(% by vol)		(ug/m³)⁻¹		(mg/m³)			(ug/m³)	(ug/m³)
	83-32-9	Acenaphthene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	1.78E+04	1.47E+04	17.58	0.6	M							
	67-64-1	Acetone	Yes	Yes	1.4E+05	NC	1.4E+06	1.3E+08	--	7.25E+08	1.04E+09	17.58	2.6	E			3.10E+01	A			1.4E+05
	120-12-7	Anthracene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	6.26E+01	4.51E+01	17.58	0.6	M							
	100-52-7	Benzaldehyde	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	7.25E+06	4.14E+06	17.58	1.4	M							
x	71-43-2	Benzene	Yes	Yes	1.6E+00	C	1.6E+01	9.8E+00	No (5)	3.98E+08	2.87E+08	17.58	1.2	N	7.80E-06	I	3.00E-02	I		1.6E+00	1.3E+02
	92-52-4	Biphenyl, 1,1'-	Yes	Yes	1.8E+00	NC	1.8E+01	2.5E+02	--	7.41E+04	4.79E+04	17.58	0.6	N			4.00E-04	X			1.8E+00
x	75-15-0	Carbon Disulfide	Yes	Yes	3.1E+03	NC	3.1E+04	6.9E+03	--	1.47E+09	9.55E+08	17.58	1.3	N			7.00E-01	I			3.1E+03
	98-82-8	Cumene	Yes	Yes	1.8E+03	NC	1.8E+04	6.4E+03	--	2.91E+07	1.68E+07	17.58	0.9	N			4.00E-01	I			1.8E+03
	110-82-7	Cyclohexane	Yes	Yes	2.6E+04	NC	2.6E+05	6.0E+03	--	4.39E+08	2.40E+08	17.58					6.00E+00	I			2.6E+04
	132-64-9	Dibenzofuran	No Inhal. Tox. Info	No Inhal. Tox. Info		--	--	--	--	2.24E+04	6.29E+02	17.58									
	95-50-1	Dichlorobenzene, 1,2-	Yes	Yes	8.8E+02	NC	8.8E+03	1.8E+04	No (600)	1.16E+07	7.42E+06	17.58	2.2	N			2.00E-01	H			8.8E+02
x	106-46-7	Dichlorobenzene, 1,4-	Yes	Yes	1.1E+00	C	1.1E+01	1.8E+01	Yes (75)	1.38E+07	4.95E+06	17.58	2.5	N	1.10E-05	CA	8.00E-01	I		1.1E+00	3.5E+03
	100-41-4	Ethylbenzene	Yes	Yes	4.9E+00	C	4.9E+01	2.4E+01	Yes (700)	5.48E+07	3.53E+07	17.58	0.8	N	2.50E-06	CA	1.00E+00	I		4.9E+00	4.4E+03
	86-73-7	Fluorene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	5.37E+03	3.32E+03	17.58									
	110-54-3	Hexane, N-	Yes	Yes	3.1E+03	NC	3.1E+04	5.8E+01	--	7.00E+08	5.03E+08	17.58	1.1	N			7.00E-01	I			3.1E+03
	1634-04-4	Methyl tert-Butyl Ether (MTBE)	Yes	Yes	4.7E+01	C	4.7E+02	2.7E+03	--	1.19E+09	8.97E+08	17.58	1.6	M	2.60E-07	CA	3.00E+00	I		4.7E+01	1.3E+04
	91-57-6	Methylnaphthalene, 2-	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	4.21E+05	2.60E+05	17.58									
	91-20-3	Naphthalene	Yes	Yes	3.6E-01	C	3.6E+00	3.5E+01	--	5.86E+05	3.21E+05	17.58	0.9	N	3.40E-05	CA	3.00E-03	I		3.6E-01	1.3E+01
	129-00-0	Pyrene	No Inhal. Tox. Info	No Inhal. Tox. Info	--	--	--	--	--	4.90E+01	2.67E+01	17.58									
	100-42-5	Styrene	Yes	Yes	4.4E+03	NC	4.4E+04	6.1E+04	No (100)	3.59E+07	2.23E+07	17.58	1.1	E			1.00E+00	I			4.4E+03
x	108-88-3	Toluene	Yes	Yes	2.2E+04	NC	2.2E+05	1.2E+05	No (1000)	1.41E+08	9.65E+07	17.58	1.1	N			5.00E+00	I			2.2E+04
x	79-01-6	Trichloroethylene	Yes	Yes	3.0E+00	C	3.0E+01	1.1E+01	No (5)	4.88E+08	3.58E+08	17.58	8	N	see note	I	2.00E-03	I	TCE	3.0E+00	8.8E+00
	108-38-3	Xylene, m-	Yes	Yes	4.4E+02	NC	4.4E+03	2.3E+03	--	4.74E+07	3.05E+07	17.58	1.1	N			1.00E-01	S			4.4E+02
x	95-47-6	Xylene, o-	Yes	Yes	4.4E+02	NC	4.4E+03	3.2E+03	--	4.56E+07	2.43E+07	17.58	0.9	N			1.00E-01	S			4.4E+02
x	106-42-3	Xylene, P-	Yes	Yes	4.4E+02	NC	4.4E+03	2.4E+03	--	5.05E+07	2.95E+07	17.58	1	N			1.00E-01	S			4.4E+02
x	1330-20-7	Xylenes	Yes	Yes	4.4E+02	NC	4.4E+03	3.2E+03	Yes (10000)	4.78E+07	1.45E+07	17.58					1.00E-01	I			4.4E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	30	ATnc_C	25	ATnc	25
Exposure duration	(yrs)	ED_R	30	ED_C	25	ED	25
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	250
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
Groundwater	(-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R	0.1	AFss_C	0.1	AFss	0.1

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario in cell E6) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	0.00E+00
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 30 years	14	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:
NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium
C = Carcinogenic
NC = noncarcinogenic
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html
N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: http://www.cdc.gov/niosh/npg/default.html http://www.cdc.gov/niosh/npg/default.html
M = Chemical-specific MSDS
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

Table 3.1.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Surface Soil within Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	MG/KG	3.1E+04	N/A	1.8E+02		1.8E+02	MG/KG	Max	(1)
	Benzo(a)pyrene	MG/KG	2.2E+04	N/A	1.3E+02		1.3E+02	MG/KG	Max	(1)
	Benzo(b)fluoranthene	MG/KG	3.4E+04	N/A	2.0E+02		2.0E+02	MG/KG	Max	(1)
	Benzo(k)fluoranthene	MG/KG	1.4E+04	N/A	8.1E+01		8.1E+01	MG/KG	Max	(1)
	Carbazole	MG/KG	2.4E+04	N/A	1.2E+02	J	1.2E+02	MG/KG	Max	(1)
	Chrysene	MG/KG	3.6E+04	N/A	2.1E+02		2.1E+02	MG/KG	Max	(1)
	Dibenz(a,h)anthracene	MG/KG	3.8E+03	N/A	2.2E+01	K	2.2E+01	MG/KG	Max	(1)
	Dibenzofuran	MG/KG	4.0E+03	N/A	1.9E+01		1.9E+01	MG/KG	Max	(1)
	Fluoranthene	MG/KG	8.5E+04	N/A	5.0E+02		5.0E+02	MG/KG	Max	(1)
	Indeno(1,2,3-cd)pyrene	MG/KG	1.2E+04	N/A	6.9E+01	J	6.9E+01	MG/KG	Max	(1)
	Naphthalene	MG/KG	4.4E+03	N/A	2.6E+01	J	2.6E+01	MG/KG	Max	(1)
	Pyrene	MG/KG	6.6E+04	N/A	3.9E+02		3.9E+02	MG/KG	Max	(1)
	Dieldrin	MG/KG	1.4E+02	N/A	6.5E-01	J	6.5E-01	MG/KG	Max	(1)
	gamma-BHC (Lindane)	MG/KG	1.8E+02	N/A	8.6E-01		8.6E-01	MG/KG	Max	(1)
	Aluminum	MG/KG	9.7E+03	N/A	1.3E+04		1.3E+04	MG/KG	Max	(1)
	Arsenic	MG/KG	4.5E+00	N/A	7.3E+00		7.3E+00	MG/KG	Max	(1)
	Chromium (hexavalent)	MG/KG	N/A	N/A	5.3E-01		5.3E-01	MG/KG	Max	(3)
	Cobalt	MG/KG	3.3E+00	N/A	4.9E+00		4.9E+00	MG/KG	Max	(1)
	Iron	MG/KG	1.5E+04	N/A	1.9E+04		1.9E+04	MG/KG	Max	(1)
	Lead	MG/KG	1.5E+02	N/A	7.9E+02		1.5E+02	MG/KG	Mean-N	(2)
	Manganese	MG/KG	1.7E+02	N/A	3.2E+02		3.2E+02	MG/KG	Max	(1)

Options: Maximum Detected Value (Max); Mean Normal (Mean-N)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available.
(2) Mean value used for lead models.
(3) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value
K = Biased High
N/A - Not Applicable
MG/KG = milligrams per kilogram

Table 3.2.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Naphthalene	µg/m^3	7.3E+01	N/A	4.3E-01 J	4.3E-01	µg/m^3	Max	(1)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available.

J - Estimated Value
K = Biased High
N/A - Not Applicable
ug/m^3 = micrograms per cubic meter

Table 3.3.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	MG/KG	6.9E-01	4.2E+00	NP	8.8E+00		4.2E+00	MG/KG	99% KM	(4)
	Benzo(a)pyrene	MG/KG	6.0E-01	3.5E+00	NP	7.0E+00		3.5E+00	MG/KG	99% KM	(4)
	Benzo(b)fluoranthene	MG/KG	6.9E-01	3.5E+00	NP	6.8E+00		3.5E+00	MG/KG	99% KM	(4)
	Benzo(k)fluoranthene	MG/KG	4.8E-01	1.7E+00	NP	6.8E+00		1.7E+00	MG/KG	95% KM	(1) (3)
	Dibenz(a,h)anthracene	MG/KG	1.1E-01	2.2E-01	NP	1.4E+00	J	2.2E-01	MG/KG	95% KM-BCA	(1) (3)
	Indeno(1,2,3-cd)pyrene	MG/KG	3.5E-01	1.8E+00	NP	3.4E+00	J	1.8E+00	MG/KG	99% KM	(1)
	Aldrin	MG/KG	N/A	N/A		3.3E-02	K	3.3E-02	MG/KG	Max	(5)
	Aroclor-1242	MG/KG	N/A	N/A		1.0E+00	K	1.0E+00	MG/KG	Max	(5)
	Aroclor-1260	MG/KG	1.6E-01	8.6E-01	NP	2.7E+00	K	8.6E-01	MG/KG	97.5% KM	(4)
	Aluminum	MG/KG	9.7E+03	1.2E+04	G	2.9E+04		1.2E+04	MG/KG	App. Gamma	(1) (3)
	Arsenic	MG/KG	1.7E+01	7.7E+01	NP	3.5E+02	J	7.7E+01	MG/KG	95% Cheb-m	(4)
	Cobalt	MG/KG	3.1E+00	3.9E+00	NP	1.2E+01	J	3.9E+00	MG/KG	95% KM-BCA	(1) (3)
	Iron	MG/KG	1.9E+04	4.0E+04	NP	1.2E+05	J	4.0E+04	MG/KG	95% Cheb-m	(4)
	Manganese	MG/KG	1.1E+02	1.6E+02	G	5.1E+02	J	1.6E+02	MG/KG	App. Gamma	(1) (3)
	Thallium	MG/KG	5.0E-01	5.6E-01	NP	1.1E+00	L	5.6E-01	MG/KG	95% KM-t	(4)
	Vanadium	MG/KG	2.2E+01	2.7E+01	G	6.4E+01		2.7E+01	MG/KG	App. Gamma	(1) (3)

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 99% Kaplan-Meier Chebyshev UCL (99% KM); 95% KM BCA UCL (95% KM-BCA); 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Approximate Gamma (App. Gamma); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 95% Kaplan-Meier (t) UCL (95% KM-t); Maximum Detected Value (Max)

Table 3.3.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because constituent detected in only one sample.

G - Gamma
J - Estimated Value
K - Biased High
L - Biased Low
MG/KG = milligrams per kilogram
NP - Non-Parametric

Table 3.4.RME

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Youth Pond	Arsenic	UG/L	1.5E+00	N/A	1.6E+00	J	1.6E+00	UG/L	Max	1

Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available.

J - Estimated Value
N/A - Not Applicable
UG/L = micrograms per liter

Table 3.5.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Upstream Pond											
	Benzo(a)pyrene	UG/L	9.4E-02	1.5E-01	NP	2.4E-01	J	1.5E-01	UG/L	95% KM-t	(4)
	Arsenic	UG/L	N/A	N/A		1.0E+01		1.0E+01	UG/L	Max	(5)
	Iron	UG/L	3.9E+03	1.3E+04	NP	1.9E+04		1.3E+04	UG/L	95% Cheb-m	(4)

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Chebyshev (mean, std) UCL (95% Cheb-m); Maximum Detected Value (Max)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because constituent detected in only one sample.

J - Estimated Value
UG/L = micrograms per liter
NP - Non-Parametric

Table 3.6.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe:Current/ Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Drainage Channel to Upstream Pond	Arsenic	UG/L	1.5E+01	N/A	5.8E+01	5.8E+01	UG/L	Max	(1)
	Iron	UG/L	6.7E+03	N/A	3.0E+04	3.0E+04	UG/L	Max	(1)

Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available.

N/A - Not Applicable
UG/L = micrograms per liter

Table 3.7.RME

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Drainage Channel to Upstream Pond	Benzo(a)pyrene	MG/KG	6.4E-02	1.9E-01	NP	3.8E-01		1.9E-01	MG/KG	95% KM	(1) (3)
	Arsenic	MG/KG	5.4E+00	7.3E+00	G	1.3E+01	L	7.3E+00	MG/KG	App. Gamma	(1) (3)
	Chromium	MG/KG	2.0E+01	4.0E+01	NP	7.2E+01	L	4.0E+01	MG/KG	95% Cheb-m	(4)

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier Chebyshev UCL (95% KM); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 95% Approximate Gamma (App. Gamma)

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

G - Gamma

L - Biased Low

MG/KG = milligrams per kilogram

NP - Non-Parametric

Table 3.8.RME

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Youth Pond											
	Benzo(a)anthracene	MG/KG	2.0E-01	8.3E-01	NP	2.4E+00		8.3E-01	MG/KG	97.5% KM	(4)
	Benzo(a)pyrene	MG/KG	2.1E-01	9.2E-01	NP	2.7E+00		9.2E-01	MG/KG	97.5% KM	(4)
	Benzo(b)fluoranthene	MG/KG	3.1E-01	1.3E+00	NP	3.7E+00		1.3E+00	MG/KG	97.5% KM	(4)
	Dibenz(a,h)anthracene	MG/KG	1.8E-01	2.0E-01	NP	4.0E-01		2.0E-01	MG/KG	95% KM-t	(4)
	Indeno(1,2,3-cd)pyrene	MG/KG	1.2E-01	2.6E-01	NP	1.5E+00		2.6E-01	MG/KG	95% KM (BCA)	(1)
	Arsenic	MG/KG	3.0E+01	7.5E+01	T	2.7E+02		7.5E+01	MG/KG	95% H-UCL	(1)
	Chromium	MG/KG	1.7E+01	2.5E+01	NP	3.5E+01		2.5E+01	MG/KG	95% Cheb-m	(4)
	Thallium	MG/KG	1.0E+00	1.4E+00	NP	1.9E+00	J	1.4E+00	MG/KG	95% KM-t	(1) (2) (3)

Notes:

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Kaplan-Meier (t) UCL (95% KM-t); 95% KM BCA UCL (95% KM-BCA); 95% H-Stat UCL (95% H-UCL); 95% Chebyshev (mean, std) UCL (95% Cheb-m)

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.

(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.

(3) Test indicates data are gamma distributed.

(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

J - Estimated Value

MG/KG = milligrams per kilogram

NP - Non-Parametric

T - Lognormal

Table 3.9.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Upstream Pond											
	Benzo(a)anthracene	MG/KG	2.4E-01	3.4E-01	NP	1.5E+00		3.4E-01	MG/KG	95% Boot	(1) (3)
	Benzo(a)pyrene	MG/KG	2.7E-01	5.7E-01	NP	2.1E+00		5.7E-01	MG/KG	95% KM	(1) (3)
	Benzo(b)fluoranthene	MG/KG	4.8E-01	1.1E+00	NP	3.9E+00		1.1E+00	MG/KG	95% KM	(1) (3)
	Dibenz(a,h)anthracene	MG/KG	7.0E-02	1.1E-01	NP	6.6E-01		1.1E-01	MG/KG	95% KM-t	(1) (3)
	Indeno(1,2,3-cd)pyrene	MG/KG	2.7E-01	8.2E-01	NP	2.8E+00		8.2E-01	MG/KG	97.5% KM	(1)
	Aroclor-1254	MG/KG	1.1E+00	5.3E+00	NP	2.1E+01		5.3E+00	MG/KG	97.5% KM	(4)
	Aroclor-1260	MG/KG	4.8E-01	1.0E+00	NP	2.4E+00		1.0E+00	MG/KG	95% KM	(1) (3)
	Dieldrin	MG/KG	8.7E-02	2.0E-01	NP	1.4E+00	J	2.0E-01	MG/KG	95% KM-t	(1) (3)
	Heptachlor epoxide	MG/KG	3.3E-02	8.2E-02	NP	5.4E-01	J	8.2E-02	MG/KG	95% KM-t	(1) (2)
	Arsenic	MG/KG	1.5E+01	2.0E+01	G	1.1E+02		2.0E+01	MG/KG	App. Gamma	(1) (3)
	Chromium	MG/KG	2.3E-02	2.8E-02	G	5.7E+01		2.8E-02	MG/KG	App. Gamma	(1) (3)
	Lead	MG/KG	6.0E+01	N/A		4.2E+02		6.0E+01	MG/KG	Mean-N	(5)

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier Percentile Bootstrap UCL (95% Boot); 95% Kaplan-Meier Chebyshev UCL (95% KM); 95% Kaplan-Meier (t) UCL (95% KM-t); 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Approximate Gamma (App. Gamma); Mean Normal (Mean-N)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Mean value used for lead models.

G - Gamma
J - Estimated Value
MG/KG = milligrams per kilogram
NP - Non-Parametric

Table 3.10.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/Surface Soil
Exposure Medium: Sediment/Surface Soil

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	MG/KG	1.3E+02	N/A	4.5E-01	4.5E-01	MG/KG	Max	(1)
	Benzo(a)pyrene	MG/KG	1.2E+02	N/A	4.5E-01	4.5E-01	MG/KG	Max	(1)
	Benzo(b)fluoranthene	MG/KG	2.3E+02	N/A	8.1E-01	8.1E-01	MG/KG	Max	(1)
	Dibenz(a,h)anthracene	MG/KG	3.5E+01	N/A	5.4E-02	5.4E-02	MG/KG	Max	(1)
	Indeno(1,2,3-cd)pyrene	MG/KG	6.0E+01	N/A	1.9E-01	1.9E-01	MG/KG	Max	(1)
	Arsenic	MG/KG	4.3E+00	N/A	7.7E+00	7.7E+00	MG/KG	Max	(1)
	Cobalt	MG/KG	1.7E+00	N/A	2.7E+00	2.7E+00	MG/KG	Max	(1)
	Iron	MG/KG	7.4E+03	N/A	1.1E+04	1.1E+04	MG/KG	Max	(1)
	Manganese	MG/KG	9.2E+01	N/A	2.2E+02	2.2E+02	MG/KG	Max	(1)

Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available.

MG/KG = milligrams per kilogram

Table 3.11.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic	Rationale
Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	MG/KG	5.3E+01	N/A	8.2E-02	J	8.2E-02	MG/KG	Max	(1)
	Aroclor-1260	MG/KG	2.4E+02	N/A	4.2E-01		4.2E-01	MG/KG	Max	(1)
	Dioxin-Like PCB TEQ	MG/KG	2.4E-01	N/A	8.1E-06		8.1E-06	MG/KG	Max	(1)
	Chromium	MG/KG	N/A	N/A	1.4E-01	J	1.4E-01	MG/KG	Max	(1)
	Mercury	MG/KG	6.0E-02	N/A	9.0E-02		9.0E-02	MG/KG	Max	(1)

Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Maximum detected concentration used because less than 8 samples available (2 samples).

N/A - Not Applicable
MG/KG = milligrams per kilogram

Table 3.12.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Soil* from inside and outside the Fenced Area	Benzo(a)anthracene	MG/KG	4.0E+00	3.9E+01	NP	1.8E+02		3.9E+01	MG/KG	99% KM	(4)
	Benzo(a)pyrene	MG/KG	3.0E+00	2.8E+01	NP	1.3E+02		2.8E+01	MG/KG	99% KM	(4)
	Benzo(b)fluoranthene	MG/KG	4.5E+00	4.4E+01	NP	2.0E+02		4.4E+01	MG/KG	99% KM	(4)
	Benzo(k)fluoranthene	MG/KG	1.9E+00	1.8E+01	NP	8.1E+01		1.8E+01	MG/KG	99% KM	(1) (3)
	bis(2-Ethylhexyl)phthalate	MG/KG	1.6E+00	4.6E+00	NP	6.3E+01	J	4.6E+00	MG/KG	95% KM-t	(1) (3)
	Carbazole	MG/KG	3.0E+00	3.2E+01	NP	1.2E+02	J	3.2E+01	MG/KG	99% KM	(4)
	Chrysene	MG/KG	4.7E+00	4.6E+01	NP	2.1E+02		4.6E+01	MG/KG	99% KM	(1)
	Dibenz(a,h)anthracene	MG/KG	5.1E-01	4.8E+00	NP	2.2E+01	K	4.8E+00	MG/KG	99% KM	(4)
	Dibenzofuran	MG/KG	6.0E-01	6.1E+00	NP	1.9E+01		6.1E+00	MG/KG	99% KM	(1)
	Fluoranthene	MG/KG	1.1E+01	1.1E+02	NP	5.0E+02		1.1E+02	MG/KG	99% KM	(1)
	Indeno(1,2,3-cd)pyrene	MG/KG	1.7E+00	1.5E+01	NP	6.9E+01	J	1.5E+01	MG/KG	99% KM	(1)
	Naphthalene	MG/KG	5.3E-01	5.8E+00	NP	2.6E+01	J	5.8E+00	MG/KG	99% KM	(4)
	Pyrene	MG/KG	8.5E+00	8.5E+01	NP	3.9E+02		8.5E+01	MG/KG	99% KM	(1)
	Aldrin	MG/KG	2.5E-03	4.6E-03	NP	3.3E-02	K	4.6E-03	MG/KG	95% KM-t	(1) (2)
	Aroclor-1242	MG/KG	1.0E+00	1.1E+00	NP	2.3E+00	L	1.1E+00	MG/KG	95% KM-t	(4)
	Aroclor-1260	MG/KG	1.3E-01	4.0E-01	NP	2.7E+00	K	4.0E-01	MG/KG	95% KM	(4)
	Dieldrin	MG/KG	1.7E-02	1.8E-01	NP	6.5E-01	J	1.8E-01	MG/KG	99% KM	(4)
	gamma-BHC (Lindane)	MG/KG	2.2E-02	2.4E-01	NP	8.6E-01		2.4E-01	MG/KG	99% KM	(1)
	Aluminum	MG/KG	1.1E+04	1.3E+04	T	3.2E+04		1.3E+04	MG/KG	95% H-UCL	(1)
	Arsenic	MG/KG	1.0E+01	4.0E+01	NP	3.5E+02	J	4.0E+01	MG/KG	95% Cheb-m	(4)
	Chromium (hexavalent)	MG/KG	2.8E-01	N/A		4.3E-01	J	4.3E-01	MG/KG	Max	(5)
	Cobalt	MG/KG	3.1E+00	3.6E+00	NP	1.2E+01	J	3.6E+00	MG/KG	95% KM-BCA	(3)
	Iron	MG/KG	1.7E+04	2.1E+04	G	1.2E+05	J	2.1E+04	MG/KG	App. Gamma	(1) (3)
	Lead	MG/KG	3.7E+01	N/A		7.9E+02		3.7E+01	MG/KG	Mean-N	(6)
	Manganese	MG/KG	1.0E+02	1.4E+02	NP	5.1E+02	J	1.4E+02	MG/KG	95% Cheb-m	(4)
	Thallium	MG/KG	3.5E-01	3.8E-01	NP	1.1E+00	L	3.8E-01	MG/KG	95% KM-t	(1) (2)
	Vanadium	MG/KG	2.5E+01	3.5E+01	NP	6.4E+01		3.5E+01	MG/KG	95% KM	(1)

Table 3.12.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

* Surface soil & subsurface soil combined.
ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier Chebyshev UCL (95% KM); 99% Kaplan-Meier Chebyshev UCL (99% KM); 95% Kaplan-Meier (t) UCL (95% KM-t); 95% H-Stat UCL (95% H-UCL); 95% Approximate Gamma (App. Gamma); 95% Chebyshev (mean, std) UCL (95% Cheb-m); 95% KM BCA UCL (95% KM-BCA); Maximum Detected Value (Max); Mean-Normal (Mean-N)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because less than 8 samples available.
(6) Mean value used for lead models.

G - Gamma
J - Estimated Value
K - Biased High
L - Biased Low
MG/KG = milligrams per kilogram
NP - Non-Parametric
T - Lognormal

Table 3.13.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions from Soil* from inside and outside the Fenced Area	Naphthalene	µg/m^3	8.8E-03	9.6E-02 NP	4.3E-01 J	9.6E-02	µg/m^3	99% KM	(4)

* Surface soil & subsurface soil combined.
ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 99% Kaplan-Meier Chebyshev UCL (99% KM)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).

J - Estimated Value
ug/m^3 = micrograms per cubic meter
NP - Non-Parametric

Table 3.14.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Soil* from within Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	MG/KG	2.1E+01	2.2E+02	NP	1.8E+02		1.8E+02	MG/KG	Max	(1) (5)
	Benzo(a)pyrene	MG/KG	1.5E+01	8.2E+02	NP	1.3E+02		8.2E+02	MG/KG	Max	(4) (5)
	Benzo(b)fluoranthene	MG/KG	2.3E+01	1.2E+03	NP	2.0E+02		2.0E+02	MG/KG	Max	(4) (5)
	Benzo(k)fluoranthene	MG/KG	9.3E+00	6.6E+02	NP	8.1E+01		8.1E+01	MG/KG	Max	(4) (5)
	Carbazole	MG/KG	1.5E+01	1.7E+02	NP	1.2E+02	J	1.2E+02	MG/KG	Max	(4) (5)
	Chrysene	MG/KG	2.4E+01	1.5E+03	NP	2.1E+02		2.1E+02	MG/KG	Max	(4) (5)
	Dibenz(a,h)anthracene	MG/KG	2.8E+00	2.7E+01	NP	2.2E+01	K	2.2E+01	MG/KG	Max	(1) (5)
	Dibenzofuran	MG/KG	2.6E+00	7.4E+00	NP	1.9E+01		7.4E+00	MG/KG	95% KM-t	(1) (3)
	Fluoranthene	MG/KG	5.8E+01	6.1E+02	NP	5.0E+02		5.0E+02	MG/KG	Max	(1) (5)
	Indeno(1,2,3-cd)pyrene	MG/KG	8.2E+00	8.4E+01	NP	6.9E+01	J	6.9E+01	MG/KG	Max	(1) (5)
	Naphthalene	MG/KG	2.9E+00	3.2E+01	NP	2.6E+01	J	2.6E+01	MG/KG	Max	(1) (5)
	Pyrene	MG/KG	4.5E+01	4.7E+02	NP	3.9E+02		3.9E+02	MG/KG	Max	(1) (5)
	Dieldrin	MG/KG	N/A	N/A		6.5E-01	J	6.5E-01	MG/KG	Max	(6)
	gamma-BHC (Lindane)	MG/KG	1.1E-01	1.3E+00	NP	8.6E-01		8.6E-01	MG/KG	Max	(4) (5)
	Aluminum	MG/KG	9.8E+00	1.1E+04	N	1.3E+04		1.1E+04	MG/KG	95% Stud-t	(1) (2) (3)
	Arsenic	MG/KG	3.8E+00	4.8E+00	N	7.3E+00		4.8E+00	MG/KG	95% Stud-t	(1) (2) (3)
	Chromium (hexavalent)	MG/KG	N/A	N/A		5.3E-01		5.3E-01	MG/KG	Max	(6)
	Cobalt	MG/KG	3.2E+00	3.8E+00	N	4.9E+00		3.8E+00	MG/KG	95% Stud-t	(1) (2) (3)
	Iron	MG/KG	1.4E+04	1.6E+04	N	1.9E+04		1.6E+04	MG/KG	95% Stud-t	(1) (2) (3)
	Lead	MG/KG	1.2E+02	N/A		7.9E+02		1.2E+02	MG/KG	Mean-N	(7)
	Manganese	MG/KG	1.5E+02	2.1E+02	G	3.2E+02		2.1E+02	MG/KG	App. Gamma	(3)

Table 3.14.RME

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

Notes:

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 95% Kaplan-Meier (t) UCL (95% KM-t); 95% Student's-T test UCL (95% Stud-t); 95% Approximate Gamma (App. Gamma); Maximum Detected Value (Max) Mean Normal (Mean-N)

UCL Rationale:

(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because UCL greater than maximum.
(6) Maximum detected concentration used because constituent detected in only one sample.
(7) Mean value used for lead models.

J - Estimated Value
MG/KG = milligrams per kilogram
NP - Non-Parametric
T - Lognormal

Table 3.15.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Emissions from Soil* from within Fenced Area of Youth Pond/Site 4	Naphthalene	µg/m^3	4.9E-02	5.4E-01 NP	4.3E-01 J	4.3E-01	µg/m^3	Max	(1) (5)

Notes:

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: Maximum Detected Value (Max)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because UCL greater than maximum.
(6) Maximum detected concentration used because constituent detected in only one sample.
(7) Mean value used for lead models.

J - Estimated Value
ug/m^3 = micrograms per cubic meter
NP - Non-Parametric

Table 3.16.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Shallow Aquifer - Tap Water and Water in Excavation Trench	1,4-Dichlorobenzene	UG/L	N/A	N/A		2.0E+00	J	2.0E+00	UG/L	Max	(5)
	Benzene	UG/L	N/A	N/A		1.4E+01		1.4E+01	UG/L	Max	(5)
	Ethylbenzene	UG/L	9.0E-01	1.0E+01	NP	1.0E+01		1.0E+01	UG/L	Max	(4) (6)
	m- and p-Xylene	UG/L	2.4E+00	2.1E+01	NP	2.0E+01		2.0E+01	UG/L	Max	(4) (6)
	Trichloroethene	UG/L	N/A	N/A		4.0E-01	J	4.0E-01	UG/L	Max	(5)
	Xylene, total	UG/L	3.6E+00	1.8E+01	NP	2.5E+01		1.8E+01	UG/L	97.5% KM	(4)
	1,1-Biphenyl	UG/L	N/A	N/A		8.0E+00	J	8.0E+00	UG/L	Max	(5)
	2,4-Dimethylphenol	UG/L	N/A	N/A		2.9E+01		2.9E+01	UG/L	Max	(5)
	2-Methylnaphthalene	UG/L	3.8E+00	8.3E+00	NP	3.2E+01		8.3E+00	UG/L	95% KM-t	(1) (2)
	Benzo(a)anthracene	UG/L	5.5E-01	9.6E-01	NP	2.9E+00		9.6E-01	UG/L	95% KM-t	(1) (2)
	Benzo(a)pyrene	UG/L	3.6E-01	6.9E-01	NP	2.0E+00		6.9E-01	UG/L	95% KM-t	(1) (2) (3)
	Benzo(b)fluoranthene	UG/L	4.8E-01	9.5E-01	NP	2.7E+00		9.5E-01	UG/L	95% KM-t	(1) (2)
	Benzo(k)fluoranthene	UG/L	9.2E-01	9.3E-01	NP	9.4E-01		9.3E-01	UG/L	95% KM-t	(4)
	Dibenz(a,h)anthracene	UG/L	2.1E-01	2.2E-01	NP	2.6E-01	J	2.2E-01	UG/L	95% KM-t	(4)
	Dibenzofuran	UG/L	5.0E+00	1.9E+01	NP	1.9E+01		1.9E+01	UG/L	95% KM-BCA	(4)
	Indeno(1,2,3-cd)pyrene	UG/L	N/A	N/A		1.2E+00	J	1.2E+00	UG/L	Max	(5)
	Naphthalene	UG/L	4.2E+01	1.2E+02	NP	5.6E+02		1.2E+02	UG/L	95% KM-t	(1) (3)
	Dieldrin	UG/L	N/A	N/A		1.7E-02	J	1.7E-02	UG/L	Max	(5)
	Aluminum	UG/L	3.2E+03	1.1E+04	NP	2.3E+04		1.1E+04	UG/L	95% KM	(1) (3)
	Antimony	UG/L	4.5E-01	5.5E-01	NP	6.7E-01	J	5.5E-01	UG/L	95% KM-t	(1) (2) (3)
	Arsenic	UG/L	8.5E+00	1.7E+01	NP	5.4E+01		1.7E+01	UG/L	95% KM-BCA	(1) (3)
	Barium	UG/L	6.4E+01	1.6E+02	NP	3.0E+02		1.6E+02	UG/L	95% Cheb-m	(4)
	Chromium	UG/L	7.7E+00	1.5E+01	G	4.5E+01		1.5E+01	UG/L	App. Gamma	(1) (3)
	Cobalt	UG/L	1.5E+00	2.4E+00	NP	5.1E+00	J	2.4E+00	UG/L	95% KM-t	(1) (2) (3)
	Iron	UG/L	9.7E+03	2.6E+04	NP	3.9E+04		2.6E+04	UG/L	95% KM	(1) (3)
	Lead	UG/L	4.5E+00	N/A		1.9E+01		4.5E+00	UG/L	Mean-N	(7)
	Manganese	UG/L	2.1E+02	3.5E+02	G	6.4E+02		3.5E+02	UG/L	App. Gamma	(1) (3)
	Mercury	UG/L	2.4E-01	5.9E-01	NP	2.3E+00		5.9E-01	UG/L	95% KM-t	(1) (2)
	Thallium	UG/L	N/A	N/A		1.1E+00	J	1.1E+00	UG/L	Max	(5)
	Vanadium	UG/L	9.7E+00	2.9E+01	NP	5.5E+01		2.9E+01	UG/L	95% KM	(1) (3)

Table 3.16.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Kaplan-Meier (t) UCL (95% KM-t); 95% KM BCA UCL (95% KM-BCA); 95% Kaplan-Meier Chebyshev UCL (95% KM); 95% Approximate Gamma (App. Gamma); 95% Chebyshev (mean, std) UCL (95% Cheb-m); Maximum Detected Value (Max); Mean-Normal (Mean-N)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because constituent detected in only one sample.
(6) Maximum detected concentration used because UCL greater than maximum.
(7) Mean value used for lead models.

G - Gamma
J - Estimated Value
UG/L = micrograms per liter
NP - Non-Parametric

Table 3.17.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Water Vapors at Showerhead and in Excavation Trench	1,4-Dichlorobenzene	UG/L	N/A	N/A		2.0E+00	J	2.0E+00	UG/L	Max	(5)
	Benzene	UG/L	N/A	N/A		1.4E+01		1.4E+01	UG/L	Max	(5)
	Ethylbenzene	UG/L	9.0E-01	1.0E+01	NP	1.0E+01		1.0E+01	UG/L	Max	(4) (6)
	m- and p-Xylene	UG/L	2.4E+00	2.1E+01	NP	2.0E+01		2.0E+01	UG/L	Max	(4) (6)
	Trichloroethene	UG/L	N/A	N/A		4.0E-01	J	4.0E-01	UG/L	Max	(5)
	Xylene, total	UG/L	3.6E+00	1.8E+01	NP	2.5E+01		1.8E+01	UG/L	97.5% KM	(4)
	1,1-Biphenyl	UG/L	N/A	N/A		8.0E+00	J	8.0E+00	UG/L	Max	(5)
	2-Methylnaphthalene	UG/L	3.8E+00	8.3E+00	NP	3.2E+01		8.3E+00	UG/L	95% KM-t	(1) (2)
	Dibenzofuran	UG/L	5.0E+00	1.9E+01	NP	1.9E+01		1.9E+01	UG/L	95% KM-BCA	(4)
	Naphthalene	UG/L	4.2E+01	1.2E+02	NP	5.6E+02		1.2E+02	UG/L	95% KM-t	(1) (3)

ProUCL, Version 4.1.01 used to determine distribution of data and calculate 95% UCL, following recommendations in user's guide (USEPA. July 2011. Prepared by Lockheed Martin Environmental Services).

Options: 97.5% Kaplan-Meier Chebyshev UCL (97.5% KM); 95% Kaplan-Meier (t) UCL (95% KM-t); 95% KM BCA UCL (95% KM-BCA); Maximum Detected Value (Max)

UCL Rationale:
(1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
(2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
(3) Test indicates data are gamma distributed.
(4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
(5) Maximum detected concentration used because constituent detected in only one sample.
(6) Maximum detected concentration used because UCL greater than maximum.

J - Estimated Value
UG/L = micrograms per liter
NP - Non-Parametric

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Surface Soil within	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	Chronic Daily Intake (CDI) (mg/kg-day) =
			Fenced Area of Youth Pond/Site 4	IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Industrial Worker	Adult	Surface Soil within	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	CDI (mg/kg-day) =
			Fenced Area of Youth Pond/Site 4	SA	Skin Surface Area Available for Contact	3,300	cm2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.2.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	Exposure Concentration (EC) (mg/m^3) =
			within Fenced Area of	CA	Chemical Concentration in Air	See Table 3.2	mg/m^3	See Table 3.2	CA x ET x EF x ED x CF x 1/AT
			Youth Pond/Site 4	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Notes:

(1) Professional judgment. Assume 8 hour workday

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.3.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 2 day per week for 26 weeks per year.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Water	See Tables 3.4; 3.5, and 3.6	µg/l	See Tables 3.4; 3.5, and 3.6	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.025	l/hour	EPA, 1989, (2)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989	1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
		Child	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.5; 3.6 and 3.7	µg/l	See Tables 3.5; 3.6 and 3.7	CDI (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.025	l/hour	EPA, 1989, (2)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989	1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	EPA, 1989	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	EPA, 1989	EPA, 1989	
	Maintenance Worker	Adult	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Water	See Tables 3.5; 3.6 and 3.7	µg/l	See Tables 3.5; 3.6 and 3.7	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	0.05	l/hr	EPA, 1989	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	8	hr/day	(4)	1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Adult	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.4; 3.5 and 3.6	µg/l	See Tables 3.4; 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	24	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
	Visitor/Recreational User	Child	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.4; 3.5 and 3.6	µg/l	See Tables 3.4; 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	6	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

TABLE 4.4.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont'd)	Maintenance Worker	Adult	Youth Pond; Upstream Pond; Drainage Channel to Upstream Pond (1)	CW	Chemical Concentration in Water	See Tables 3.4; 3.5 and 3.6	µg/l	See Tables 3.4; 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	8	hr/day	(4)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	25	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

Notes:

(1) Surface water in Youth Pond, Upstream Pond, and drainage ditches to Upstream Pond are evaluated separately.

(2) Professional judgment assuming one half of the ingestion rate specified for swimming.

(3) Professional judgment assuming 2 day per week for 26 weeks per year.

(4) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(5) Skin surface area in contact with surface water based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. July 2004.

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	100	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(3)	CSed x IR-Sed x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

TABLE 4.5.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Child	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004 (7)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.5	mg/kg	See Table 3.5	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 the default value for the residential soil scenario.

(2) Professional judgment assuming 2 day per week for 26 weeks per year.

(3) Professional judgment assuming 1/2 the soil value.

(4) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(5) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(6) RME SSAF is geometric mean soil adherence factor for reed gatherers.

(7) RME SSAF is geometric mean soil adherence factor for children playing in wet soil.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	100	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(3)	CSed x IR-Sed x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

TABLE 4.6.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Child	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004 (7)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8.RME and 3.9.RME	mg/kg	See Tables 3.8.RME and 3.9.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 the default value for the residential soil scenario.

(2) Professional judgment assuming 2 day per week for 26 weeks per year.

(3) Professional judgment assuming 1/2 the soil value.

(4) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(5) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(6) RME SSAF is geometric mean soil adherence factor for reed gatherers.

(7) RME SSAF is geometric mean soil adherence factor for children playing in wet soil.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/ Surface Soil
Exposure Medium: Sediment/ Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	100	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(3)	CSed x IR-Sed x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

TABLE 4.7.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/ Surface Soil
Exposure Medium: Sediment/ Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Child	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004 (7)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	CSed x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (6)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 the default value for the residential soil scenario.

(2) Professional judgment assuming 2 day per week for 26 weeks per year.

(3) Professional judgment assuming 1/2 the soil value.

(4) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(5) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(6) RME SSAF is geometric mean soil adherence factor for reed gatherers.

(7) RME SSAF is geometric mean soil adherence factor for children playing in wet soil.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Fish from Youth Pond and Upstream Pond	CFish	Chemical Concentration in Fish	Table 3.11	mg/kg	Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	25	g/day	EPA, 1997 (1)	CFish x IR-Fish x PCF x EF x ED x CF3 x 1/BW x 1/AT
				PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF3	Conversion Factor 3	0.001	kg/g	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Fish from Youth Pond and Upstream Pond	CFish	Chemical Concentration in Fish	Table 3.11	mg/kg	Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	12	g/day	EPA, 2008 (2)	CFish x IR-Fish x PCF x EF x ED x CF3 x 1/BW x 1/AT
				PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Fish from Youth Pond and Upstream Pond	CFish	Chemical Concentration in Fish	Table 3.11	mg/kg	Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
				PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	CFish x IR-Fishadj x PCF x EF x CF3 x 1/AT
				IR-Fishc	Ingestion of Fish, child	12	g/day	EPA, 2008 (2)	
				EDc	Exposure Duration, child	6	years	EPA, 1991	IR-Fishadj = (EDc x IR-Fishc/BWc)
				BWc	Body Weight, child	15	kg	EPA, 1991	+ (EDa x IR-Fisha/BWa)
				IR-Fisha	Ingestion of Fish, adult	25	g/day	EPA, 1997 (1)	
				EDa	Exposure Duration, adult	24	years	EPA, 1991	
				BWa	Body Weight, adult	70	kg	EPA, 1991	
				IR-Fishadj	Ingestion of Fish, adjusted	13	mg-year/kg-day	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				AT	Averaging Time	25,550	days	EPA, 1989	

TABLE 4.8.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:
(1) 95th percentile recreational freshwater anglers fish ingestion rate
(2) Fish ingestion rate for child is from EPA, 2008, Table 10-1, ingestion rate of Freshwater/Estuarine Fish for 3 to < 6 years, 95th percentile value.

Sources:
EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 1997: Exposure Factors Handbook. EPA/ 600/P-95/Fa, Fb, and Fc.
EPA, 2008: Child-Specific Exposure Factors Handbook. September .
GLFA, 1993: Great Lakes Fish Advisory Task Force. Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory, September.

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Construction Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	330	mg/day	EPA, 2002	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Maintenance Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S-A	Ingestion Rate of Soil, Adult	100	mg/day	EPA, 1991	CS x IR-S-Adj x EF x CF1 x 1/AT
				IR-S-C	Ingestion Rate of Soil, Child	200	mg/day	EPA, 1991	
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	114.29	mg-year/kg-day	Calculated	IR-S-Adj (mg-year/kd-day) =
				EF	Exposure Frequency	350	days/year	EPA, 1991	(ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont'd)	Visitor/Recreational User	Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Construction Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004, (2)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (3)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Maintenance Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	25	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.9.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont'd)	Resident	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
	Resident	Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Child/Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA-A	Skin Surface Area Available for Contact, Adult	5,700	cm^2	EPA, 2004	CS x DA-Adj x DABS x CF1 x EF x 1/AT
				SA-C	Skin Surface Area Available for Contact, Child	2,800	cm^2	EPA, 2004	
				SSAF-A	Soil to Skin Adherence Factor, Adult	0.07	mg/cm^2-day	EPA, 2004	DA-Adj (mg-year/kg-day) =
				SSAF-C	Soil to Skin Adherence Factor, Child	0.2	mg/cm^2-day	EPA, 2004	
				DA-Adj	Dermal Absorption, Age-adjusted	361	mg-year/kg-day	Calculated	D-C x SA-C x SSAF-C / BW-C) + (ED-A x SA-A x SSAF-A / BW-
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Professional judgment assuming 2 day per week for 26 weeks per year.

(2) Surface area for commercial/industrial worker.

(3) Soil to skin adherence factor is based on 95th percentile adherence factor for construction workers.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.10.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Visitor/Recreational User	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.32E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Construction Worker	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(2)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Industrial Worker	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(2)	
				EF	Exposure Frequency	250	days/year	EPA, 1991	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

TABLE 4.10.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Maintenance Worker	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
	Resident	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ET	Exposure Time	24	hour/day	--	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ET	Exposure Time	24	hr/day	EPA, 1991	
				ED	Exposure Duration	30	years	EPA, 2002	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

* Surface soil & subsurface soil combined

(1) Professional judgment assuming 2 day per week for 26 weeks per year, and 4 hours per day.

(2) Professional judgment. Assume 8 hour workday

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.11.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Worker	Adult	Soil* within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	330	mg/day	EPA, 2002	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
Dermal	Construction Worker	Adult	Soil* within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004, (1)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (2)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Surface area for commercial/industrial worker.

(2) Soil to skin adherence factor is based on 95th percentile adherence factor for construction workers.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.12.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Emissions from Soil* from within the fence line	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.15	mg/m^3	See Table 3.15	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

* Surface soil & subsurface soil combined

(1) Professional judgment. Assume 8 hour workday

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	2	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				IR-W-A	Ingestion Rate of Water, Adult	2	liters/day	EPA, 1997	CW x IR-W-Adj x EF x CF2 x 1/AT
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	1.09	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) =
				EF	Exposure Frequency	350	days/year	EPA, 1991	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	24	years	EPA, 1991	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical-specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical-specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical-specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical-specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	24	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Child	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical-specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical-specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical-specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical-specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	1.0	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	6	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Child/Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
				DAevent-A	Dermally Absorbed Dose per Event, Adult	Calculated	mg/cm^2-event	calculated	
				DAevent-C	Dermally Absorbed Dose per Event, Child	Calculated	mg/cm^2-event	calculated	DA-Adj = (Daevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	Chemical-specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical-specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical-specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical-specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-specific	dimensionless	EPA, 2004	Organics :
				t_{event}-A	Event Time, Adult	0.58	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	1.0	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				EF	Exposure Frequency	350	days/year	EPA, 2004	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				ED-A	Exposure Duration, Adult	24	years	EPA, 2004	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
	Construction Worker	Adult	Shallow Aquifer - Water in Excavation Trench	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical-specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical-specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical-specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical-specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	8	hr/day	(1)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (2)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

TABLE 4.13.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

(1) Professional judgment based on construction activities that would occur 8 hrs per day for the RME.

(2) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

(3) Assumed contact with groundwater during construction project would be 125 days/year.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.14.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Shallow Aquifer - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/kg-day) =
				CAa	Chemical Concentration in Air	Calculated	mg/m^3 (non-carcinogenic); µg/m^3 (carcinogenic)	Calculated	CAa x ETa x EDa x EF x CF1 x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				EDa	Exposure Duration	24	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				ETa	Exposure Time	0.58	hr/day	EPA, 2004	calculate CAa
				CF1	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child/Adult	Shallow Aquifer - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/m^3) =
				CAa	Air Concentration for shower, Adult	Calculated	mg/m^3 (non-carcinogenic); µg/m^3 (carcinogenic)	Calculated	(CAc x ETc x EDc + CAa x ETa x EDa) x EF x CF1 x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				EDa	Exposure Duration, Adult	24	years	EPA, 1991	Use Foster & Chrostowski Shower model to
				EDc	Exposure Duration, Child	6	years	EPA, 1991	calculate CAa and CAc
				ETa	Exposure Time	0.58	hr/day	EPA, 2004	
				ETc	Exposure Time	1	hr/day	EPA, 2004	
				CF1	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Shallow Aquifer - Water Vapors in Excavation Trench	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3 (non-carcinogenic); µg/m^3 (carcinogenic)	Calculated	CA x ET x EF x ED x CF1 x 1/AT
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	CA calculated using Virginia Voluntary Remediation
				ED	Exposure Duration	1	years	EPA, 1991	Program Method
				CF1	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

(1) Professional judgment based on construction activities that would occur 8 hrs per day for the RME.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Surface Soil within	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	Chronic Daily Intake (CDI) (mg/kg-day) =
			Fenced Area of Youth Pond/Site 4	IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	- -	
Dermal	Industrial Worker	Adult	Surface Soil within	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	CDI (mg/kg-day) =
			Fenced Area of Youth Pond/Site 4	SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

TABLE 4.2.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.1	mg/kg	See Table 3.1	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.2	mg/m3	See Table 3.2	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

(1) Professional judgment. Assume 8 hour workday

(2) Professional judgment assuming 1 day per week for 26 weeks per year, and 8 hours per day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.3.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	- -	
Dermal	Visitor/Recreational User	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.3.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont'd)	Visitor/Recreational User	Child	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Surface Soil outside Fenced Area of Site 4	CS	Chemical Concentration in Soil	See Table 3.3	mg/kg	See Table 3.3	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 RME exposure.

(2) Surface area includes head and hands.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.4.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	CDI (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.025	l/hour	EPA, 1989, (2)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989	1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3,285	EPA, 1989	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	EPA, 1989	EPA, 1989	
	Visitor/Recreational User	Child	Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	CDI (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.025	l/hour	EPA, 1989, (2)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989	1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	EPA, 1989	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	EPA, 1989	EPA, 1989	
	Maintenance Worker	Adult	Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	0.05	l/hr	EPA, 1989	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	8	hr/day	(4)	1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Visitor/Recreational User	Adult	Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	9	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
		Child	Upstream Pond; Drainage Channel to Upstream Pond (1)	CSW	Chemical Concentration in Surface Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	6	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

TABLE 4.4.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont'd)	Maintenance Worker	Adult	Upstream Pond; Drainage Channel to Upstream Pond (1)	CW	Chemical Concentration in Water	See Tables 3.5 and 3.6	µg/l	See Tables 3.5 and 3.6	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	8	hr/day	(4)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (5)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	20	days/year	(4)	
				ED	Exposure Duration	9	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

Notes:

(1) Surface water in Upstream Pond, and drainage ditches to Upstream Pond are evaluated separately.

(2) Professional judgment assuming one half of the ingestion rate specified for swimming.

(3) Professional judgment assuming 1 day per week for 26 weeks per year.

(4) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(5) Skin surface area in contact with surface water based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. July 2004.

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.7	mg/kg	See Table 3.7	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	25	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	ainage Channel to Upstream Po	CSed	Chemical Concentration in Sediment	See Table 3.7	mg/kg	See Table 3.7	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Drainage Channel to Upstream Pond	CS	Chemical Concentration in Soil	See Table 3.7	mg/kg	See Table 3.7	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.7	mg/kg	See Table 3.7	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

TABLE 4.5.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Maintenance Worker	Adult	Drainage Channel to Upstream Pond	CSed	Chemical Concentration in Sediment	See Table 3.7	mg/kg	See Table 3.7	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004 (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(2)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 the RME value.

(2) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(3) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(4) SSAF is geometric mean soil adherence factor for groundskeeper.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	25	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	25	mg/day	(1)	CSed x IR-Sed x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(2)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Drainage Channel to Upstream Pond	CS	Chemical Concentration in Soil	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 4.6.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface and Subsurface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
		Child	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Youth Pond, Upstream Pond	CSed	Chemical Concentration in Sediment	See Tables 3.8 and 3.9	mg/kg	See Tables 3.8 and 3.9	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004 (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(2)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

(1) Professional judgment assuming 1/2 the RME value.

(2) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(3) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(4) SSAF is geometric mean soil adherence factor for groundskeeper.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.7.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/ Surface Soil
Exposure Medium: Sediment/ Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	25	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	(1)	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.10	mg/kg	See Table 3.10	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	25	mg/day	(1)	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	20	days/year	(2)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
Dermal	Visitor/Recreational User	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

TABLE 4.7.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Sediment/ Surface Soil
Exposure Medium: Sediment/ Surface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
		Child	Drainage Ditches to Youth Pond outside Fenced Area	CSed	Chemical Concentration in Sediment	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	1,980	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF3 x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Maintenance Worker	Adult	Drainage Ditches to Youth Pond outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.10	mg/kg	See Table 3.10	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004 (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	20	days/year	(2)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

(1) Professional judgment assuming 1/2 RME exposure.

(2) Professional judgment assuming 8 hour workday, 5 day per week for 4 weeks per year.

(3) Skin surface area in contact with sediment based on contact while wading. The skin surface area includes hands, forearms, lower legs, and feet.

(4) SSAF is geometric mean soil adherence factor for groundskeeper.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

TABLE 4.8.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDANCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Visitor/Recreational User	Adult	Fish from Youth Pond and Upstream Pond	CFish	Chemical Concentration in Fish	See Table 3.11	mg/kg	See Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	8	g/day	EPA, 1997 (1)	CFish x IR-Fish x PCF x EF x ED x CF3 x 1/BW x 1/AT
				PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF3	Conversion Factor 3	0.001	kg/g	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Fish from Youth Pond and Upstream Pond	CFish	Chemical Concentration in Fish	See Table 3.11	mg/kg	See Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	2.2	g/day	EPA, 2008 (2)	CFish x IR-Fish x PCF x EF x ED x CF3 x 1/BW x 1/AT
				PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Fish from Youth Pond	CFish	Chemical Concentration in Fish	See Table 3.11	mg/kg	See Table 3.11	Chronic Daily Intake (CDI) (mg/kg-day) =
			and Upstream Pond	PCF	Preparation/cooking loss factor - for PCBs only	0.5		GLFA, 1993	CFish x IR-Fishadj x PCF x EF x CF3 x 1/AT
				IR-Fishc	Ingestion of Fish, child	2.2	g/day	EPA, 2008 (2)	
				EDc	Exposure Duration, child	6	years	EPA, 1991	IR-Fishadj = (EDc x IR-Fishc/BWc)
				BWc	Body Weight, child	18.6	kg	EPA, 2008	+ (EDa x IR-Fisha/BWa)
				IR-Fisha	Ingestion of Fish, adult	8	g/day	EPA, 1997 (1)	
				EDa	Exposure Duration, adult	9	years	EPA, 2004	
				BWa	Body Weight, adult	70	kg	EPA, 1991	
				IR-Fishadj	Ingestion of Fish, adjusted	1.7	mg-year/kg-day	- -	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				AT	Averaging Time	25,550	days	EPA, 1989	

TABLE 4.8.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDANCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:
(1) Mean recreational freshwater anglers fish ingestion rate
(2) Fish ingestion rate for child is from EPA, 2008, Table 10-1, ingestion rate of Freshwater/Estuarine Fish for 3 to < 6 years, mean value.

Sources:
EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 1997: Exposure Factors Handbook. EPA/ 600/P-95/Fa, Fb, and Fc.
EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
EPA, 2008: Child-Specific Exposure Factors Handbook. September .
GLFA, 1993: Great Lakes Fish Advisory Task Force. Protocal for a Uniform Great Lakes Sport Fish Consumption Advisory, September.

TABLE 4.9.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Visitor/Recreational User	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Visitor/Recreational User	Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

TABLE 4.9.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion (cont'd)	Resident	Child/Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S-A	Ingestion Rate of Soil, Adult	50	mg/day	EPA, 1993	CS x IR-S-Adj x EF x CF x 1/AT
				IR-S-C	Ingestion Rate of Soil, Child	100	mg/day	EPA, 1993	
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	46.43	mg-year/kg-day	Calculated	IR-S-Adj (mg-year/kd-day) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	(ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				ED-A	Exposure Duration, Adult	9	years	EPA, 2004	
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	(2)	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Maintenance Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	50	mg/day	EPA, 1993	CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	- -	
Dermal	Industrial Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.9.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Visitor/Recreational User	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chemical specific	--	EPA, 2004	
				CF	Conversion Factor 3	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.01	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
Dermal (cont'd)		Child	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.04	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

TABLE 4.9.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Resident	Child/Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA-A	Skin Surface Area Available for Contact, Adult	5,700	cm^2	EPA, 2004	CS x DA-Adj x DABS x CF x EF x 1/AT
				SA-C	Skin Surface Area Available for Contact, Child	2,800	cm^2	EPA, 2004	
				SSAF-A	Soil to Skin Adherence Factor, Adult	0.01	mg/cm^2-day	EPA, 2004	DA-Adj (mg-year/kg-day) =
				SSAF-C	Soil to Skin Adherence Factor, Child	0.04	mg/cm^2-day	EPA, 2004	
				DA-Adj	Dermal Absorption, Age-adjusted	52	mg-year/kg-day	Calculated	(ED-C x SA-C x SSAF-C / BW-C) + (ED-A x SA-A x SSAF-A / BW-A)
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED-A	Exposure Duration, Adult	9	years	EPA, 2004	
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm^2-day	EPA, 2004, (3)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Maintenance Worker	Adult	Soil* inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	CS x SA x SSAF x DABS x CF1 x EF x
				SSAF	Soil to Skin Adherence Factor	0.02	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 2004	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Professional Judgment assuming 1/2 the RME value.

(2) Recommendation from EPA Region III Risk Assessor.

(3) Soil to skin adherence factor is based on geometric mean adherence factor for construction workers.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.10.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Industrial Worker	Adult	Emissions from Soil* from	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
			inside and outside	CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
			Fenced Area	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(2)	
				EF	Exposure Frequency	219	days/year	EPA, 2004	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
	Visitor/Recreational	Adult	Emissions from Soil* from	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
	User		inside and outside	CA	Chemical Concentration in Air	See Table 3.13	mg/m3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
			Fenced Area	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	9	years	EPA, 1993	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Emissions from Soil* from	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
			inside and outside	CA	Chemical Concentration in Air	See Table 3.13	mg/m3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
			Fenced Area	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	26	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
	Resident	Adult	Emissions from Soil* from	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
			inside and outside	CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
			Fenced Area	PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1993	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.10.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (cont'd)	Resident	Child	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	24	hour/day	--	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1993	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Emissions from Soil* from inside and outside the Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m3) = CS (1/PEF + 1/VF)
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ET	Exposure Time	24	hr/day	EPA, 1993	
				ED	Exposure Duration	15	years	EPA, 1993	
				CF	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(2)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
	Maintenance Worker	Adult	Emissions from Soil* from inside and outside Fenced Area	CS	Chemical Concentration in Soil	See Table 3.12	mg/kg	See Table 3.12	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.13	mg/m^3	See Table 3.13	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(3)	
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	9	years	EPA, 2004	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.10.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:

* Surface soil & subsurface soil combined

(1) Professional judgment assuming 1 day per week for 26 weeks per year, and 4 hours per day.

(2) Professional judgment assuming 8 hour work day.

(3) Professional judgment assuming 1 day per week for 26 weeks per year, and 8 hours per day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Viriginia Department of Envirommental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.11.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Construction Worker	Adult	Soil* from within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
				IR-S	Ingestion Rate of Soil	200	mg/day	(1)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF3	Conversion Factor 3	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
Dermal	Construction Worker	Adult	Soil* from within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF1 x EF x ED x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	3,300	cm^2	EPA, 2004	
				SSAF	Soil to Skin Adherence Factor	0.1	mg/cm^2-day	EPA, 2004, (2)	
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Recommendation from EPA Region III Risk Assessor.

(2) Soil to skin adherence factor is based on geometric mean adherence factor for construction workers.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2004 . Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.

VDEQ, 2003: Viriginia Department of Enviromental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.12.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Emissions from Soil* from within Fenced Area of Youth Pond/Site 4	CS	Chemical Concentration in Soil	See Table 3.14	mg/kg	See Table 3.14	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	See Table 3.15	mg/m^3	See Table 3.15	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor for volatile constituents	calc	m^3/kg	EPA, 2002	CA (mg/m^3) = CS (1/PEF + 1/VF)
				ET	Exposure Time	8	hr/day	(1)	
				EF	Exposure Frequency	125	days/year	VDEQ, 2003	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

* Surface soil & subsurface soil combined

(1) Professional Judgement. Assumed duration of construction project is 1/2 of a working year, and 8 hours/day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

VDEQ, 2003: Viriginia Department of Envirommental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.13.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1.4	liters/day	EPA, 1993	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	9	years	EPA, 1993	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	liters/day	EPA, 1997	CW x IR-W x EF x ED x CF2 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				IR-W-A	Ingestion Rate of Water, Adult	1.4	liters/day	EPA, 1993	CW x IR-W-Adj x EF x CF2 x 1/AT
				IR-W-C	Ingestion Rate of Water, Child	1	liters/day	EPA, 1997	
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	0.58	liter-year/kg-day	calculated	IR-W-Adj (liter-year/kd-day) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	(ED-C x IR-W-C / BW-C) +
				ED-A	Exposure Duration, Adult	9	years	EPA, 1993	(ED-A x IR-W-A / BW-A)
				ED-C	Exposure Duration, Child	6	years	EPA, 1991	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				BW-A	Body Weight , Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
Dermal	Resident	Adult	Shallow Aquifer - Tap Water	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 xτ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	

TABLE 4.13.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
				ED	Exposure Duration	9	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
		Child	Shallow Aquifer -	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
			Tap Water	DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	0.33	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 xτ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				ED	Exposure Duration	6	years	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
Dermal	Resident	Child/Adult	Shallow Aquifer -	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) = DA-Adj x EF x 1/AT
(cont'd)			Tap Water	DAevent-A	Dermally Absorbed Dose per Event, Adult	Calculated	mg/cm^2-event	calculated	
				DAevent-C	Dermally Absorbed Dose per Event, Child	Calculated	mg/cm^2-event	calculated	DA-Adj = (Daevent-A x SA-A x ED-A x 1/BW-A)
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	calculated	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	(2)	Organics :
				t_{event}-A	Event Time, Adult	0.25	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t_{event}-C	Event Time, Child	0.33	hr/event	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 xτ x t_{event})/π))
				SA-A	Skin Surface Area, Adult	18,000	cm^2	EPA, 2004	x CF2 x CF3
				SA-C	Skin Surface Area, Child	6,600	cm^2	EPA, 2004	
				EV	Event Frequency	1	events/day	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				EF	Exposure Frequency	234	days/year	EPA, 1993	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				ED-A	Exposure Duration, Adult	9	years	EPA, 2004	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				ED-C	Exposure Duration, Child	6	years	EPA, 2004	

TABLE 4.13.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
				BW-A	Body Weight, Adult	70	kg	EPA, 1991	
				BW-C	Body Weight, Child	15	ke	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	
Dermal	Construction Worker	Adult	Shallow Aquifer -	CW	Chemical Concentration in Water	See Table 3.16	µg/l	See Table 3.16	CDI (mg/kg-day) =
(cont'd)			Water in	DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
			Excavation Trench	FA	Fraction absorbed water	Chemical specific	dimensionless	EPA, 2004	
				K_p	Permeability Coefficient	Chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	Chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF2 x CF3
				t*	Time to Reach Steady-state	Chemical specific	hours	EPA, 2004	
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	4	hr/day	VDEQ, 2003	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (3)	2 x FA x Kp x CW x (sqrt((6 xτ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF2 x CF3
				EF	Exposure Frequency	125	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF2 x CF3
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
				CF2	Conversion Factor 2	0.001	mg/µg	- -	
				CF3	Conversion Factor 3	0.001	l/cm^3	- -	

Notes:

(1) Assumed construction workers could spend 4 hours/day near the excavation trench.

(2) Assumed duration of construction project may be 1/2 a year.

(3) Skin surface area in contact with groundwater assumed to be hands, forearms, lower legs, and feet.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 4.14.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Shallow Aquifer - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/m^3) =
				CAa	Chemical Concentration in Air	Calculated	mg/m^3 (non-carcinogenic); $\mu g/m^3$ (carcinogenic)	Calculated	CAa x ETa x EDa x EF x CF x 1/AT
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				EDa	Exposure Duration	9	years	EPA, 2001	Use Foster & Chrostowski Shower model to
				ETa	Exposure Time	0.25	hr/day	EPA, 2004	calculate CAa
				CF	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child/Adult	Shallow Aquifer - Water Vapors at Showerhead	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/m^3) =
				CAa	Air Concentration for shower, Adult	Calculated	mg/m^3 (non-carcinogenic); $\mu g/m^3$ (carcinogenic)	Calculated	(CAc x ETc x EDc + CAa x ETa x EDa) x EF x CF x 1/AT
				CAc	Air Concentration for shower, child	Calculated	mg/m^3 (non-carcinogenic); $\mu g/m^3$ (carcinogenic)	Calculated	
				EF	Exposure Frequency	234	days/year	EPA, 1993	
				EDa	Exposure Duration, Adult	9	years	EPA, 2001	Use Foster & Chrostowski Shower model to
				EDc	Exposure Duration, Child	6	years	EPA, 1991	calculate CAa and CAc
				ETa	Exposure Time	0.25	hr/day	EPA, 2004	
				ETc	Exposure Time	0.33	hr/day	EPA, 2004	
				CF	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
	Construction Worker	Adult	Shallow Aquifer - Water Vapors in Excavation Trench	CW	Chemical Concentration in Water	See Table 3.17	µg/l	See Table 3.17	Chronic Daily Intake (CDI) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF x 1/AT
				ET	Exposure Time	4	hr/day	VDEQ, 2003	
				EF	Exposure Frequency	125	days/year	(2)	CA calculated using two-film model
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Conversion Factor 1	1/24	day/hour	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Notes:

(1) Assumed construction workers could spend 4 hours/day near the excavation trench.

(2) Assumed duration of construction project may be 1/2 a year.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

VDEQ, 2003: Virginia Department of Environmental Quality, Voluntary Remediation Program Risk Assessment Guidance. Dec. 2003

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YY)
1,4-Dichlorobenzene	Chronic	7.0E-02	mg/kg-day	>50%	7.0E-02	mg/kg-day	Liver	100	ATSDR	7/2006
	Subchronic	7.0E-02	mg/kg-day	>50%	7.0E-02	mg/kg-day	Liver	100	ATSDR	7/2006
Benzene	Chronic	4.0E-03	mg/kg-day	>50%	4.0E-03	mg/kg-day	Blood	300/1	IRIS	6/19/2013
	Subchronic	1.0E-02	mg/kg-day	>50%	1.0E-02	mg/kg-day	Blood	100	PPRTV	9/29/2009
Ethylbenzene	Chronic	1.0E-01	mg/kg-day	>50%	1.0E-01	mg/kg-day	Liver, Kidney	1000	IRIS	6/19/2013
	Subchronic	5.0E-02	mg/kg-day	>50%	5.0E-02	mg/kg-day	Liver	1000	PPRTV	9/10/2009
Trichloroethene	Chronic	5.0E-04	mg/kg-day	Generally > 50%	5.0E-04	mg/kg-day	multiple (see below)	multiple (see below)	IRIS	6/19/2013
	Chronic	4.8E-04	mg/kg-day	Generally > 50%	4.8E-04	mg/kg-day	adult immunological effects	100 / 1	IRIS	6/19/2013
	Chronic	3.7E-04	mg/kg-day	Generally > 50%	3.7E-04	mg/kg-day	development Immunotoxicity	1000 / 1	IRIS	6/19/2013
	Chronic	5.1E-04	mg/kg-day	Generally > 50%	5.1E-04	mg/kg-day	heart malformations	10 / 1	IRIS	6/19/2013
	Subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Xylenes	Chronic	2.0E-01	mg/kg-day	>50%	2.0E-01	mg/kg-day	Body Weight, Mortality	1000/1	IRIS	6/19/2013
	Subchronic	4.0E-01	mg/kg-day	>50%	4.0E-01	mg/kg-day	Body Weight	1000	PPRTV	9/30/2009
1,1-Biphenyl	Chronic	5.0E-02	mg/kg-day	>50%	5.0E-02	mg/kg-day	Kidney	100	IRIS	6/19/2013
	Subchronic	1.0E-01	mg/kg-day	>50%	1.0E-01	mg/kg-day	Developmental/Fetus	100	PPRTV	4/4/2011
2,4-Dimethylphenol	Chronic	2.0E-02	mg/kg-day	>50%	2.0E-02	mg/kg-day	Whole Body, Blood	3000	IRIS	6/19/2013
	Subchronic	5.0E-02	mg/kg-day	>50%	5.0E-02	mg/kg-day	Whole Body	1000	PPRTV	6/27/2007
2-Methylnaphthalene	Chronic	4.0E-03	mg/kg-day	100%	4.0E-03	mg/kg-day	Lung	1000/1	IRIS	6/19/2013
	Subchronic	4.0E-03	mg/kg-day	100%	4.0E-03	mg/kg-day	Lung	1000/1	PPRTV	9/18/2007
Benzo(a)anthracene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Benzo(a)pyrene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Benzo(b)fluoranthene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Benzo(k)fluoranthene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Bis(2-Ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg-day	>50%	2.0E-02	mg/kg-day	Liver	1000	IRIS	6/19/2013
	Subchronic	1.0E-01	mg/kg-day	>50%	1.0E-01	mg/kg-day	Reproductive System	100	ATSDR	9/2002
Carbazole	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Chrysene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Dibenz(a,h)anthracene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YY)
Dibenzofuran	Chronic	1.0E-03	mg/kg-day	>50%	1.0E-03	mg/kg-day	Whole Body	10000	PPRTV-A	6/11/2007
	Subchronic	4.0E-03	mg/kg-day	>50%	4.0E-03	mg/kg-day	Whole Body	3000	PPRTV	6/11/2007
Fluoranthene	Chronic	4.0E-02	mg/kg-day	>50%	4.0E-02	mg/kg-day	Kidney, Liver, Blood	3000	IRIS	6/19/2013
	Subchronic	1.0E-01	mg/kg-day	>50%	1.0E-01	mg/kg-day	Kidney	1000	PPRTV	12/27/2012
Indeno(1,2,3-cd)pyrene	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Naphthalene	Chronic	2.0E-02	mg/kg-day	>50%	2.0E-02	mg/kg-day	Body Weight	3000	IRIS	6/19/2013
	Subchronic	6.0E-01	mg/kg-day	>50%	6.0E-01	mg/kg-day	Neurological	90	ATSDR	9/2005
Pyrene	Chronic	3.0E-02	mg/kg-day	>50%	3.0E-02	mg/kg-day	Kidney	3000	IRIS	6/19/2013
	Subchronic	3.0E-01	mg/kg-day	>50%	3.0E-01	mg/kg-day	Kidney	300	PPRTV	9/5/2007
4,4'-DDT	Chronic	5.0E-04	mg/kg-day	70-90%	5.0E-04	mg/kg-day	Liver	100/1	IRIS	6/19/2013
	Subchronic	5.0E-04	mg/kg-day	70-90%	5.0E-04	mg/kg-day	Liver	100	ATSDR	9/2002
Aldrin	Chronic	3.0E-05	mg/kg-day	>50%	3.0E-05	mg/kg-day	Liver	1000 / 1	IRIS	6/19/2013
	Subchronic	4.0E-05	mg/kg-day	>50%	4.0E-05	mg/kg-day	Kidney	1000	PPRTV	3/14/2005
Aroclor 1242	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Aroclor 1248	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Aroclor 1254 and Total PCB Congeners	Chronic	2.0E-05	mg/kg-day	100%	2.0E-05	mg/kg-day	Ocular, Finger and Toe Nails	300	IRIS	6/19/2013
	Subchronic	3.0E-05	mg/kg-day	100%	3.0E-05	mg/kg-day	Neurological	300	ATSDR	11/2000
Aroclor 1260	Chronic	N/A			N/A					
	Subchronic	N/A			N/A					
Dieldrin	Chronic	5.0E-05	mg/kg-day	>50%	5.0E-05	mg/kg-day	Liver	100	IRIS	6/19/2013
	Subchronic	1.0E-04	mg/kg-day	>50%	1.0E-04	mg/kg-day	Neurological	100	ATSDR	9/2002
gamma-BHC (Lindane)	Chronic	3.0E-04	mg/kg-day	>50%	3.0E-04	mg/kg-day	Kidney, Liver	1000	IRIS	6/19/2013
	Subchronic	1.0E-05	mg/kg-day	>50%	1.0E-05	mg/kg-day	Immunological	1000	ATSDR	9/2005
Heptachlor epoxide	Chronic	1.3E-05	mg/kg-day	>50%	1.3E-05	mg/kg-day	Liver	1000 / 1	IRIS	06/19/13
	Subchronic	1.3E-05	mg/kg-day	>50%	1.3E-05	mg/kg-day	Liver	1000 / 1	HEAST	07/31/97
2,3,7,8-TCDD	Chronic	7.0E-10	mg/kg/day	50% - 83%	7.0E-10	mg/kg-day	Sperm	30	IRIS	06/19/13
	Subchronic	2.0E-08	mg/kg/day	50% - 83%	2.0E-08	mg/kg/day	Lymphatic System	30	ATSDR	12/01/98
Aluminum	Chronic	1.0E+00	mg/kg-day	N/A	1.0E+00	mg/kg-day	Neurological	100	PPRTV	10/23/2006
	Subchronic	1.0E+00	mg/kg-day	N/A	1.0E+00	mg/kg-day	Neurological	30	ATSDR	9/2008
Antimony	Chronic	4.0E-04	mg/kg-day	15%	6.0E-05	mg/kg-day	Blood, Longevity	1000/1	IRIS	6/19/2013
	Subchronic	4.0E-04	mg/kg-day	15%	6.0E-05	mg/kg-day	Blood, Whole Body	1000	PPRTV	7/29/2008

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YY)
Arsenic	Chronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3/1	IRIS	6/19/2013
	Subchronic	3.0E-04	mg/kg-day	95%	3.0E-04	mg/kg-day	Skin, Vascular	3	HEAST	7/1997
Barium	Chronic	2.0E-01	mg/kg-day	7%	1.4E-02	mg/kg-day	Kidney	300	IRIS	06/19/13
	Subchronic	2.0E-01	mg/kg-day	7%	1.4E-02	mg/kg-day	Kidney	100	ATSDR	08/01/07
Chromium (hexavalent)	Chronic	3.0E-03	mg/kg-day	2.5%	7.5E-05	mg/kg-day	NOE	300/1	IRIS	6/19/2013
	Subchronic	5.0E-03	mg/kg-day	2.5%	1.3E-04	mg/kg-day	Blood	100	ATSDR	9/2012
Cobalt	Chronic	3.0E-04	mg/kg-day	N/A	3.0E-04	mg/kg/day	Thyroid	3000	PPRTV	8/25/2008
	Subchronic	3.0E-03	mg/kg-day	N/A	3.0E-03	mg/kg/day	Thyroid	300	PPRTV	8/25/2008
Iron	Chronic	7.0E-01	mg/kg/day	N/A	7.0E-01	mg/kg/day	Gastrointestinal	1.5	PPRTV	9/11/2006
	Subchronic	7.0E-01	mg/kg/day	N/A	7.0E-01	mg/kg/day	Gastrointestinal	1.5	PPRTV	9/11/2006
Manganese (non-diet)	Chronic	2.4E-02	mg/kg-day	4%	9.6E-04	mg/kg-day	CNS	1/1	IRIS	6/19/2013
	Subchronic	N/A			N/A					
Manganese (diet)	Chronic	1.4E-01	mg/kg-day	4%	5.6E-03	mg/kg-day	CNS	1/1	IRIS	6/19/2013
	Subchronic	1.4E-01	mg/kg-day	4%	5.6E-03	mg/kg-day	CNS	1/1	HEAST	7/1997
Mercury	Chronic	3.0E-04	mg/kg-day	7%	2.1E-05	mg/kg-day	Immune System	1000	IRIS	06/19/13
	Subchronic	2.0E-03	mg/kg-day	7%	1.4E-04	mg/kg-day	Kidney	100	ATSDR	03/01/99
Methyl Mercury	Chronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Neurological	10	IRIS	06/28/13
	Subchronic	1.0E-04	mg/kg-day	100%	1.0E-04	mg/kg-day	Neurological	10	HEAST	7/1997
Thallium	Chronic	1.0E-05	mg/kg-day	100%	1.0E-05	mg/kg-day	Hair	3000	PPRTV	10/08/10
	Subchronic	4.0E-05	mg/kg-day	100%	4.0E-05	mg/kg-day	Hair	1000	PPRTV	10/08/10
Vanadium	Chronic	5.0E-03	mg/kg-day	100%	5.0E-03	mg/kg-day	Kidney	300	RSL/IRIS	6/19/2013
	Subchronic	7.0E-03	mg/kg-day	100%	7.0E-03	mg/kg-day	Whole Body	100	HEAST	7/1997

Notes:

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%. Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.

(2) Adjusted based on RAGS Part E. (dermal RfD = Oral RfD x oral absorption efficiency)

Definitions:
ATSDR = Agency for Toxic Substances and Disease Registry
CNS = Central Nervous System
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
N/A = Not Available
NOE = No Observed Effects
PPRTV = Provisional Peer-Reviewed Toxicity Value
PPRTV-A = Provisional Peer-Reviewed Toxicity Value, Appendix
RSL = USEPA Regional Screening Level Table

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (MM/DD/YY)
Benzene	Chronic	3.0E-02	mg/m^3	Blood	300/1	IRIS	6/19/2013
	Subchronic	8.0E-02	mg/m^3	Blood	100	PPRTV	9/29/2009
Ethylbenzene	Chronic	1.0E+00	mg/m^3	Developmental/Fetus	300	IRIS	6/19/2013
	Subchronic	9.0E+00	mg/m^3	Ear	100	PPRTV	9/9/2010
Trichloroethene	Chronic	2.0E-03	mg/m^3	Multiple (see below)	multiple (see below)	IRIS	6/19/2013
	Chronic	1.9E-03	mg/m^3	Immunotoxicity	100 / 1	IRIS	6/19/2013
	Chronic	2.1E-03	mg/m^3	Heart Malformations	10 / 1	IRIS	6/19/2013
	Subchronic	NA	NA	NA	NA	NA	NA
Xylenes	Chronic	1.0E-01	mg/m^3	Whole Body	300	IRIS	6/19/2013
	Subchronic	4.0E-01	mg/m^3	Whole Body	100	PPRTV	9/30/2009
1,1-Biphenyl	Chronic	4.0E-04	mg/m^3	Respiratory System	3000	PPRTV-A	4/4/2011
	Subchronic	4.0E-03	mg/m^3	Respiratory System	300	PPRTV-A	4/4/2011
2-Methylnaphthalene	Chronic	N/A					
	Subchronic	N/A					
Dibenzofuran	Chronic	N/A					
	Subchronic	N/A					
Naphthalene	Chronic	3.0E-03	mg/m^3	Respiratory System	3000	IRIS	6/19/2013
	Subchronic	NA	NA	NA	NA	NA	NA
Chromium (hexavalent)	Chronic	1.0E-04	mg/m^3	Respiratory System	300/1	IRIS	6/19/2013
	Subchronic	3.0E-04	mg/m^3	Respiratory System	30	ATSDR	9/1/2012

ATSDR = Agency for Toxic Substances & Disease Registry Minimal Risk Levels

IRIS = Integrated Risk Information System

PPRTV = Provisional Peer-Reviewed Toxicity Value

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	EPA Carcinogen Group	Source	Date (MM/DD/YY)
1,4-Dichlorobenzene	5.4E-03	100%	5.4E-03	$(mg/kg\text{-}day)^{-1}$	A	CalEPA	5/29/2013
Benzene	5.5E-02	Generally > 50%	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	6/19/2013
Ethylbenzene	1.1E-02	Generally > 50%	1.1E-02	$(mg/kg\text{-}day)^{-1}$	D	CalEPA	5/29/2013
Trichloroethene (4)	4.6E-02	>50%	4.6E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	6/19/2013
Trichloroethene (Kidney)	9.3E-03	>50%	9.3E-03	$(mg/kg\text{-}day)^{-1}$	A	IRIS	6/19/2013
Trichloroethene (NHL+Liver)	3.7E-02	>50%	3.7E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	6/19/2013
Xylenes	N/A		N/A				
1,1-Biphenyl	8.0E-03	58 - 89%	8.0E-03	$(mg/kg\text{-}day)^{-1}$	D	PPRTV-A	4/4/2011
2,4-Dimethylphenol	N/A		N/A				
2-Methylnaphthalene	N/A		N/A				
Benzo(a)anthracene (3)	7.3E-01	58 - 89%	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	7/1/1993
Benzo(a)pyrene (3)	7.3E+00	58 - 89%	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Benzo(b)fluoranthene (3)	7.3E-01	58 - 89%	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	7/1/1993
Benzo(k)fluoranthene (3)	7.3E-02	58 - 89%	7.3E-02	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	7/1/1993
Bis(2-Ethylhexyl)phthalate	1.4E-02	Generally > 50%	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Carbazole	2.0E-02	Generally > 50%	2.0E-02	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	7/1997
Chrysene (3)	7.3E-03	58 - 89%	7.3E-03	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	7/1/1993
Dibenz(a,h)anthracene (3)	7.3E+00	58 - 89%	7.3E+00	$(mg/kg\text{-}day)^{-1}$	2B	NCEA	7/1/1993
Dibenzofuran	N/A		N/A				
Fluoranthene	N/A		N/A				
Indeno(1,2,3-cd)pyrene (3)	7.3E-01	58 - 89%	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	NCEA	7/1/1993
Naphthalene	N/A		N/A				
Pyrene	N/A		N/A				
4,4'-DDT	3.4E-01	70-90%	3.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Aldrin	1.7E+01	>50%	1.7E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Aroclor 1242	2.0E+00	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Aroclor 1248	2.0E+00	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Aroclor 1254 and Total PCB Congeners	2.0E+00	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Aroclor 1260	2.0E+00	100%	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
Dieldrin	1.6E+01	>50%	1.6E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
gamma-BHC (Lindane)	1.1E+00	>50%	1.1E+00	$(mg/kg\text{-}day)^{-1}$	2B	CalEPA	5/22/2013
Heptachlor epoxide	9.1E+00	>50%	9.1E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/19/2013
2,3,7,8-TCDD	1.3E+05	50% - 83%	1.3E+05	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	6/11/2013
Aluminum	N/A		N/A				
Antimony	N/A		N/A				
Arsenic	1.5E+00	95%	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	6/19/2013
Barium	N/A		N/A				
Beryllium	N/A		N/A				

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	EPA Carcinogen Group	Source	Date (MM/DD/YY)
Cadmium (water)	N/A		N/A				
Cadmium (diet)	N/A		N/A				
Chromium (hexavalent) (3)	5.0E-01	2.5%	2.0E+01	$(mg/kg\text{-}day)^{-1}$	D	NJ DEP	4/8/2009
Cobalt	N/A		N/A				
Manganese	N/A		N/A				
Mercury	N/A		N/A				
Thallium	N/A		N/A				
Vanadium	N/A		N/A				

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1. USEPA recommends that the oral slope factor should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%. Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.

(2) Adjusted based on RAGS Part E. (dermal CSF = Oral CSF / oral absorption efficiency)

(3) This chemical operates with a mutagenic mode of action.

Chemical-specific data are not available; therefore, default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

Definitions:

CalEPA = California EPA
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
N/A = Not Available
NCEA = National Center for Environmental Assessment
NJ DEP = New Jersey Department of Environmental Protection
PPRTV = Provisional Peer-Reviewed Toxicity Value
PPRTV-A = Provisional Peer-Reviewed Toxicity Value, Appendix

(4) EPA has concluded, by a weight of evidence evaluation, that TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. As a result, increased early-life susceptibility is assumed for kidney cancer and the age-dependent adjustment factors (ADAFs) were used for the kidney cancer component of the total cancer risk when estimating age-specific cancer risks. Cancer risk estimates will also account for non-Hodgkins Lymphoma (NHL) and liver contribution.

Weight of Evidence definitions:
Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.
Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.
Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.
Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.
Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.
Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both.

2B: The agent is possibly carcinogenic to humans

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Unit Risk	Units	Weight of Evidence/ Cancer Guidance Description	Source	Date (MM/DD/YY)
1,4-Dichlorobenzene	1.1E-05	$(\mu g/m^3)^{-1}$	2B	CalEPA	5/29/2013
Benzene	7.8E-06	$(\mu g/m^3)^{-1}$	A	IRIS	6/19/2013
Ethylbenzene	2.5E-06	$(\mu g/m^3)^{-1}$	D	CalEPA	5/29/2012
Trichloroethene (2)	4.1E-06	$(\mu g/m^3)^{-1}$	A	IRIS	6/19/2013
Trichloroethene (Kidney)	1.0E-06	$(\mu g/m^3)^{-1}$	A	IRIS	6/19/2013
Trichloroethene (NHL+Liver)	3.1E-06	$(\mu g/m^3)^{-1}$	A	IRIS	6/19/2013
Xylenes	N/A				
1,1-Biphenyl	N/A				
2-Methylnaphthalene	N/A				
Dibenzofuran	N/A				
Naphthalene	3.4E-05	$(\mu g/m^3)^{-1}$	D	IRIS	6/19/2013
Chromium (hexavalent) (1)	8.4E-02	$(\mu g/m^3)^{-1}$	A	IRIS	6/19/2013

Definitions: CalEPA = California Environmental Protection

IRIS = Integrated Risk Information System

N/A = Not Available

(1) This chemical operates with a mutagenic mode of action.

Chemical-specific data are not available; therefore, USEPA default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<30	1

(2) EPA has concluded, by a weight of evidence evaluation, that TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors. As a result, increased early-life susceptibility is assumed for kidney cancer and the age-dependent adjustment factors (ADAFs) were used for the kidney cancer component of the total cancer risk when estimating age-specific cancer risks. Cancer risk estimates will also account for non-Hodgkins Lymphoma (NHL) and liver contribution.

Weight of Evidence definitions:

Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Unit Risk	Units	Weight of Evidence/ Cancer Guidance Description	Source	Date (MM/DD/YY)

Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.

Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.

Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.

Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.

Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or

2B: The agent is possibly carcinogenic to humans

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Ingestion	Benzo(a)anthracene	1.8E+02	mg/kg	6.3E-05	mg/kg/day	7.3E-01	1/mg/kg-day	4.6E-05	1.8E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	1.3E+02	mg/kg	4.5E-05	mg/kg/day	7.3E+00	1/mg/kg-day	3.3E-04	1.3E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	7.0E-05	mg/kg/day	7.3E-01	1/mg/kg-day	5.1E-05	2.0E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	2.8E-05	mg/kg/day	7.3E-02	1/mg/kg-day	2.1E-06	7.9E-05	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	4.2E-05	mg/kg/day	2.0E-02	1/mg/kg-day	8.4E-07	1.2E-04	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	7.3E-05	mg/kg/day	7.3E-03	1/mg/kg-day	5.4E-07	2.1E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	7.7E-06	mg/kg/day	7.3E+00	1/mg/kg-day	5.6E-05	2.2E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	mg/kg	6.6E-06	mg/kg/day	N/A		N/A	1.9E-05	mg/kg/day	1.0E-03	mg/kg/day	1.9E-02
				Fluoranthene	5.0E+02	mg/kg	1.7E-04	mg/kg/day	N/A		N/A	4.9E-04	mg/kg/day	4.0E-02	mg/kg/day	1.2E-02
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	2.4E-05	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-05	6.8E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	9.1E-06	mg/kg/day	N/A		N/A	2.5E-05	mg/kg/day	2.0E-02	mg/kg/day	1.3E-03
				Pyrene	3.9E+02	mg/kg	1.4E-04	mg/kg/day	N/A		N/A	3.8E-04	mg/kg/day	3.0E-02	mg/kg/day	1.3E-02
				Dieldrin	6.5E-01	mg/kg	2.3E-07	mg/kg/day	1.6E+01	1/mg/kg-day	3.6E-06	6.4E-07	mg/kg/day	5.0E-05	mg/kg/day	1.3E-02
				gamma-BHC (Lindane)	8.6E-01	mg/kg	3.0E-07	mg/kg/day	1.1E+00	1/mg/kg-day	3.3E-07	8.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.8E-03
				Aluminum	1.3E+04	mg/kg	4.4E-03	mg/kg/day	N/A		N/A	1.2E-02	mg/kg/day	1.0E+00	mg/kg/day	1.2E-02
				Arsenic	7.3E+00	mg/kg	2.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.8E-06	7.1E-06	mg/kg/day	3.0E-04	mg/kg/day	2.4E-02
				Chromium (hexavalent)	5.3E-01	mg/kg	1.9E-07	mg/kg/day	5.0E-01	1/mg/kg-day	9.3E-08	5.2E-07	mg/kg/day	3.0E-03	mg/kg/day	1.7E-04
				Cobalt	4.9E+00	mg/kg	1.7E-06	mg/kg/day	N/A		N/A	4.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.6E-02
				Iron	1.9E+04	mg/kg	6.8E-03	mg/kg/day	N/A		N/A	1.9E-02	mg/kg/day	7.0E-01	mg/kg/day	2.7E-02
				Lead	1.5E+02	mg/kg	5.3E-05	mg/kg/day	N/A		N/A	1.5E-04	mg/kg/day	N/A		N/A
				Manganese	3.2E+02	mg/kg	1.1E-04	mg/kg/day	N/A		N/A	3.1E-04	mg/kg/day	2.4E-02	mg/kg/day	1.3E-02
			Exp. Route Total								5.1E-04					1.5E-01
			Dermal Absorption[1]	Benzo(a)anthracene	1.8E+02	mg/kg	5.4E-05	mg/kg/day	7.3E-01	1/mg/kg-day	3.9E-05	1.5E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	1.3E+02	mg/kg	3.9E-05	mg/kg/day	7.3E+00	1/mg/kg-day	2.8E-04	1.1E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	6.0E-05	mg/kg/day	7.3E-01	1/mg/kg-day	4.4E-05	1.7E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	2.4E-05	mg/kg/day	7.3E-02	1/mg/kg-day	1.8E-06	6.8E-05	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	2.8E-05	mg/kg/day	2.0E-02	1/mg/kg-day	5.5E-07	7.7E-05	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	6.3E-05	mg/kg/day	7.3E-03	1/mg/kg-day	4.6E-07	1.8E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	6.6E-06	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-05	1.8E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	mg/kg	4.4E-06	mg/kg/day	N/A		N/A	1.2E-05	mg/kg/day	1.0E-03	mg/kg/day	1.2E-02
				Fluoranthene	5.0E+02	mg/kg	1.5E-04	mg/kg/day	N/A		N/A	4.2E-04	mg/kg/day	4.0E-02	mg/kg/day	1.0E-02
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	2.1E-05	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-05	5.8E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	7.8E-06	mg/kg/day	N/A		N/A	2.2E-05	mg/kg/day	2.0E-02	mg/kg/day	1.1E-03
				Pyrene	3.9E+02	mg/kg	1.2E-04	mg/kg/day	N/A		N/A	3.3E-04	mg/kg/day	3.0E-02	mg/kg/day	1.1E-02
				Dieldrin	6.5E-01	mg/kg	1.5E-07	mg/kg/day	1.6E+01	1/mg/kg-day	2.4E-06	4.2E-07	mg/kg/day	5.0E-05	mg/kg/day	8.4E-03
				gamma-BHC (Lindane)	8.6E-01	mg/kg	7.9E-08	mg/kg/day	1.1E+00	1/mg/kg-day	8.7E-08	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.4E-04
				Aluminum	1.3E+04	mg/kg	2.9E-04	mg/kg/day	N/A		N/A	8.1E-04	mg/kg/day	1.0E+00	mg/kg/day	8.1E-04
				Arsenic	7.3E+00	mg/kg	5.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.6E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.7E-03
				Chromium (hexavalent)	5.3E-01	mg/kg	1.2E-08	mg/kg/day	2.0E+01	1/mg/kg-day	2.4E-07	3.4E-08	mg/kg/day	7.5E-05	mg/kg/day	4.6E-04
				Cobalt	4.9E+00	mg/kg	1.1E-07	mg/kg/day	N/A		N/A	3.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.1E-03
				Iron	1.9E+04	mg/kg	4.5E-04	mg/kg/day	N/A		N/A	1.3E-03	mg/kg/day	7.0E-01	mg/kg/day	1.8E-03
				Lead	1.5E+02	mg/kg	3.5E-06	mg/kg/day	N/A		N/A	9.8E-06	mg/kg/day	N/A		N/A
				Manganese	3.2E+02	mg/kg	7.3E-06	mg/kg/day	N/A		N/A	2.0E-05	mg/kg/day	9.6E-04	mg/kg/day	2.1E-02
			Exp. Route Total								4.4E-04					7.4E-02
		Exposure Point Total									9.5E-04					2.3E-01

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Exposure Medium Total										9.5E-04					2.3E-01
il within Fenced Are (cont'd)	Air	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Inhalation	Naphthalene	4.3E-01	µg/m^3	3.5E-02	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	1.2E-06	9.9E-05	mg/m^3	3.0E-03	mg/m^3	3.3E-02
			Exp. Route Total								1.2E-06					3.3E-02
		Exposure Point Total									1.2E-06					3.3E-02
	Exposure Medium Total										1.2E-06					3.3E-02
Surface Soil within Fenced Area of Site 4											9.5E-04					2.6E-01
										Total of Receptor Risk	9.5E-04				Total of Receptor Hazard	2.6E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.03 used for arsenic, DABS of 0.04 for lindane, DABS of 0.01 for all other inorganics, DABS of 0.13 for PAHs.

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene	4.2E+00	mg/kg	2.9E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-07	8.6E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	2.4E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.8E-06	7.1E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	2.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-07	7.1E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	1.2E-07	mg/kg/day	7.3E-02	1/mg/kg-day	8.6E-09	3.4E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	1.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-07	4.5E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.2E-08	3.7E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	2.3E-09	mg/kg/day	1.7E+01	1/mg/kg-day	3.9E-08	6.7E-09	mg/kg/day	3.0E-05	mg/kg/day	2.2E-04
				Aroclor-1242	1.0E+00	mg/kg	7.0E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-07	2.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	6.0E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-07	1.7E-07	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	8.1E-04	mg/kg/day	N/A		N/A	2.4E-03	mg/kg/day	1.0E+00	mg/kg/day	2.4E-03
				Arsenic	7.7E+01	mg/kg	5.4E-06	mg/kg/day	1.5E+00	1/mg/kg-day	8.0E-06	1.6E-05	mg/kg/day	3.0E-04	mg/kg/day	5.2E-02
				Cobalt	3.9E+00	mg/kg	2.7E-07	mg/kg/day	N/A		N/A	7.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Iron	4.0E+04	mg/kg	2.8E-03	mg/kg/day	N/A		N/A	8.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.2E-02
				Manganese	1.6E+02	mg/kg	1.1E-05	mg/kg/day	N/A		N/A	3.2E-05	mg/kg/day	2.4E-02	mg/kg/day	1.3E-03
				Thallium	5.6E-01	mg/kg	3.9E-08	mg/kg/day	N/A		N/A	1.1E-07	mg/kg/day	1.0E-05	mg/kg/day	1.1E-02
				Vanadium	2.7E+01	mg/kg	1.9E-06	mg/kg/day	N/A		N/A	5.4E-06	mg/kg/day	5.0E-03	mg/kg/day	1.1E-03
			Exp. Route Total								1.1E-05					8.3E-02
			Dermal Absorption[1]	Benzo(a)anthracene	4.2E+00	mg/kg	1.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-07	4.4E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	1.3E-07	mg/kg/day	7.3E+00	1/mg/kg-day	9.2E-07	3.7E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.3E-08	3.7E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	6.1E-08	mg/kg/day	7.3E-02	1/mg/kg-day	4.4E-09	1.8E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	8.1E-09	mg/kg/day	7.3E+00	1/mg/kg-day	5.9E-08	2.4E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	6.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-08	1.9E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	9.2E-10	mg/kg/day	1.7E+01	1/mg/kg-day	1.6E-08	2.7E-09	mg/kg/day	3.0E-05	mg/kg/day	8.9E-05
				Aroclor-1242	1.0E+00	mg/kg	3.9E-08	mg/kg/day	2.0E+00	1/mg/kg-day	7.8E-08	1.1E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	3.3E-08	mg/kg/day	2.0E+00	1/mg/kg-day	6.7E-08	9.8E-08	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	3.2E-05	mg/kg/day	N/A		N/A	9.4E-05	mg/kg/day	1.0E+00	mg/kg/day	9.4E-05
				Arsenic	7.7E+01	mg/kg	6.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	9.6E-07	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	6.2E-03
				Cobalt	3.9E+00	mg/kg	1.1E-08	mg/kg/day	N/A		N/A	3.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.1E-04
				Iron	4.0E+04	mg/kg	1.1E-04	mg/kg/day	N/A		N/A	3.3E-04	mg/kg/day	7.0E-01	mg/kg/day	4.7E-04
				Manganese	1.6E+02	mg/kg	4.3E-07	mg/kg/day	N/A		N/A	1.3E-06	mg/kg/day	9.6E-04	mg/kg/day	1.3E-03
				Thallium	5.6E-01	mg/kg	1.6E-09	mg/kg/day	N/A		N/A	4.5E-09	mg/kg/day	1.0E-05	mg/kg/day	4.5E-04
				Vanadium	2.7E+01	mg/kg	7.4E-08	mg/kg/day	N/A		N/A	2.2E-07	mg/kg/day	5.0E-03	mg/kg/day	4.3E-05
			Exp. Route Total								2.4E-06					8.8E-03
		Exposure Point Total									1.3E-05					9.2E-02
	Exposure Medium Total										1.3E-05					9.2E-02
Surface Soil outside Fenced Area of Site 4											1.3E-05					9.2E-02

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	7.3E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.1E-04
			Exp. Route Total								1.1E-07					7.1E-04
			Dermal Absorption	Arsenic	1.6E+00	ug/L	1.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-08	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
			Exp. Route Total								2.5E-08					1.6E-04
		Exposure Point Total									1.4E-07					8.8E-04
	Surface Water - Youth Pond Total										1.4E-07					8.8E-04
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	6.6E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-08	1.9E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	4.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.0E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.5E-03
				Iron	1.3E+04	ug/L	6.0E-04	mg/kg/day	N/A		N/A	1.8E-03	mg/kg/day	7.0E-01	mg/kg/day	2.5E-03
			Exp. Route Total								7.5E-07					7.1E-03
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	3.0E-06	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-05	8.7E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-07	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Iron	1.3E+04	ug/L	1.4E-04	mg/kg/day	N/A		N/A	4.0E-04	mg/kg/day	7.0E-01	mg/kg/day	5.7E-04
			Exp. Route Total								2.2E-05					1.6E-03
		Exposure Point Total									2.3E-05					8.7E-03
	Surface Water - Upstream Pond Total										2.3E-05					8.7E-03
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	2.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-06	7.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
				Iron	3.0E+04	ug/L	1.4E-03	mg/kg/day	N/A		N/A	4.0E-03	mg/kg/day	7.0E-01	mg/kg/day	5.7E-03
			Exp. Route Total								3.9E-06					3.1E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	6.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	9.0E-07	1.7E-06	mg/kg/day	3.0E-04	mg/kg/day	5.8E-03
				Iron	3.0E+04	ug/L	3.1E-04	mg/kg/day	N/A		N/A	9.1E-04	mg/kg/day	7.0E-01	mg/kg/day	1.3E-03
			Exp. Route Total								9.0E-07					7.1E-03
		Exposure Point Total									4.8E-06					3.8E-02
	Surface Water - Drainage Channel to Upstream Pond Total										4.8E-06					3.8E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	6.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.9E-08	2.0E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.8E-07	7.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.5E-03
				Chromium	4.0E+01	mg/kg	1.4E-06	mg/kg/day	5.0E-01	1/mg/kg-day	7.0E-07	4.1E-06	mg/kg/day	3.0E-03	mg/kg/day	1.4E-03
			Exp. Route Total								1.1E-06					3.8E-03
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	3.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-07	8.7E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-07	7.6E-07	mg/kg/day	3.0E-04	mg/kg/day	2.5E-03
				Chromium	4.0E+01	mg/kg	4.8E-07	mg/kg/day	2.0E+01	1/mg/kg-day	9.5E-06	1.4E-06	mg/kg/day	7.5E-05	mg/kg/day	1.8E-02
			Exp. Route Total								1.0E-05					2.1E-02
		Exposure Point Total									1.1E-05					2.5E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										1.1E-05					2.5E-02

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.5E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	3.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.3E-07	9.4E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.4E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.2E-08	1.3E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	7.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	5.1E-08	2.0E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	9.2E-09	mg/kg/day	7.3E-01	1/mg/kg-day	6.7E-09	2.7E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-06	7.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.5E-02
				Chromium	2.5E+01	mg/kg	8.7E-07	mg/kg/day	5.0E-01	1/mg/kg-day	4.4E-07	2.5E-06	mg/kg/day	3.0E-03	mg/kg/day	8.5E-04
				Thallium	1.4E+00	mg/kg	4.7E-08	mg/kg/day	N/A		N/A	1.4E-07	mg/kg/day	1.0E-05	mg/kg/day	1.4E-02
			Exp. Route Total								4.7E-06					4.0E-02
			Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.4E-08	3.8E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	1.4E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.0E-06	4.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	2.0E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.4E-07	5.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	3.1E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.3E-07	9.0E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	4.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-08	1.2E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.7E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-06	7.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
				Chromium	2.5E+01	mg/kg	3.0E-07	mg/kg/day	2.0E+01	1/mg/kg-day	6.0E-06	8.7E-07	mg/kg/day	7.5E-05	mg/kg/day	1.2E-02
				Thallium	1.4E+00	mg/kg	1.6E-08	mg/kg/day	N/A		N/A	4.7E-08	mg/kg/day	1.0E-05	mg/kg/day	4.7E-03
			Exp. Route Total								1.2E-05					4.2E-02
		Exposure Point Total									1.6E-05					8.2E-02
	Surface and Subsurface Sediment - Youth Pond Total										1.6E-05					8.2E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	1.2E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.6E-09	3.4E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	2.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.5E-07	5.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	3.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.8E-08	1.1E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	3.8E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.8E-08	1.1E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.3E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.7E-07	5.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	3.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	7.1E-08	1.0E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	7.0E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.1E-07	2.1E-08	mg/kg/day	5.0E-05	mg/kg/day	4.1E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.9E-09	mg/kg/day	9.1E+00	1/mg/kg-day	2.6E-08	8.4E-09	mg/kg/day	1.3E-05	mg/kg/day	6.4E-04
				Arsenic	2.0E+01	mg/kg	6.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.0E-06	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.6E-03
				Chromium	2.8E-02	mg/kg	9.7E-10	mg/kg/day	5.0E-01	1/mg/kg-day	4.9E-10	2.8E-09	mg/kg/day	3.0E-03	mg/kg/day	9.4E-07
				Lead	6.0E+01	mg/kg	2.1E-06	mg/kg/day	N/A		N/A	6.1E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								1.8E-06					7.7E-03
			Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	5.3E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.8E-08	1.5E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	8.9E-08	mg/kg/day	7.3E+00	1/mg/kg-day	6.5E-07	2.6E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.7E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-07	4.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.7E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.2E-07	4.9E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.3E-08	3.7E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	8.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.8E-06	2.6E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.7E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.4E-07	4.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	2.4E-08	mg/kg/day	1.6E+01	1/mg/kg-day	3.8E-07	7.0E-08	mg/kg/day	5.0E-05	mg/kg/day	1.4E-03
				Heptachlor epoxide	8.2E-02	mg/kg	9.8E-09	mg/kg/day	9.1E+00	1/mg/kg-day	8.9E-08	2.9E-08	mg/kg/day	1.3E-05	mg/kg/day	2.2E-03
				Arsenic	2.0E+01	mg/kg	7.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-06	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.8E-03
				Chromium	2.8E-02	mg/kg	3.3E-10	mg/kg/day	2.0E+01	1/mg/kg-day	6.6E-09	9.7E-10	mg/kg/day	7.5E-05	mg/kg/day	1.3E-05
				Lead	6.0E+01	mg/kg	7.2E-07	mg/kg/day	N/A		N/A	2.1E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								4.7E-06					1.0E-02
		Exposure Point Total									6.5E-06					1.8E-02
	Surface and Subsurface Sediment - Upstream Pond Total										6.5E-06					1.8E-02

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	1.6E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-08	4.6E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	1.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-07	4.6E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	2.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	1.9E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-08	5.5E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	6.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-09	1.9E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-07	7.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Cobalt	2.7E+00	mg/kg	1.9E-07	mg/kg/day	N/A		N/A	2.7E-07	mg/kg/day	3.0E-04	mg/kg/day	9.1E-04
				Iron	1.1E+04	mg/kg	7.9E-04	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.6E-03
				Manganese	2.2E+02	mg/kg	1.5E-05	mg/kg/day	N/A		N/A	2.2E-05	mg/kg/day	2.4E-02	mg/kg/day	9.2E-04
			Exp. Route Total								5.7E-07					6.1E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	7.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	5.1E-08	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	7.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	5.1E-07	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.2E-08	3.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	8.4E-09	mg/kg/day	7.3E+00	1/mg/kg-day	6.1E-08	2.4E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.2E-08	8.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-07	8.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.7E-03
				Cobalt	1.9E-01	mg/kg	2.3E-09	mg/kg/day	N/A		N/A	6.6E-09	mg/kg/day	3.0E-04	mg/kg/day	2.2E-05
				Iron	7.7E+00	mg/kg	9.2E-08	mg/kg/day	N/A		N/A	2.7E-07	mg/kg/day	7.0E-01	mg/kg/day	3.8E-07
				Manganese	2.7E+00	mg/kg	3.2E-08	mg/kg/day	N/A		N/A	9.4E-08	mg/kg/day	9.6E-04	mg/kg/day	9.8E-05
			Exp. Route Total								1.1E-06					2.8E-03
		Exposure Point Total									1.7E-06					8.9E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										1.7E-06					8.9E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	4.8E-06	mg/kg/day	2.0E+00	1/mg/kg-day	9.6E-06	1.4E-05	mg/kg/day	2.0E-05	mg/kg/day	7.0E-01
				Aroclor-1260	4.2E-01	mg/kg	2.5E-05	mg/kg/day	2.0E+00	1/mg/kg-day	4.9E-05	7.2E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	4.7E-10	mg/kg/day	1.3E+05	1/mg/kg-day	6.2E-05	1.4E-09	mg/kg/day	7.0E-10	mg/kg/day	2.0E+00
				Chromium	1.4E-01	mg/kg	1.6E-05	mg/kg/day	5.0E-01	1/mg/kg-day	8.2E-06	4.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.6E-02
				Mercury	9.0E-02	mg/kg	1.1E-05	mg/kg/day	N/A		N/A	3.1E-05	mg/kg/day	1.0E-04	mg/kg/day	3.1E-01
			Exp. Route Total								1.3E-04					3.0E+00
		Exposure Point Total									1.3E-04					3.0E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										1.3E-04					3.0E+00
Total of Receptor Risk from Youth Pond											1.5E-04	Total of Receptor Hazard from Youth Pond				3.1E+00
Total of Receptor Risk from Upstream Pond											1.9E-04	Total of Receptor Hazard from Upstream Pond				3.2E+00

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements A, B, and C.

Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Table 7.2.RME Supplement A
Calculation of DAevent for Youth Pond
Adult and Child Visitor/Recreational User
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Arsenic	1.6E+00	1.0E-03	NA	NA	NA	NA	2.6	4.2E-09	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

Table 7.2.RME Supplement B
Calculation of DAevent for Upstream Pond
Adult and Child Visitor/Recreational User
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Benzo(a)pyrene	1.5E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	2.6	7.5E-07	2
Arsenic	1.0E+01	1.0E-03	NA	NA	NA	NA	2.6	2.7E-08	1
Iron	1.3E+04	1.0E-03	NA	NA	NA	NA	2.6	3.5E-05	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

Table 7.2.RME Supplement C
Calculation of DAevent for Drainage Channel to Upstream Pond
Adult and Child Visitor/Recreational User
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Arsenic	5.8E+01	1.0E-03	NA	NA	NA	NA	2.6	1.5E-07	1
Iron	3.0E+04	1.0E-03	NA	NA	NA	NA	2.6	7.9E-05	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene[2]	4.2E+00	mg/kg			7.3E-01	1/mg/kg-day	2.7E-06	8.0E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	3.5E+00	mg/kg			7.3E+00	1/mg/kg-day	2.2E-05	6.6E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	3.5E+00	mg/kg			7.3E-01	1/mg/kg-day	2.2E-06	6.7E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.7E+00	mg/kg			7.3E-02	1/mg/kg-day	1.1E-07	3.2E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	mg/kg			7.3E+00	1/mg/kg-day	1.4E-06	4.2E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.8E+00	mg/kg			7.3E-01	1/mg/kg-day	1.1E-06	3.4E-06	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	5.4E-09	mg/kg/day	1.7E+01	1/mg/kg-day	9.1E-08	6.3E-08	mg/kg/day	3.0E-05	mg/kg/day	2.1E-03
				Aroclor-1242	1.0E+00	mg/kg	1.6E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.3E-07	1.9E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	1.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	2.8E-07	1.6E-06	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	1.9E-03	mg/kg/day	N/A		N/A	2.2E-02	mg/kg/day	1.0E+00	mg/kg/day	2.2E-02
				Arsenic	7.7E+01	mg/kg	1.3E-05	mg/kg/day	1.5E+00	1/mg/kg-day	1.9E-05	1.5E-04	mg/kg/day	3.0E-04	mg/kg/day	4.9E-01
				Cobalt	3.9E+00	mg/kg	6.3E-07	mg/kg/day	N/A		N/A	7.4E-06	mg/kg/day	3.0E-04	mg/kg/day	2.5E-02
				Iron	4.0E+04	mg/kg	6.6E-03	mg/kg/day	N/A		N/A	7.7E-02	mg/kg/day	7.0E-01	mg/kg/day	1.1E-01
				Manganese	1.6E+02	mg/kg	2.5E-05	mg/kg/day	N/A		N/A	2.9E-04	mg/kg/day	2.4E-02	mg/kg/day	1.2E-02
				Thallium	5.6E-01	mg/kg	9.1E-08	mg/kg/day	N/A		N/A	1.1E-06	mg/kg/day	1.0E-05	mg/kg/day	1.1E-01
				Vanadium	2.7E+01	mg/kg	4.3E-06	mg/kg/day	N/A		N/A	5.1E-05	mg/kg/day	5.0E-03	mg/kg/day	1.0E-02
			Exp. Route Total								4.9E-05					7.7E-01
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.2E+00	mg/kg			7.3E-01	1/mg/kg-day	9.7E-07	2.9E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	3.5E+00	mg/kg			7.3E+00	1/mg/kg-day	8.1E-06	2.4E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	3.5E+00	mg/kg			7.3E-01	1/mg/kg-day	8.1E-07	2.4E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.7E+00	mg/kg			7.3E-02	1/mg/kg-day	3.9E-08	1.2E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	mg/kg			7.3E+00	1/mg/kg-day	5.2E-07	1.5E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.8E+00	mg/kg			7.3E-01	1/mg/kg-day	4.2E-07	1.2E-06	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	1.5E-09	mg/kg/day	1.7E+01	1/mg/kg-day	2.6E-08	1.8E-08	mg/kg/day	3.0E-05	mg/kg/day	5.9E-04
				Aroclor-1242	1.0E+00	mg/kg	6.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-07	7.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	5.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-07	6.4E-07	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	5.3E-05	mg/kg/day	N/A		N/A	6.2E-04	mg/kg/day	1.0E+00	mg/kg/day	6.2E-04
				Arsenic	7.7E+01	mg/kg	1.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-06	1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.1E-02
				Cobalt	3.9E+00	mg/kg	1.8E-08	mg/kg/day	N/A		N/A	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	6.9E-04
				Iron	4.0E+04	mg/kg	1.8E-04	mg/kg/day	N/A		N/A	2.1E-03	mg/kg/day	7.0E-01	mg/kg/day	3.1E-03
				Manganese	1.6E+02	mg/kg	7.1E-07	mg/kg/day	N/A		N/A	8.3E-06	mg/kg/day	9.6E-04	mg/kg/day	8.6E-03
				Thallium	5.6E-01	mg/kg	2.5E-09	mg/kg/day	N/A		N/A	3.0E-08	mg/kg/day	1.0E-05	mg/kg/day	3.0E-03
				Vanadium	2.7E+01	mg/kg	1.2E-07	mg/kg/day	N/A		N/A	1.4E-06	mg/kg/day	5.0E-03	mg/kg/day	2.8E-04
			Exp. Route Total								1.3E-05					5.8E-02
		Exposure Point Total									6.2E-05					8.3E-01
	Exposure Medium Total										6.2E-05					8.3E-01
Surface Soil outside Fenced Area of Site 4											6.2E-05					8.3E-01

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	8.6E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.3E-07	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.3E-03
			Exp. Route Total								1.3E-07					3.3E-03
			Dermal Absorption	Arsenic	1.6E+00	ug/L	6.8E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.0E-08	7.9E-08	mg/kg/day	3.0E-04	mg/kg/day	2.6E-04
			Exp. Route Total								1.0E-08					2.6E-04
		Exposure Point Total									1.4E-07					3.6E-03
	Surface Water - Youth Pond Total										1.4E-07					3.6E-03
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	3.0E-07	9.0E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	5.5E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.2E-07	6.4E-06	mg/kg/day	3.0E-04	mg/kg/day	2.1E-02
				Iron	1.3E+04	ug/L	7.0E-04	mg/kg/day	N/A		N/A	8.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.2E-02
			Exp. Route Total								1.1E-06					3.3E-02
			Dermal Absorption	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	4.7E-05	1.4E-05	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	4.3E-08	mg/kg/day	1.5E+00	1/mg/kg-day	6.5E-08	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Iron	1.3E+04	ug/L	5.6E-05	mg/kg/day	N/A		N/A	6.5E-04	mg/kg/day	7.0E-01	mg/kg/day	9.3E-04
			Exp. Route Total								4.7E-05					2.6E-03
		Exposure Point Total									4.8E-05					3.6E-02
	Surface Water - Upstream Pond Total										4.8E-05					3.6E-02
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	3.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.6E-06	3.6E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Iron	3.0E+04	ug/L	1.6E-03	mg/kg/day	N/A		N/A	1.9E-02	mg/kg/day	7.0E-01	mg/kg/day	2.7E-02
			Exp. Route Total								4.6E-06					1.5E-01
			Dermal Absorption	Arsenic	5.8E+01	ug/L	2.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.6E-07	2.8E-06	mg/kg/day	3.0E-04	mg/kg/day	9.5E-03
				Iron	3.0E+04	ug/L	1.3E-04	mg/kg/day	N/A		N/A	1.5E-03	mg/kg/day	7.0E-01	mg/kg/day	2.1E-03
			Exp. Route Total								3.6E-07					1.2E-02
		Exposure Point Total									5.0E-06					1.6E-01
	Surface Water - Drainage Channel to Upstream Pond Total										5.0E-06					1.6E-01
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	6.1E-07	1.8E-07	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	6.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.9E-07	6.9E-06	mg/kg/day	3.0E-04	mg/kg/day	2.3E-02
				Chromium[2]	4.0E+01	mg/kg			5.0E-01	1/mg/kg-day	8.7E-06	3.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.3E-02
			Exp. Route Total								1.0E-05					3.6E-02
			Dermal Absorption[1]	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	3.1E-07	9.4E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	7.1E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	8.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.8E-03
				Chromium[2]	4.0E+01	mg/kg			2.0E+01	1/mg/kg-day	1.4E-05	1.5E-06	mg/kg/day	7.5E-05	mg/kg/day	2.0E-02
			Exp. Route Total								1.4E-05					2.3E-02
		Exposure Point Total									2.4E-05					5.9E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										2.4E-05					5.9E-02

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.9E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	2.9E-06	8.7E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	4.0E-07	1.2E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	6.3E-07	1.9E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	8.4E-08	2.5E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	6.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	9.1E-06	7.1E-05	mg/kg/day	3.0E-04	mg/kg/day	2.4E-01
				Chromium[2]	2.5E+01	mg/kg			5.0E-01	1/mg/kg-day	5.4E-06	2.4E-05	mg/kg/day	3.0E-03	mg/kg/day	7.9E-03
				Thallium	1.4E+00	mg/kg	1.1E-07	mg/kg/day	N/A		N/A	1.3E-06	mg/kg/day	1.0E-05	mg/kg/day	1.3E-01
			Exp. Route Total								1.9E-05					3.7E-01
			Dermal Absorption[1]	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-07	4.1E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	1.5E-06	4.5E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	2.1E-07	6.2E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	3.3E-07	9.8E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	4.3E-08	1.3E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	7.2E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-06	8.4E-06	mg/kg/day	3.0E-04	mg/kg/day	2.8E-02
				Chromium[2]	2.5E+01	mg/kg			2.0E+01	1/mg/kg-day	8.6E-06	9.4E-07	mg/kg/day	7.5E-05	mg/kg/day	1.3E-02
				Thallium	1.4E+00	mg/kg	4.4E-09	mg/kg/day	N/A		N/A	5.1E-08	mg/kg/day	1.0E-05	mg/kg/day	5.1E-03
			Exp. Route Total								1.2E-05					4.6E-02
		Exposure Point Total									3.1E-05					4.2E-01
	Surface and Subsurface Sediment - Youth Pond Total										3.1E-05					4.2E-01
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	1.1E-07	3.2E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-06	5.5E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	3.5E-07	1.0E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	3.5E-07	1.0E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.8E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	4.3E-07	mg/kg/day	2.0E+00	1/mg/kg-day	8.7E-07	5.1E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	8.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.6E-07	9.6E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	1.6E-08	mg/kg/day	1.6E+01	1/mg/kg-day	2.6E-07	1.9E-07	mg/kg/day	5.0E-05	mg/kg/day	3.8E-03
				Heptachlor epoxide	8.2E-02	mg/kg	6.7E-09	mg/kg/day	9.1E+00	1/mg/kg-day	6.1E-08	7.8E-08	mg/kg/day	1.3E-05	mg/kg/day	6.0E-03
				Arsenic	2.0E+01	mg/kg	1.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.4E-06	1.9E-05	mg/kg/day	3.0E-04	mg/kg/day	6.2E-02
				Chromium[2]	2.8E-02	mg/kg			5.0E-01	1/mg/kg-day	6.0E-09	2.6E-08	mg/kg/day	3.0E-03	mg/kg/day	8.8E-06
				Lead	6.0E+01	mg/kg	4.9E-06	mg/kg/day	N/A		N/A	5.7E-05	mg/kg/day	N/A		N/A
			Exp. Route Total								6.6E-06					7.2E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	5.5E-08	1.7E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	9.4E-07	2.8E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	1.8E-07	5.3E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-07	5.3E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-07	4.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	2.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	4.8E-07	2.8E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	4.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	9.1E-08	5.3E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.5E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.0E-07	7.6E-08	mg/kg/day	5.0E-05	mg/kg/day	1.5E-03
				Heptachlor epoxide	8.2E-02	mg/kg	2.6E-09	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-08	3.1E-08	mg/kg/day	1.3E-05	mg/kg/day	2.4E-03
				Arsenic	2.0E+01	mg/kg	1.9E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.8E-07	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.4E-03
				Chromium[2]	2.8E-02	mg/kg			2.0E+01	1/mg/kg-day	9.6E-09	1.0E-09	mg/kg/day	7.5E-05	mg/kg/day	1.4E-05
				Lead	6.0E+01	mg/kg	1.9E-07	mg/kg/day	N/A		N/A	2.3E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								2.5E-06					1.1E-02
		Exposure Point Total									9.1E-06					8.3E-02

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Surface and Subsurface Sediment - Upstream Pond Total										9.1E-06					8.3E-02
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-07	4.3E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	1.4E-06	4.3E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	1.7E-07	5.1E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	6.0E-08	1.8E-07	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.3E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.0E-07	7.3E-06	mg/kg/day	3.0E-04	mg/kg/day	2.4E-02
				Cobalt	2.7E+00	mg/kg	4.7E-08	mg/kg/day	N/A		N/A	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	8.5E-03
				Iron	1.1E+04	mg/kg	2.0E-04	mg/kg/day	N/A		N/A	1.1E-02	mg/kg/day	7.0E-01	mg/kg/day	1.5E-02
				Manganese	2.2E+02	mg/kg	3.8E-06	mg/kg/day	N/A		N/A	2.1E-04	mg/kg/day	2.4E-02	mg/kg/day	8.6E-03
			Exp. Route Total								2.3E-06					5.7E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	7.3E-08	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-07	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-07	4.0E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	8.8E-08	2.6E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	3.1E-08	9.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	7.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	8.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.9E-03
				Cobalt	1.9E-01	mg/kg	6.1E-10	mg/kg/day	N/A		N/A	7.1E-09	mg/kg/day	3.0E-04	mg/kg/day	2.4E-05
				Iron	7.7E+00	mg/kg	2.5E-08	mg/kg/day	N/A		N/A	2.9E-07	mg/kg/day	7.0E-01	mg/kg/day	4.1E-07
				Manganese	2.7E+00	mg/kg	8.7E-09	mg/kg/day	N/A		N/A	1.0E-07	mg/kg/day	9.6E-04	mg/kg/day	1.1E-04
			Exp. Route								1.2E-06					3.0E-03
		Exposure Point Total									3.4E-06					6.0E-02
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										3.4E-06					6.0E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	2.7E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.4E-06	3.1E-05	mg/kg/day	2.0E-05	mg/kg/day	1.6E+00
				Aroclor-1260	4.2E-01	mg/kg	1.4E-05	mg/kg/day	2.0E+00	1/mg/kg-day	2.8E-05	1.6E-04	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	2.7E-10	mg/kg/day	1.3E+05	1/mg/kg-day	3.5E-05	3.1E-09	mg/kg/day	7.0E-10	mg/kg/day	4.4E+00
				Chromium[2]	1.4E-01	mg/kg			5.0E-01	1/mg/kg-day	2.5E-05	1.1E-04	mg/kg/day	3.0E-03	mg/kg/day	3.6E-02
				Mercury	9.0E-02	mg/kg	5.9E-06	mg/kg/day	N/A		N/A	6.9E-05	mg/kg/day	1.0E-04	mg/kg/day	6.9E-01
			Exp. Route								9.2E-05					6.7E+00
		Exposure Point Total									9.2E-05					6.7E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										9.2E-05					6.7E+00
										Total of Receptor Risk from Youth Pond	1.3E-04				Total of Receptor Risk from Youth Pon	7.2E+00
										Total of Receptor Risk from Upstream Pond	2.4E-04				Total of Receptor Hazard from Upstream Pond	7.9E+00

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements A, B, and C.

[2] See Table 7.3.RME Supplement A for calculation of cancer intake and cancer risk following MMOA method.

Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

TABLE 7.3.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene	4.2E+00	mg/kg	2.3E-07	4.6E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.7E-06
				Benzo(a)pyrene	3.5E+00	mg/kg	1.9E-07	3.8E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	2.2E-05
				Benzo(b)fluoranthene	3.5E+00	mg/kg	1.9E-07	3.8E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.2E-06
				Benzo(k)fluoranthene	1.7E+00	mg/kg	9.1E-08	1.8E-07	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	1.1E-07
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	1.2E-08	2.4E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.4E-06
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	9.8E-08	2.0E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.1E-06
			Dermal	Benzo(a)anthracene	4.2E+00	mg/kg	8.3E-08	1.7E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	9.7E-07
				Benzo(a)pyrene	3.5E+00	mg/kg	6.9E-08	1.4E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.1E-06
				Benzo(b)fluoranthene	3.5E+00	mg/kg	6.9E-08	1.4E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	8.1E-07
				Benzo(k)fluoranthene	1.7E+00	mg/kg	3.3E-08	6.6E-08	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	3.9E-08
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	4.4E-09	8.8E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	5.2E-07
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	3.6E-08	7.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.2E-07

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene	8.8E+00	mg/kg	6.4E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.7E-07	1.8E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	2.5E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.9E-06	7.1E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	2.6E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-07	7.1E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	1.2E-07	mg/kg/day	7.3E-02	1/mg/kg-day	8.9E-09	3.4E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	1.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.2E-07	4.5E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.5E-08	3.7E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	2.4E-09	mg/kg/day	1.7E+01	1/mg/kg-day	4.1E-08	6.7E-09	mg/kg/day	3.0E-05	mg/kg/day	2.2E-04
				Aroclor-1242	1.0E+00	mg/kg	7.3E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.5E-07	2.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	6.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-07	1.7E-07	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	8.4E-04	mg/kg/day	N/A		N/A	2.4E-03	mg/kg/day	1.0E+00	mg/kg/day	2.4E-03
				Arsenic	7.7E+01	mg/kg	5.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	8.4E-06	1.6E-05	mg/kg/day	3.0E-04	mg/kg/day	5.2E-02
				Cobalt	3.9E+00	mg/kg	2.8E-07	mg/kg/day	N/A		N/A	7.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Iron	4.0E+04	mg/kg	2.9E-03	mg/kg/day	N/A		N/A	8.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.2E-02
				Manganese	1.6E+02	mg/kg	1.1E-05	mg/kg/day	N/A		N/A	3.2E-05	mg/kg/day	2.4E-02	mg/kg/day	1.3E-03
				Thallium	5.6E-01	mg/kg	4.1E-08	mg/kg/day	N/A		N/A	1.1E-07	mg/kg/day	1.0E-05	mg/kg/day	1.1E-02
				Vanadium	2.7E+01	mg/kg	1.9E-06	mg/kg/day	N/A		N/A	5.4E-06	mg/kg/day	5.0E-03	mg/kg/day	1.1E-03
			Exp. Route Total								1.1E-05					8.3E-02
			Dermal Absorption[1]	Benzo(a)anthracene	8.8E+00	mg/kg	5.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.0E-07	1.5E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	2.2E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.6E-06	6.1E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	2.2E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.6E-07	6.1E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	1.0E-07	mg/kg/day	7.3E-02	1/mg/kg-day	7.7E-09	2.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	1.4E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.0E-07	3.9E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	1.1E-07	mg/kg/day	7.3E-01	1/mg/kg-day	8.2E-08	3.1E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	1.6E-09	mg/kg/day	1.7E+01	1/mg/kg-day	2.7E-08	4.4E-09	mg/kg/day	3.0E-05	mg/kg/day	1.5E-04
				Aroclor-1242	1.0E+00	mg/kg	6.7E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-07	1.9E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	5.8E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-07	1.6E-07	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	5.6E-05	mg/kg/day	N/A		N/A	1.6E-04	mg/kg/day	1.0E+00	mg/kg/day	1.6E-04
				Arsenic	7.7E+01	mg/kg	1.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.7E-06	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Cobalt	3.9E+00	mg/kg	1.9E-08	mg/kg/day	N/A		N/A	5.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.7E-04
				Iron	4.0E+04	mg/kg	1.9E-04	mg/kg/day	N/A		N/A	5.4E-04	mg/kg/day	7.0E-01	mg/kg/day	7.7E-04
				Manganese	1.6E+02	mg/kg	7.4E-07	mg/kg/day	N/A		N/A	2.1E-06	mg/kg/day	9.6E-04	mg/kg/day	2.2E-03
				Thallium	5.6E-01	mg/kg	2.7E-09	mg/kg/day	N/A		N/A	7.5E-09	mg/kg/day	1.0E-05	mg/kg/day	7.5E-04
				Vanadium	2.7E+01	mg/kg	1.3E-07	mg/kg/day	N/A		N/A	3.6E-07	mg/kg/day	5.0E-03	mg/kg/day	7.2E-05
			Exp. Route Total								4.3E-06					1.5E-02
		Exposure Point Total									1.6E-05					9.7E-02
	Exposure Medium Total										1.6E-05					9.7E-02
Surface Soil outside Fenced Area of Site 4											1.6E-05					9.7E-02

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	1.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.7E-07	5.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
			Exp. Route Total								2.7E-07					1.7E-03
			Dermal Absorption	Arsenic	1.6E+00	ug/L	2.1E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.1E-08	5.8E-08	mg/kg/day	3.0E-04	mg/kg/day	1.9E-04
			Exp. Route Total								3.1E-08					1.9E-04
		Exposure Point Total									3.0E-07					1.9E-03
	Surface Water - Youth Pond Total										3.0E-07					1.9E-03
		Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.2E-07	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.7E-06	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Iron	1.3E+04	ug/L	1.5E-03	mg/kg/day	N/A		N/A	4.2E-03	mg/kg/day	7.0E-01	mg/kg/day	6.0E-03
			Exp. Route Total								1.8E-06					1.7E-02
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	2.1E-06	mg/kg/day	7.3E+00	mg/kg/day	1.5E-05	5.9E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.3E-07	mg/kg/day	1.5E+00	mg/kg/day	2.0E-07	3.7E-07	mg/kg/day	3.0E-04	mg/kg/day	1.2E-03
				Iron	1.3E+04	ug/L	1.7E-04	mg/kg/day	N/A		N/A	4.8E-04	mg/kg/day	7.0E-01	mg/kg/day	6.8E-04
			Exp. Route Total								1.5E-05					1.9E-03
		Exposure Point Total									1.7E-05					1.9E-02
	Surface Water - Upstream Pond Total										1.7E-05					1.9E-02
		Drainageways to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	6.5E-06	mg/kg/day	1.5E+00	mg/kg/day	9.7E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.1E-02
				Iron	3.0E+04	ug/L	3.4E-03	mg/kg/day	N/A		N/A	9.5E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-02
			Exp. Route Total								9.7E-06					7.4E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	7.4E-07	mg/kg/day	1.5E+00	mg/kg/day	1.1E-06	2.1E-06	mg/kg/day	3.0E-04	mg/kg/day	6.9E-03
				Iron	3.0E+04	ug/L	3.9E-04	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.5E-03
			Exp. Route Total								1.1E-06					8.4E-03
		Exposure Point Total									1.1E-05					8.3E-02
	Surface Water - Drainage Channel to Upstream Pond Total										1.1E-05					8.3E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	2.6E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.9E-08	7.6E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	9.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	2.9E-07	mg/kg/day	3.0E-04	mg/kg/day	9.5E-04
				Chromium	4.0E+01	mg/kg	5.3E-07	mg/kg/day	5.0E-01	1/mg/kg-day	2.7E-07	1.6E-06	mg/kg/day	3.0E-03	mg/kg/day	5.2E-04
			Exp. Route Total								4.3E-07					1.5E-03
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	8.4E-08	3.4E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	2.9E-07	mg/kg/day	3.0E-04	mg/kg/day	9.8E-04
				Chromium	4.0E+01	mg/kg	1.8E-07	mg/kg/day	2.0E+01	1/mg/kg-day	3.7E-06	5.3E-07	mg/kg/day	7.5E-05	mg/kg/day	7.1E-03
			Exp. Route Total								3.9E-06					8.1E-03
		Exposure Point Total									4.3E-06					9.6E-03
	Surface Sediment - Drainage Channel to Upstream Pond Total										4.3E-06					9.6E-03

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.2E-09	3.3E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	9.0E-08	3.6E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.7E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-08	4.9E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	2.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.0E-08	7.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	3.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-09	1.0E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.0E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-06	2.9E-06	mg/kg/day	3.0E-04	mg/kg/day	9.7E-03
				Chromium	2.5E+01	mg/kg	3.4E-07	mg/kg/day	5.0E-01	1/mg/kg-day	1.7E-07	9.8E-07	mg/kg/day	3.0E-03	mg/kg/day	3.3E-04
				Thallium	1.4E+00	mg/kg	1.8E-08	mg/kg/day	N/A		N/A	5.3E-08	mg/kg/day	1.0E-05	mg/kg/day	5.3E-03
			Exp. Route Total								1.8E-06					1.5E-02
			Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	5.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.6E-08	1.5E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	5.5E-08	mg/kg/day	7.3E+00	1/mg/kg-day	4.0E-07	1.6E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	7.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	5.5E-08	2.2E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	8.7E-08	3.5E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	1.6E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-08	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.0E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-06	3.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Chromium	2.5E+01	mg/kg	1.1E-07	mg/kg/day	2.0E+01	1/mg/kg-day	2.3E-06	3.3E-07	mg/kg/day	7.5E-05	mg/kg/day	4.5E-03
				Thallium	1.4E+00	mg/kg	6.2E-09	mg/kg/day	N/A		N/A	1.8E-08	mg/kg/day	1.0E-05	mg/kg/day	1.8E-03
			Exp. Route Total								4.4E-06					1.6E-02
		Exposure Point Total									6.2E-06					3.2E-02
	Surface and Subsurface Sediment - Youth Pond Total										6.2E-06					3.2E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	4.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	3.3E-09	1.3E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	7.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	5.6E-08	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-08	4.3E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-08	4.3E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.0E-09	3.2E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	7.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-07	2.1E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	2.7E-08	4.0E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	2.7E-09	mg/kg/day	1.6E+01	1/mg/kg-day	4.3E-08	7.9E-09	mg/kg/day	5.0E-05	mg/kg/day	1.6E-04
				Heptachlor epoxide	8.2E-02	mg/kg	1.1E-09	mg/kg/day	9.1E+00	1/mg/kg-day	1.0E-08	3.2E-09	mg/kg/day	1.3E-05	mg/kg/day	2.5E-04
				Arsenic	2.0E+01	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-07	7.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Chromium	2.8E-02	mg/kg	3.7E-10	mg/kg/day	5.0E-01	1/mg/kg-day	1.9E-10	1.1E-09	mg/kg/day	3.0E-03	mg/kg/day	3.6E-07
				Lead	6.0E+01	mg/kg	8.1E-07	mg/kg/day	N/A		N/A	2.4E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								7.1E-07					3.0E-03
			Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	2.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-08	5.9E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	3.4E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.5E-07	1.0E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	6.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-08	1.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	6.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.7E-08	1.9E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	4.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.6E-08	1.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	3.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	6.9E-07	1.0E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	6.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-07	1.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	9.3E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.5E-07	2.7E-08	mg/kg/day	5.0E-05	mg/kg/day	5.4E-04
				Heptachlor epoxide	8.2E-02	mg/kg	3.8E-09	mg/kg/day	9.1E+00	1/mg/kg-day	3.4E-08	1.1E-08	mg/kg/day	1.3E-05	mg/kg/day	8.5E-04
				Arsenic	2.0E+01	mg/kg	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-07	7.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Chromium	2.8E-02	mg/kg	1.3E-10	mg/kg/day	2.0E+01	1/mg/kg-day	2.6E-09	3.7E-10	mg/kg/day	7.5E-05	mg/kg/day	5.0E-06
				Lead	6.0E+01	mg/kg	2.8E-07	mg/kg/day	N/A		N/A	8.1E-07	mg/kg/day	N/A		N/A
			Exp. Route Total								1.8E-06					4.0E-03
		Exposure Point Total									2.5E-06					7.0E-03
	Surface and Subsurface Sediment - Upstream Pond Total										2.5E-06					7.0E-03

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	6.0E-09	mg/kg/day	7.3E-01	1/mg/kg-day	4.4E-09	1.8E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	6.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.4E-08	1.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	7.9E-09	3.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	7.2E-10	mg/kg/day	7.3E+00	1/mg/kg-day	5.3E-09	2.1E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-09	7.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	3.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Cobalt	2.7E+00	mg/kg	3.6E-08	mg/kg/day	N/A		N/A	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.5E-04
				Iron	1.1E+04	mg/kg	1.5E-04	mg/kg/day	N/A		N/A	4.4E-04	mg/kg/day	7.0E-01	mg/kg/day	6.3E-04
				Manganese	2.2E+02	mg/kg	2.9E-06	mg/kg/day	N/A		N/A	8.5E-06	mg/kg/day	2.4E-02	mg/kg/day	3.5E-04
			Exp. Route Total								2.2E-07					2.3E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	2.7E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-08	7.8E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	2.7E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.0E-07	7.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	4.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.5E-08	1.4E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	3.2E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.4E-08	9.4E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.3E-09	3.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-07	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Cobalt	1.9E-01	mg/kg	8.7E-10	mg/kg/day	N/A		N/A	2.5E-09	mg/kg/day	3.0E-04	mg/kg/day	8.5E-06
				Iron	7.7E+00	mg/kg	3.5E-08	mg/kg/day	N/A		N/A	1.0E-07	mg/kg/day	7.0E-01	mg/kg/day	1.5E-07
				Manganese	2.7E+00	mg/kg	1.2E-08	mg/kg/day	N/A		N/A	3.6E-08	mg/kg/day	9.6E-04	mg/kg/day	3.8E-05
			Exp. Route Total								4.4E-07					1.1E-03
		Exposure Point Total									6.6E-07					3.4E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										6.6E-07					3.4E-03
Total of Receptor Risk from Youth Pond											7.2E-06	Total of Receptor Hazard from Youth Pond				3.7E-02
Total of Receptor Risk from Upstream Pond											5.1E-05	Total of Receptor Hazard from Upstream Pond				2.2E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.4.RME Supplements A, B, and C.

Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, and surface and subsurface sediment to Upstream Pond.

Table 7.4.RME Supplement A
Calculation of DAevent for Youth Pond
Maintenance Worker
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Arsenic	1.6E+00	1.0E-03	NA	NA	NA	NA	8	1.3E-08	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

Table 7.4.RME Supplement B
Calculation of DAevent for Upstream Pond
Maintenance Worker
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Benzo(a)pyrene	1.5E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	8	1.3E-06	2
Arsenic	1.0E+01	1.0E-03	NA	NA	NA	NA	8	8.2E-08	1
Iron	1.3E+04	1.0E-03	NA	NA	NA	NA	8	1.1E-04	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
$2 \times FA \times Kp \times CW \times (\mathrm{sqrt}((6 \times \tau_{event} \times t_{event})/\pi)) \times 0.001\ mg/ug \times 0.001\ l/cm^3$ (eq 2)

If tevent>t*, then DAevent =
$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau_{event} \times ((1 + 3xB + 3xB^2)/(1+B)^2) \times 0.001\ mg/ug \times 0.001\ l/cm^3$ (eq 3)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

Table 7.4.RME Supplement C
Calculation of DAevent for Drainageways to Upstream Pond
Maintenance Worker
Cheatham Annex Site 4/Youth Pond Investigation Report

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Arsenic	5.8E+01	1.0E-03	NA	NA	NA	NA	8	4.6E-07	1
Iron	3.0E+04	1.0E-03	NA	NA	NA	NA	8	2.4E-04	1

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Notes:
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	7.3E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.1E-04
			Exp. Route Total								1.1E-07					7.1E-04
			Dermal Absorption	Arsenic	1.6E+00	ug/L	1.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-08	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
			Exp. Route Total								2.5E-08					1.6E-04
		Exposure Point Total									1.4E-07					8.8E-04
	Surface Water - Youth Pond Total										1.4E-07					8.8E-04
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	6.6E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-08	1.9E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	4.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.0E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.5E-03
				Iron	1.3E+04	ug/L	6.0E-04	mg/kg/day	N/A		N/A	1.8E-03	mg/kg/day	7.0E-01	mg/kg/day	2.5E-03
			Exp. Route Total								7.5E-07					7.1E-03
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	3.0E-06	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-05	8.7E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-07	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Iron	1.3E+04	ug/L	1.4E-04	mg/kg/day	N/A		N/A	4.0E-04	mg/kg/day	7.0E-01	mg/kg/day	5.7E-04
			Exp. Route Total								2.2E-05					1.6E-03
		Exposure Point Total									2.3E-05					8.7E-03
	Surface Water - Upstream Pond Total										2.3E-05					8.7E-03
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	2.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-06	7.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
				Iron	3.0E+04	ug/L	1.4E-03	mg/kg/day	N/A		N/A	4.0E-03	mg/kg/day	7.0E-01	mg/kg/day	5.7E-03
			Exp. Route Total								3.9E-06					3.1E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	6.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	9.0E-07	1.7E-06	mg/kg/day	3.0E-04	mg/kg/day	5.8E-03
				Iron	3.0E+04	ug/L	3.1E-04	mg/kg/day	N/A		N/A	9.1E-04	mg/kg/day	7.0E-01	mg/kg/day	1.3E-03
			Exp. Route Total								9.0E-07					7.1E-03
		Exposure Point Total									4.8E-06					3.8E-02
	Surface Water - Drainage Channel to Upstream Pond Total										4.8E-06					3.8E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	6.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.9E-08	2.0E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.8E-07	7.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.5E-03
				Chromium	4.0E+01	mg/kg	1.4E-06	mg/kg/day	5.0E-01	1/mg/kg-day	7.0E-07	4.1E-06	mg/kg/day	3.0E-03	mg/kg/day	1.4E-03
			Exp. Route Total								1.1E-06					3.8E-03
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	3.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-07	8.7E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-07	7.6E-07	mg/kg/day	3.0E-04	mg/kg/day	2.5E-03
				Chromium	4.0E+01	mg/kg	4.8E-07	mg/kg/day	2.0E+01	1/mg/kg-day	9.5E-06	1.4E-06	mg/kg/day	7.5E-05	mg/kg/day	1.8E-02
			Exp. Route Total								1.0E-05					2.1E-02
		Exposure Point Total									1.1E-05					2.5E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										1.1E-05					2.5E-02
	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.5E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	3.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.3E-07	9.4E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.4E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.2E-08	1.3E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	7.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	5.1E-08	2.0E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	9.2E-09	mg/kg/day	7.3E-01	1/mg/kg-day	6.7E-09	2.7E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-06	7.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.5E-02
				Chromium	2.5E+01	mg/kg	8.7E-07	mg/kg/day	5.0E-01	1/mg/kg-day	4.4E-07	2.5E-06	mg/kg/day	3.0E-03	mg/kg/day	8.5E-04
				Thallium	1.4E+00	mg/kg	4.7E-08	mg/kg/day	N/A		N/A	1.4E-07	mg/kg/day	1.0E-05	mg/kg/day	1.4E-02

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Exp. Route Total								4.7E-06					4.0E-02
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.4E-08	3.8E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	1.4E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.0E-06	4.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	2.0E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.4E-07	5.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	3.1E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.3E-07	9.0E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	4.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-08	1.2E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.7E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-06	7.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
				Chromium	2.5E+01	mg/kg	3.0E-07	mg/kg/day	2.0E+01	1/mg/kg-day	6.0E-06	8.7E-07	mg/kg/day	7.5E-05	mg/kg/day	1.2E-02
				Thallium	1.4E+00	mg/kg	1.6E-08	mg/kg/day	N/A		N/A	4.7E-08	mg/kg/day	1.0E-05	mg/kg/day	4.7E-03
			Exp. Route Total								1.2E-05					4.2E-02
		Exposure Point Total									1.6E-05					8.2E-02
	Surface and Subsurface Sediment - Youth Pond Total										1.6E-05					8.2E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	1.2E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.6E-09	3.4E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	2.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.5E-07	5.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	3.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.8E-08	1.1E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	3.8E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.8E-08	1.1E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.3E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.7E-07	5.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	3.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	7.1E-08	1.0E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	7.0E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.1E-07	2.1E-08	mg/kg/day	5.0E-05	mg/kg/day	4.1E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.9E-09	mg/kg/day	9.1E+00	1/mg/kg-day	2.6E-08	8.4E-09	mg/kg/day	1.3E-05	mg/kg/day	6.4E-04
				Arsenic	2.0E+01	mg/kg	6.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.0E-06	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.6E-03
				Chromium	2.8E-02	mg/kg	9.7E-10	mg/kg/day	5.0E-01	1/mg/kg-day	4.9E-10	2.8E-09	mg/kg/day	3.0E-03	mg/kg/day	9.4E-07
				Lead	6.0E+01	mg/kg	2.1E-06	mg/kg/day	N/A		N/A	6.1E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								1.8E-06					7.7E-03
			Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	5.3E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.8E-08	1.5E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	8.9E-08	mg/kg/day	7.3E+00	1/mg/kg-day	6.5E-07	2.6E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.7E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-07	4.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.7E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.2E-07	4.9E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.3E-08	3.7E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	8.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.8E-06	2.6E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.7E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.4E-07	4.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	2.4E-08	mg/kg/day	1.6E+01	1/mg/kg-day	3.8E-07	7.0E-08	mg/kg/day	5.0E-05	mg/kg/day	1.4E-03
				Heptachlor epoxide	8.2E-02	mg/kg	9.8E-09	mg/kg/day	9.1E+00	1/mg/kg-day	8.9E-08	2.9E-08	mg/kg/day	1.3E-05	mg/kg/day	2.2E-03
				Arsenic	2.0E+01	mg/kg	7.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-06	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.8E-03
				Chromium	2.8E-02	mg/kg	3.3E-10	mg/kg/day	2.0E+01	1/mg/kg-day	6.6E-09	9.7E-10	mg/kg/day	7.5E-05	mg/kg/day	1.3E-05
				Lead	6.0E+01	mg/kg	7.2E-07	mg/kg/day	N/A		N/A	2.1E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								4.7E-06					1.0E-02
		Exposure Point Total									6.5E-06					1.8E-02
	Surface and Subsurface Sediment - Upstream Pond Total										6.5E-06					1.8E-02

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	1.6E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-08	4.6E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	1.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-07	4.6E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	2.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-08	8.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	1.9E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-08	5.5E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	6.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-09	1.9E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-07	7.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Cobalt	2.7E+00	mg/kg	1.9E-07	mg/kg/day	N/A		N/A	2.7E-07	mg/kg/day	3.0E-04	mg/kg/day	9.1E-04
				Iron	1.1E+04	mg/kg	7.9E-04	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.6E-03
				Manganese	2.2E+02	mg/kg	1.5E-05	mg/kg/day	N/A		N/A	2.2E-05	mg/kg/day	2.4E-02	mg/kg/day	9.2E-04
			Exp. Route Total								5.7E-07					6.1E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	7.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	5.1E-08	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	7.0E-08	mg/kg/day	7.3E+00	1/mg/kg-day	5.1E-07	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.2E-08	3.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	8.4E-09	mg/kg/day	7.3E+00	1/mg/kg-day	6.1E-08	2.4E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.2E-08	8.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-07	8.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.7E-03
				Cobalt	1.9E-01	mg/kg	5.3E-10	mg/kg/day	N/A		N/A	6.6E-09	mg/kg/day	3.0E-04	mg/kg/day	2.2E-05
				Iron	7.7E+00	mg/kg	2.1E-08	mg/kg/day	N/A		N/A	2.7E-07	mg/kg/day	7.0E-01	mg/kg/day	3.8E-07
				Manganese	2.7E+00	mg/kg	7.5E-09	mg/kg/day	N/A		N/A	9.4E-08	mg/kg/day	9.6E-04	mg/kg/day	9.8E-05
			Exp. Route Total								1.1E-06					2.8E-03
		Exposure Point Total									1.7E-06					8.9E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										1.7E-06					8.9E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	4.8E-06	mg/kg/day	2.0E+00	1/mg/kg-day	9.6E-06	1.4E-05	mg/kg/day	2.0E-05	mg/kg/day	7.0E-01
				Aroclor-1260	4.2E-01	mg/kg	2.5E-05	mg/kg/day	2.0E+00	1/mg/kg-day	4.9E-05	7.2E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	4.7E-10	mg/kg/day	1.3E+05	1/mg/kg-day	6.2E-05	1.4E-09	mg/kg/day	7.0E-10	mg/kg/day	2.0E+00
				Chromium	1.4E-01	mg/kg	1.6E-05	mg/kg/day	5.0E-01	1/mg/kg-day	8.2E-06	4.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.6E-02
				Mercury	9.0E-02	mg/kg	1.1E-05	mg/kg/day	N/A		N/A	3.1E-05	mg/kg/day	3.0E-04	mg/kg/day	1.0E-01
			Exp. Route Total								1.3E-04					2.8E+00
		Exposure Point Total									1.3E-04					2.8E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										1.3E-04					2.8E+00

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	2.7E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-06	8.0E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	2.0E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-05	5.8E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	3.0E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.2E-06	8.9E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.2E-06	mg/kg/day	7.3E-02	1/mg/kg-day	9.1E-08	3.6E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	3.2E-07	mg/kg/day	1.4E-02	1/mg/kg-day	4.5E-09	9.3E-07	mg/kg/day	2.0E-02	mg/kg/day	4.7E-05
				Carbazole	3.2E+01	mg/kg	2.3E-06	mg/kg/day	2.0E-02	1/mg/kg-day	4.5E-08	6.6E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	3.2E-06	mg/kg/day	7.3E-03	1/mg/kg-day	2.3E-08	9.3E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	3.4E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.5E-06	9.9E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	4.3E-07	mg/kg/day	N/A		N/A	1.3E-06	mg/kg/day	1.0E-03	mg/kg/day	1.3E-03
				Fluoranthene	1.1E+02	mg/kg	7.6E-06	mg/kg/day	N/A		N/A	2.2E-05	mg/kg/day	4.0E-02	mg/kg/day	5.5E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	1.1E-06	mg/kg/day	7.3E-01	1/mg/kg-day	7.7E-07	3.1E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	4.0E-07	mg/kg/day	N/A		N/A	1.2E-06	mg/kg/day	2.0E-02	mg/kg/day	5.9E-05
				Pyrene	8.5E+01	mg/kg	5.9E-06	mg/kg/day	N/A		N/A	1.7E-05	mg/kg/day	3.0E-02	mg/kg/day	5.7E-04
				Aldrin	4.6E-03	mg/kg	3.2E-10	mg/kg/day	1.7E+01	1/mg/kg-day	5.5E-09	9.4E-10	mg/kg/day	3.0E-05	mg/kg/day	3.1E-05
				Aroclor-1242	1.1E+00	mg/kg	7.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.5E-07	2.2E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.8E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.6E-08	8.2E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.3E-08	mg/kg/day	1.6E+01	1/mg/kg-day	2.0E-07	3.7E-08	mg/kg/day	5.0E-05	mg/kg/day	7.5E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	1.7E-08	mg/kg/day	1.1E+00	1/mg/kg-day	1.9E-08	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
				Aluminum	1.3E+04	mg/kg	9.4E-04	mg/kg/day	N/A		N/A	2.7E-03	mg/kg/day	1.0E+00	mg/kg/day	2.7E-03
				Arsenic	4.0E+01	mg/kg	2.8E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.2E-06	8.1E-06	mg/kg/day	3.0E-04	mg/kg/day	2.7E-02
				Chromium (hexavalent)	4.3E-01	mg/kg	3.0E-08	mg/kg/day	5.0E-01	1/mg/kg-day	1.5E-08	8.8E-08	mg/kg/day	3.0E-03	mg/kg/day	2.9E-05
				Cobalt	3.6E+00	mg/kg	2.5E-07	mg/kg/day	N/A		N/A	7.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.4E-03
				Iron	2.1E+04	mg/kg	1.5E-03	mg/kg/day	N/A		N/A	4.2E-03	mg/kg/day	7.0E-01	mg/kg/day	6.1E-03
				Lead	3.7E+01	mg/kg	2.6E-06	mg/kg/day	N/A		N/A	7.5E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	1.0E-05	mg/kg/day	N/A		N/A	2.9E-05	mg/kg/day	2.4E-02	mg/kg/day	1.2E-03
				Thallium	3.8E-01	mg/kg	2.7E-08	mg/kg/day	N/A		N/A	7.8E-08	mg/kg/day	1.0E-05	mg/kg/day	7.8E-03
				Vanadium	3.5E+01	mg/kg	2.5E-06	mg/kg/day	N/A		N/A	7.2E-06	mg/kg/day	5.0E-03	mg/kg/day	1.4E-03
			Exp. Route Total								2.7E-05					5.2E-02
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	1.4E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.0E-06	4.1E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	1.0E-06	mg/kg/day	7.3E+00	1/mg/kg-day	7.5E-06	3.0E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.6E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-06	4.6E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	6.4E-07	mg/kg/day	7.3E-02	1/mg/kg-day	4.7E-08	1.9E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.3E-07	mg/kg/day	1.4E-02	1/mg/kg-day	1.8E-09	3.7E-07	mg/kg/day	2.0E-02	mg/kg/day	1.9E-05
				Carbazole	3.2E+01	mg/kg	9.0E-07	mg/kg/day	2.0E-02	1/mg/kg-day	1.8E-08	2.6E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.7E-06	mg/kg/day	7.3E-03	1/mg/kg-day	1.2E-08	4.8E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.8E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.3E-06	5.1E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	5.0E-07	mg/kg/day	1.0E-03	mg/kg/day	5.0E-04
				Fluoranthene	1.1E+02	mg/kg	3.9E-06	mg/kg/day	N/A		N/A	1.1E-05	mg/kg/day	4.0E-02	mg/kg/day	2.9E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	5.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.0E-07	1.6E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	2.1E-07	mg/kg/day	N/A		N/A	6.1E-07	mg/kg/day	2.0E-02	mg/kg/day	3.0E-05
				Pyrene	8.5E+01	mg/kg	3.1E-06	mg/kg/day	N/A		N/A	8.9E-06	mg/kg/day	3.0E-02	mg/kg/day	3.0E-04
				Aldrin	4.6E-03	mg/kg	1.3E-10	mg/kg/day	1.7E+01	1/mg/kg-day	2.2E-09	3.7E-10	mg/kg/day	3.0E-05	mg/kg/day	1.2E-05
				Aroclor-1242	1.1E+00	mg/kg	4.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	8.5E-08	1.2E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	3.1E-08	4.6E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	5.1E-09	mg/kg/day	1.6E+01	1/mg/kg-day	8.2E-08	1.5E-08	mg/kg/day	5.0E-05	mg/kg/day	3.0E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	2.7E-09	mg/kg/day	1.1E+00	1/mg/kg-day	3.0E-09	7.9E-09	mg/kg/day	3.0E-04	mg/kg/day	2.6E-05
				Aluminum	1.3E+04	mg/kg	3.7E-05	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	1.0E+00	mg/kg/day	1.1E-04
				Arsenic	4.0E+01	mg/kg	3.3E-07	mg/kg/day	1.5E+00	1/mg/kg-day	5.0E-07	9.7E-07	mg/kg/day	3.0E-04	mg/kg/day	3.2E-03
				Chromium (hexavalent)	4.3E-01	mg/kg	1.2E-09	mg/kg/day	2.0E+01	1/mg/kg-day	2.4E-08	3.5E-09	mg/kg/day	7.5E-05	mg/kg/day	4.7E-05

TABLE 7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* from inside and outside the Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	9.9E-09	mg/kg/day	N/A		N/A	2.9E-08	mg/kg/day	3.0E-04	mg/kg/day	9.6E-05
				Iron	2.1E+04	mg/kg	5.8E-05	mg/kg/day	N/A		N/A	1.7E-04	mg/kg/day	7.0E-01	mg/kg/day	2.4E-04
				Lead	3.7E+01	mg/kg	1.0E-07	mg/kg/day	N/A		N/A	3.0E-07	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	4.0E-07	mg/kg/day	N/A		N/A	1.2E-06	mg/kg/day	9.6E-04	mg/kg/day	1.2E-03
				Thallium	3.8E-01	mg/kg	1.1E-09	mg/kg/day	N/A		N/A	3.1E-09	mg/kg/day	1.0E-05	mg/kg/day	3.1E-04
				Vanadium	3.5E+01	mg/kg	9.8E-08	mg/kg/day	N/A		N/A	2.9E-07	mg/kg/day	5.0E-03	mg/kg/day	5.7E-05
			Exp. Route Total								1.2E-05					6.8E-03
		Exposure Point									3.9E-05					5.9E-02
	Exposure Medium Total										3.9E-05					5.9E-02
	Air	Emissions from Soil* from inside and outside the Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	7.8E-04	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	2.7E-08	2.3E-06	mg/m^3	3.0E-03	mg/m^3	7.6E-04
			Exp. Route Total								2.7E-08					7.6E-04
		Exposure Point Total									2.7E-08					7.6E-04
	Exposure Medium Total										2.7E-08					7.6E-04
Soil* from inside and outside the Fenced Area											3.9E-05					6.0E-02
Total of Receptor Risk from Youth Pond											1.5E-04	Total of Receptor Hazard from Youth Pond				2.9E+00
Total of Receptor Risk from Upstream Pond											2.1E-04	Total of Receptor Hazard from Upstream Pond				2.9E+00

* Surface soil & subsurface soil combined.

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements A, B, and C.

Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area, and fish tissue from Youth and Upstream Pond.

Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	8.6E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.3E-07	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.3E-03
			Exp. Route Total								1.3E-07					3.3E-03
			Dermal Absorption	Arsenic	1.6E+00	ug/L	6.8E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.0E-08	7.9E-08	mg/kg/day	3.0E-04	mg/kg/day	2.6E-04
			Exp. Route Total								1.0E-08					2.6E-04
		Exposure Point Total									1.4E-07					3.6E-03
	Surface Water - Youth Pond Total										1.4E-07					3.6E-03
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	3.0E-07	9.0E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	5.5E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.2E-07	6.4E-06	mg/kg/day	3.0E-04	mg/kg/day	2.1E-02
				Iron	1.3E+04	ug/L	7.0E-04	mg/kg/day	N/A		N/A	8.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.2E-02
			Exp. Route Total								1.1E-06					3.3E-02
			Dermal Absorption	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	4.7E-05	1.6E-05	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	4.3E-08	mg/kg/day	1.5E+00	1/mg/kg-day	6.5E-08	5.6E-07	mg/kg/day	3.0E-04	mg/kg/day	1.9E-03
				Iron	1.3E+04	ug/L	5.6E-05	mg/kg/day	N/A		N/A	7.2E-04	mg/kg/day	7.0E-01	mg/kg/day	1.0E-03
			Exp. Route Total								4.7E-05					2.9E-03
		Exposure Point Total									4.8E-05					3.6E-02
	Surface Water - Upstream Pond Total										4.8E-05					3.6E-02
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	3.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.6E-06	3.6E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Iron	3.0E+04	ug/L	1.6E-03	mg/kg/day	N/A		N/A	1.9E-02	mg/kg/day	7.0E-01	mg/kg/day	2.7E-02
			Exp. Route Total								4.6E-06					1.5E-01
			Dermal Absorption	Arsenic	5.8E+01	ug/L	2.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.6E-07	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Iron	3.0E+04	ug/L	1.3E-04	mg/kg/day	N/A		N/A	1.6E-03	mg/kg/day	7.0E-01	mg/kg/day	2.3E-03
			Exp. Route Total								3.6E-07					1.3E-02
		Exposure Point Total									5.0E-06					1.6E-01
	Surface Water - Drainage Channel to Upstream Pond Total										5.0E-06					1.6E-01
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	6.1E-07	1.8E-07	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	6.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.9E-07	6.9E-06	mg/kg/day	3.0E-04	mg/kg/day	2.3E-02
				Chromium[2]	4.0E+01	mg/kg			5.0E-01	1/mg/kg-day	8.7E-06	3.8E-05	mg/kg/day	3.0E-03	mg/kg/day	1.3E-02
			Exp. Route Total								1.0E-05					3.6E-02
			Dermal Absorption[1]	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	3.1E-07	1.0E-07	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	7.1E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	9.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.0E-03
				Chromium[2]	4.0E+01	mg/kg			2.0E+01	1/mg/kg-day	1.4E-05	1.7E-06	mg/kg/day	7.5E-05	mg/kg/day	2.2E-02
			Exp. Route Total								1.4E-05					2.5E-02
		Exposure Point Total									2.4E-05					6.1E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										2.4E-05					6.1E-02
	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.9E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	2.9E-06	8.7E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	4.0E-07	1.2E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	6.3E-07	1.9E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	8.4E-08	2.5E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	6.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	9.1E-06	7.1E-05	mg/kg/day	3.0E-04	mg/kg/day	2.4E-01
				Chromium[2]	2.5E+01	mg/kg			5.0E-01	1/mg/kg-day	5.4E-06	2.4E-05	mg/kg/day	3.0E-03	mg/kg/day	7.9E-03
				Thallium	1.4E+00	mg/kg	1.1E-07	mg/kg/day	N/A		N/A	1.3E-06	mg/kg/day	1.0E-05	mg/kg/day	1.3E-01

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
			Exp. Route Total								1.9E-05					3.7E-01
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Dermal Absorption[1]	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-07	4.1E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	1.5E-06	4.5E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	2.1E-07	6.2E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	3.3E-07	9.8E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	4.3E-08	1.3E-07	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	7.2E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-06	8.4E-06	mg/kg/day	3.0E-04	mg/kg/day	2.8E-02
				Chromium[2]	2.5E+01	mg/kg			2.0E+01	1/mg/kg-day	8.6E-06	9.4E-07	mg/kg/day	7.5E-05	mg/kg/day	1.3E-02
				Thallium	1.4E+00	mg/kg	4.4E-09	mg/kg/day	N/A		N/A	5.1E-08	mg/kg/day	1.0E-05	mg/kg/day	5.1E-03
			Exp. Route Total								1.2E-05					4.6E-02
		Exposure Point Total									3.1E-05					4.2E-01
	Surface and Subsurface Sediment - Youth Pond Total										3.1E-05					4.2E-01
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	1.1E-07	3.2E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-06	5.5E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	3.5E-07	1.0E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	3.5E-07	1.0E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.8E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	4.3E-07	mg/kg/day	2.0E+00	1/mg/kg-day	8.7E-07	5.1E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	8.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.6E-07	9.6E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	1.6E-08	mg/kg/day	1.6E+01	1/mg/kg-day	2.6E-07	1.9E-07	mg/kg/day	5.0E-05	mg/kg/day	3.8E-03
				Heptachlor epoxide	8.2E-02	mg/kg	6.7E-09	mg/kg/day	9.1E+00	1/mg/kg-day	6.1E-08	7.8E-08	mg/kg/day	1.3E-05	mg/kg/day	6.0E-03
				Arsenic	2.0E+01	mg/kg	1.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.4E-06	1.9E-05	mg/kg/day	3.0E-04	mg/kg/day	6.2E-02
				Chromium[2]	2.8E-02	mg/kg			5.0E-01	1/mg/kg-day	6.0E-09	2.6E-08	mg/kg/day	3.0E-03	mg/kg/day	8.8E-06
				Lead	6.0E+01	mg/kg	4.9E-06	mg/kg/day	N/A		N/A	5.7E-05	mg/kg/day	N/A		N/A
			Exp. Route Total								6.6E-06					7.2E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	5.5E-08	1.7E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	9.4E-07	2.8E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	1.8E-07	5.3E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-07	5.3E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-07	4.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	2.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	4.8E-07	2.8E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	4.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	9.1E-08	5.3E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.5E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.0E-07	7.6E-08	mg/kg/day	5.0E-05	mg/kg/day	1.5E-03
				Heptachlor epoxide	8.2E-02	mg/kg	2.6E-09	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-08	3.1E-08	mg/kg/day	1.3E-05	mg/kg/day	2.4E-03
				Arsenic	2.0E+01	mg/kg	1.9E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.8E-07	2.2E-06	mg/kg/day	3.0E-04	mg/kg/day	7.4E-03
				Chromium[2]	2.8E-02	mg/kg			2.0E+01	1/mg/kg-day	9.6E-09	1.0E-09	mg/kg/day	7.5E-05	mg/kg/day	1.4E-05
				Lead	6.0E+01	mg/kg	1.9E-07	mg/kg/day	N/A		N/A	2.3E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								2.5E-06					1.1E-02
		Exposure Point Total									9.1E-06					8.3E-02
	Surface and Subsurface Sediment - Upstream Pond Total										9.1E-06					8.3E-02

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-07	4.3E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	1.4E-06	4.3E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	2.6E-07	7.7E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	1.7E-07	5.1E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	6.0E-08	1.8E-07	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	6.3E-07	mg/kg/day	1.5E+00	1/mg/kg-day	9.4E-07	7.3E-06	mg/kg/day	3.0E-04	mg/kg/day	2.4E-02
				Cobalt	2.7E+00	mg/kg	2.2E-07	mg/kg/day	N/A		N/A	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	8.5E-03
				Iron	1.1E+04	mg/kg	9.2E-04	mg/kg/day	N/A		N/A	1.1E-02	mg/kg/day	7.0E-01	mg/kg/day	1.5E-02
				Manganese	2.2E+02	mg/kg	1.8E-05	mg/kg/day	N/A		N/A	2.1E-04	mg/kg/day	2.4E-02	mg/kg/day	8.6E-03
			Exp. Route Total								3.0E-06					5.7E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	7.3E-08	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-07	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-07	4.0E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	8.8E-08	2.6E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	3.1E-08	9.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	7.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	8.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.9E-03
				Cobalt	1.9E-01	mg/kg	6.1E-10	mg/kg/day	N/A		N/A	7.1E-09	mg/kg/day	3.0E-04	mg/kg/day	2.4E-05
				Iron	7.7E+00	mg/kg	2.5E-08	mg/kg/day	N/A		N/A	2.9E-07	mg/kg/day	7.0E-01	mg/kg/day	4.1E-07
				Manganese	2.7E+00	mg/kg	8.7E-09	mg/kg/day	N/A		N/A	1.0E-07	mg/kg/day	9.6E-04	mg/kg/day	1.1E-04
			Exp. Route Total								1.2E-06					3.0E-03
		Exposure Point Total									4.2E-06					6.0E-02
	Sediment/Surface Soil - Drainage Ditches to Youth Pond ouside Fenced Area										4.2E-06					6.0E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	2.7E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.4E-06	3.1E-05	mg/kg/day	2.0E-05	mg/kg/day	1.6E+00
				Aroclor-1260	4.2E-01	mg/kg	1.4E-05	mg/kg/day	2.0E+00	1/mg/kg-day	2.8E-05	1.6E-04	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	2.7E-10	mg/kg/day	1.3E+05	1/mg/kg-day	3.5E-05	3.1E-09	mg/kg/day	7.0E-10	mg/kg/day	4.4E+00
				Chromium[2]	1.4E-01	mg/kg			5.0E-01	1/mg/kg-day	2.5E-05	1.1E-04	mg/kg/day	3.0E-03	mg/kg/day	3.6E-02
				Mercury	9.0E-02	mg/kg	5.9E-06	mg/kg/day	N/A		N/A	6.9E-05	mg/kg/day	3.0E-04	mg/kg/day	2.3E-01
			Exp. Route Total								9.2E-05					6.3E+00
		Exposure Point Total									9.2E-05					6.3E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										9.2E-05					6.3E+00

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	2.5E-05	7.4E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-04	5.4E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	2.8E-05	8.3E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	1.1E-06	3.4E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	7.4E-07	mg/kg/day	1.4E-02	1/mg/kg-day	1.0E-08	8.7E-06	mg/kg/day	2.0E-02	mg/kg/day	4.3E-04
				Carbazole	3.2E+01	mg/kg	5.3E-06	mg/kg/day	2.0E-02	1/mg/kg-day	1.1E-07	6.2E-05	mg/kg/day	N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	2.9E-07	8.7E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	3.1E-05	9.2E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.0E-06	mg/kg/day	N/A		N/A	1.2E-05	mg/kg/day	1.0E-03	mg/kg/day	1.2E-02
				Fluoranthene	1.1E+02	mg/kg	1.8E-05	mg/kg/day	N/A		N/A	2.1E-04	mg/kg/day	4.0E-02	mg/kg/day	5.2E-03
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	9.6E-06	2.9E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	9.4E-07	mg/kg/day	N/A		N/A	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	5.5E-04
				Pyrene	8.5E+01	mg/kg	1.4E-05	mg/kg/day	N/A		N/A	1.6E-04	mg/kg/day	3.0E-02	mg/kg/day	5.4E-03
				Aldrin	4.6E-03	mg/kg	7.5E-10	mg/kg/day	1.7E+01	1/mg/kg-day	1.3E-08	8.8E-09	mg/kg/day	3.0E-05	mg/kg/day	2.9E-04
				Aroclor-1242	1.1E+00	mg/kg	1.8E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.5E-07	2.1E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	6.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-07	7.6E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	3.0E-08	mg/kg/day	1.6E+01	1/mg/kg-day	4.8E-07	3.5E-07	mg/kg/day	5.0E-05	mg/kg/day	7.0E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	3.9E-08	mg/kg/day	1.1E+00	1/mg/kg-day	4.3E-08	4.6E-07	mg/kg/day	3.0E-04	mg/kg/day	1.5E-03
				Aluminum	1.3E+04	mg/kg	2.2E-03	mg/kg/day	N/A		N/A	2.6E-02	mg/kg/day	1.0E+00	mg/kg/day	2.6E-02
				Arsenic	4.0E+01	mg/kg	6.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	9.7E-06	7.6E-05	mg/kg/day	3.0E-04	mg/kg/day	2.5E-01
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			5.0E-01	1/mg/kg-day	1.9E-07	8.2E-07	mg/kg/day	3.0E-03	mg/kg/day	2.7E-04
				Cobalt	3.6E+00	mg/kg	5.8E-07	mg/kg/day	N/A		N/A	6.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.2E-02
				Iron	2.1E+04	mg/kg	3.4E-03	mg/kg/day	N/A		N/A	4.0E-02	mg/kg/day	7.0E-01	mg/kg/day	5.7E-02
				Lead	3.7E+01	mg/kg	6.0E-06	mg/kg/day	N/A		N/A	7.0E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	2.3E-05	mg/kg/day	N/A		N/A	2.7E-04	mg/kg/day	2.4E-02	mg/kg/day	1.1E-02
				Thallium	3.8E-01	mg/kg	6.2E-08	mg/kg/day	N/A		N/A	7.2E-07	mg/kg/day	1.0E-05	mg/kg/day	7.2E-02
				Vanadium	3.5E+01	mg/kg	5.7E-06	mg/kg/day	N/A		N/A	6.7E-05	mg/kg/day	5.0E-03	mg/kg/day	1.3E-02
			Exp. Route Total								2.9E-04					4.9E-01
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	9.0E-06	2.7E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	6.6E-05	2.0E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	1.0E-05	3.0E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	4.1E-07	1.2E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.1E-07	mg/kg/day	1.4E-02	1/mg/kg-day	2.9E-09	2.4E-06	mg/kg/day	2.0E-02	mg/kg/day	1.2E-04
				Carbazole	3.2E+01	mg/kg	1.5E-06	mg/kg/day	2.0E-02	1/mg/kg-day	3.0E-08	1.7E-05	mg/kg/day	N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	1.1E-07	3.2E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	1.1E-05	3.3E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.8E-07	mg/kg/day	N/A		N/A	3.3E-06	mg/kg/day	1.0E-03	mg/kg/day	3.3E-03
				Fluoranthene	1.1E+02	mg/kg	6.4E-06	mg/kg/day	N/A		N/A	7.5E-05	mg/kg/day	4.0E-02	mg/kg/day	1.9E-03
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	3.5E-06	1.0E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.4E-07	mg/kg/day	N/A		N/A	4.0E-06	mg/kg/day	2.0E-02	mg/kg/day	2.0E-04
				Pyrene	8.5E+01	mg/kg	5.0E-06	mg/kg/day	N/A		N/A	5.9E-05	mg/kg/day	3.0E-02	mg/kg/day	2.0E-03
				Aldrin	4.6E-03	mg/kg	2.1E-10	mg/kg/day	1.7E+01	1/mg/kg-day	3.6E-09	2.5E-09	mg/kg/day	3.0E-05	mg/kg/day	8.2E-05
				Aroclor-1242	1.1E+00	mg/kg	6.9E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-07	8.1E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.1E-08	3.0E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	8.4E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.3E-07	9.8E-08	mg/kg/day	5.0E-05	mg/kg/day	2.0E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	4.4E-09	mg/kg/day	1.1E+00	1/mg/kg-day	4.9E-09	5.2E-08	mg/kg/day	3.0E-04	mg/kg/day	1.7E-04
				Aluminum	1.3E+04	mg/kg	6.1E-05	mg/kg/day	N/A		N/A	7.1E-04	mg/kg/day	1.0E+00	mg/kg/day	7.1E-04
				Arsenic	4.0E+01	mg/kg	5.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.2E-07	6.3E-06	mg/kg/day	3.0E-04	mg/kg/day	2.1E-02
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			2.0E+01	1/mg/kg-day	2.1E-07	2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.0E-04

TABLE 7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	1.6E-08	mg/kg/day	N/A		N/A	1.9E-07	mg/kg/day	3.0E-04	mg/kg/day	6.3E-04
				Iron	2.1E+04	mg/kg	9.5E-05	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.6E-03
				Lead	3.7E+01	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	2.0E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	6.5E-07	mg/kg/day	N/A		N/A	7.6E-06	mg/kg/day	9.6E-04	mg/kg/day	7.9E-03
				Thallium	3.8E-01	mg/kg	1.7E-09	mg/kg/day	N/A		N/A	2.0E-08	mg/kg/day	1.0E-05	mg/kg/day	2.0E-03
				Vanadium	3.5E+01	mg/kg	1.6E-07	mg/kg/day	N/A		N/A	1.9E-06	mg/kg/day	5.0E-03	mg/kg/day	3.8E-04
			Exp. Route Total								1.0E-04					4.4E-02
		Exposure Point Total									3.9E-04					5.3E-01
	Exposure Medium Total										3.9E-04					5.3E-01
	Air	Emissions from Soil* from inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	2.0E-04	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	6.6E-09	2.3E-06	mg/m^3	3.0E-03	mg/m^3	7.6E-04
			Exp. Route Total								6.6E-09					7.6E-04
		Exposure Point Total									6.6E-09					7.6E-04
	Exposure Medium Total										6.6E-09					7.6E-04
Soil* from inside and outside the Fenced Area											3.9E-04					5.3E-01
Total of Receptor Risk from Youth Pond											1E-04	Total of Receptor Hazard from Youth Pond				7E+00
Total of Receptor Risk from Upstream Pond											6E-04	Total of Receptor Hazard from Upstream Pond				7E+00

* Surface soil & subsurface soil combined.

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements A, B, and C.

[2] See Table 7.6.RME Supplement A for calculation of cancer intake and cancer risk following MMOA method.

Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area, and fish tissue from Youth and Upstream Pond.

Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.

TABLE 7.6.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Surface Water	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	2.6E-09	5.2E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	3.0E-07
			Dermal	Benzo(a)pyrene	1.5E-01	ug/L	4.0E-07	8.0E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	4.7E-05
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	5.2E-09	1.0E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	6.1E-07
				Chromium	4.0E+01	mg/kg	1.1E-06	2.2E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	8.7E-06
			Dermal	Benzo(a)pyrene	1.9E-01	mg/kg	2.7E-09	5.4E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	3.1E-07
				Chromium	4.0E+01	mg/kg	4.3E-08	8.6E-08	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	1.4E-05
Sediment	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	2.3E-08	4.5E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.6E-07
				Benzo(a)pyrene	9.2E-01	mg/kg	2.5E-08	5.0E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	2.9E-06
				Benzo(b)fluoranthene	1.3E+00	mg/kg	3.4E-08	6.8E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.0E-07
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	5.4E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	6.3E-07
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	7.2E-09	1.4E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	8.4E-08
				Chromium	2.5E+01	mg/kg	6.8E-07	1.4E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	5.4E-06
			Dermal	Benzo(a)anthracene	8.3E-01	mg/kg	1.2E-08	2.3E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.4E-07
				Benzo(a)pyrene	9.2E-01	mg/kg	1.3E-08	2.6E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.5E-06
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.8E-08	3.5E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.1E-07
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	2.8E-09	5.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.3E-07
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	3.7E-09	7.4E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.3E-08
				Chromium	2.5E+01	mg/kg	2.7E-08	5.4E-08	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	8.6E-06
Sediment	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	9.2E-09	1.8E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.1E-07
				Benzo(a)pyrene	5.7E-01	mg/kg	1.6E-08	3.1E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.8E-06
				Benzo(b)fluoranthene	1.1E+00	mg/kg	3.0E-08	5.9E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.5E-07
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	3.0E-09	5.9E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.5E-07
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	2.2E-08	4.4E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.6E-07
				Chromium	2.8E-02	mg/kg	7.5E-10	1.5E-09	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	6.0E-09
			Dermal	Benzo(a)anthracene	3.4E-01	mg/kg	4.7E-09	9.5E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	5.5E-08
				Benzo(a)pyrene	5.7E-01	mg/kg	8.0E-09	1.6E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	9.4E-07
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.5E-08	3.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.8E-07
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.5E-09	3.0E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.8E-07
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.1E-08	2.3E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-07
				Chromium	2.8E-02	mg/kg	3.0E-11	6.0E-11	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	9.6E-09

TABLE 7.6.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Sediment/ Surface Soil	Sediment/ Surface Soil	Drainage Diches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	1.2E-08	2.4E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.4E-07
				Benzo(a)pyrene	4.5E-01	mg/kg	1.2E-08	2.4E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.4E-06
				Benzo(b)fluoranthene	8.1E-01	mg/kg	2.2E-08	4.4E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.6E-07
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	1.5E-09	2.9E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.7E-07
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	5.2E-09	1.0E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.0E-08
			Dermal	Benzo(a)anthracene	4.5E-01	mg/kg	6.3E-09	1.3E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	7.3E-08
				Benzo(a)pyrene	4.5E-01	mg/kg	6.3E-09	1.3E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.3E-07
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.1E-08	2.3E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-07
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	7.5E-10	1.5E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.8E-08
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.7E-09	5.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.1E-08
Fish	Fish	Youth and Upstream Pond Fish Tissue	Ingestion	Chromium	1.4E-01	mg/kg	3.1E-06	6.1E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	2.5E-05
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	2.1E-06	4.3E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.5E-05
				Benzo(a)pyrene	2.8E+01	mg/kg	1.5E-06	3.1E-06	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.8E-04
				Benzo(b)fluoranthene	4.4E+01	mg/kg	2.4E-06	4.7E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.8E-05
				Benzo(k)fluoranthene	1.8E+01	mg/kg	9.7E-07	1.9E-06	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	1.1E-06
				Chrysene	4.6E+01	mg/kg	2.5E-06	5.0E-06	N/A	N/A	mg/kg/day	7.3E-02	2.2E-02	N/A	N/A	1/(mg/kg-day)	2.9E-07
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	2.6E-07	5.3E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.1E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	8.2E-07	1.6E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	9.6E-06
				Chromium (hexavalent)	4.3E-01	mg/kg	2.3E-08	4.7E-08	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	1.9E-07
			Dermal	Benzo(a)anthracene	3.9E+01	mg/kg	7.7E-07	1.5E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	9.0E-06
				Benzo(a)pyrene	2.8E+01	mg/kg	5.6E-07	1.1E-06	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	6.6E-05
				Benzo(b)fluoranthene	4.4E+01	mg/kg	8.6E-07	1.7E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.0E-05
				Benzo(k)fluoranthene	1.8E+01	mg/kg	3.5E-07	7.0E-07	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	4.1E-07
				Chrysene	4.6E+01	mg/kg	9.0E-07	1.8E-06	N/A	N/A	mg/kg/day	7.3E-02	2.2E-02	N/A	N/A	1/(mg/kg-day)	1.1E-07
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	9.6E-08	1.9E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.1E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	3.0E-07	6.0E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.5E-06
				Chromium (hexavalent)	4.3E-01	mg/kg	6.5E-10	1.3E-09	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	2.1E-07

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	9.0E-07	mg/kg/day	7.3E-01	1/mg/kg-day	6.6E-07	6.3E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	6.6E-07	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-06	4.6E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.0E-06	mg/kg/day	7.3E-01	1/mg/kg-day	7.3E-07	7.0E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	4.1E-07	mg/kg/day	7.3E-02	1/mg/kg-day	3.0E-08	2.9E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.1E-07	mg/kg/day	1.4E-02	1/mg/kg-day	1.5E-09	7.4E-06	mg/kg/day	1.0E-01	mg/kg/day	7.4E-05
				Carbazole	3.2E+01	mg/kg	7.5E-07	mg/kg/day	2.0E-02	1/mg/kg-day	1.5E-08	5.2E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.1E-06	mg/kg/day	7.3E-03	1/mg/kg-day	7.7E-09	7.4E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.1E-07	mg/kg/day	7.3E+00	1/mg/kg-day	8.2E-07	7.8E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.4E-07	mg/kg/day	N/A		N/A	9.9E-06	mg/kg/day	4.0E-03	mg/kg/day	2.5E-03
				Fluoranthene	1.1E+02	mg/kg	2.5E-06	mg/kg/day	N/A		N/A	1.8E-04	mg/kg/day	1.0E-01	mg/kg/day	1.8E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	3.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-07	2.4E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	1.3E-07	mg/kg/day	N/A		N/A	9.3E-06	mg/kg/day	6.0E-01	mg/kg/day	1.5E-05
				Pyrene	8.5E+01	mg/kg	2.0E-06	mg/kg/day	N/A		N/A	1.4E-04	mg/kg/day	3.0E-01	mg/kg/day	4.6E-04
				Aldrin	4.6E-03	mg/kg	1.1E-10	mg/kg/day	1.7E+01	1/mg/kg-day	1.8E-09	7.4E-09	mg/kg/day	4.0E-05	mg/kg/day	1.9E-04
				Aroclor-1242	1.1E+00	mg/kg	2.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.0E-08	1.8E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	9.2E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.8E-08	6.5E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	4.2E-09	mg/kg/day	1.6E+01	1/mg/kg-day	6.8E-08	3.0E-07	mg/kg/day	1.0E-04	mg/kg/day	3.0E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	5.6E-09	mg/kg/day	1.1E+00	1/mg/kg-day	6.2E-09	3.9E-07	mg/kg/day	1.0E-05	mg/kg/day	3.9E-02
				Aluminum	1.3E+04	mg/kg	3.1E-04	mg/kg/day	N/A		N/A	2.2E-02	mg/kg/day	1.0E+00	mg/kg/day	2.2E-02
				Arsenic	4.0E+01	mg/kg	9.2E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.4E-06	6.4E-05	mg/kg/day	3.0E-04	mg/kg/day	2.1E-01
				Chromium (hexavalent)	4.3E-01	mg/kg	9.9E-09	mg/kg/day	5.0E-01	1/mg/kg-day	5.0E-09	6.9E-07	mg/kg/day	5.0E-03	mg/kg/day	1.4E-04
				Cobalt	3.6E+00	mg/kg	8.2E-08	mg/kg/day	N/A		N/A	5.7E-06	mg/kg/day	3.0E-03	mg/kg/day	1.9E-03
				Iron	2.1E+04	mg/kg	4.8E-04	mg/kg/day	N/A		N/A	3.4E-02	mg/kg/day	7.0E-01	mg/kg/day	4.8E-02
				Lead	3.7E+01	mg/kg	8.5E-07	mg/kg/day	N/A		N/A	5.9E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	3.3E-06	mg/kg/day	N/A		N/A	2.3E-04	mg/kg/day	2.4E-02	mg/kg/day	9.6E-03
				Thallium	3.8E-01	mg/kg	8.8E-09	mg/kg/day	N/A		N/A	6.2E-07	mg/kg/day	4.0E-05	mg/kg/day	1.5E-02
				Vanadium	3.5E+01	mg/kg	8.1E-07	mg/kg/day	N/A		N/A	5.7E-05	mg/kg/day	7.0E-03	mg/kg/day	8.1E-03
			Exp. Route Total								8.8E-06					3.7E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	3.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-07	2.5E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	2.6E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.9E-06	1.8E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	3.9E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.9E-07	2.7E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.6E-07	mg/kg/day	7.3E-02	1/mg/kg-day	1.2E-08	1.1E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	3.2E-08	mg/kg/day	1.4E-02	1/mg/kg-day	4.4E-10	2.2E-06	mg/kg/day	1.0E-01	mg/kg/day	2.2E-05
				Carbazole	3.2E+01	mg/kg	2.2E-07	mg/kg/day	2.0E-02	1/mg/kg-day	4.5E-09	1.6E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	4.1E-07	mg/kg/day	7.3E-03	1/mg/kg-day	3.0E-09	2.9E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	4.4E-08	mg/kg/day	7.3E+00	1/mg/kg-day	3.2E-07	3.0E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	4.3E-08	mg/kg/day	N/A		N/A	3.0E-06	mg/kg/day	4.0E-03	mg/kg/day	7.4E-04
				Fluoranthene	1.1E+02	mg/kg	9.8E-07	mg/kg/day	N/A		N/A	6.8E-05	mg/kg/day	1.0E-01	mg/kg/day	6.8E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	1.4E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.0E-07	9.5E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	5.2E-08	mg/kg/day	N/A		N/A	3.6E-06	mg/kg/day	6.0E-01	mg/kg/day	6.0E-06
				Pyrene	8.5E+01	mg/kg	7.6E-07	mg/kg/day	N/A		N/A	5.3E-05	mg/kg/day	3.0E-01	mg/kg/day	1.8E-04
				Aldrin	4.6E-03	mg/kg	3.2E-11	mg/kg/day	1.7E+01	1/mg/kg-day	5.4E-10	2.2E-09	mg/kg/day	4.0E-05	mg/kg/day	5.6E-05
				Aroclor-1242	1.1E+00	mg/kg	1.1E-08	mg/kg/day	2.0E+00	1/mg/kg-day	2.1E-08	7.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	3.9E-09	mg/kg/day	2.0E+00	1/mg/kg-day	7.8E-09	2.7E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.3E-09	mg/kg/day	1.6E+01	1/mg/kg-day	2.0E-08	8.9E-08	mg/kg/day	1.0E-04	mg/kg/day	8.9E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	6.7E-10	mg/kg/day	1.1E+00	1/mg/kg-day	7.4E-10	4.7E-08	mg/kg/day	1.0E-05	mg/kg/day	4.7E-03
				Aluminum	1.3E+04	mg/kg	9.3E-06	mg/kg/day	N/A		N/A	6.5E-04	mg/kg/day	1.0E+00	mg/kg/day	6.5E-04
				Arsenic	4.0E+01	mg/kg	8.3E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.2E-07	5.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.9E-02
				Chromium (hexavalent)	4.3E-01	mg/kg	3.0E-10	mg/kg/day	2.0E+01	1/mg/kg-day	6.0E-09	2.1E-08	mg/kg/day	1.3E-04	mg/kg/day	1.7E-04

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	2.5E-09	mg/kg/day	N/A		N/A	1.7E-07	mg/kg/day	3.0E-03	mg/kg/day	5.7E-05
				Iron	2.1E+04	mg/kg	1.4E-05	mg/kg/day	N/A		N/A	1.0E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-03
				Lead	3.7E+01	mg/kg	2.5E-08	mg/kg/day	N/A		N/A	1.8E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	9.9E-08	mg/kg/day	N/A		N/A	6.9E-06	mg/kg/day	9.6E-04	mg/kg/day	7.2E-03
				Thallium	3.8E-01	mg/kg	2.6E-10	mg/kg/day	N/A		N/A	1.8E-08	mg/kg/day	4.0E-05	mg/kg/day	4.6E-04
				Vanadium	3.5E+01	mg/kg	2.4E-08	mg/kg/day	N/A		N/A	1.7E-06	mg/kg/day	7.0E-03	mg/kg/day	2.4E-04
			Exp. Route Total								3.0E-06					3.7E-02
		Exposure Point Total									1.2E-05					4.0E-01
	Exposure Medium Total										1.2E-05					4.0E-01
	Air	Emissions from Soil* from inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	$\mu g/m^3$	1.6E-04	$\mu g/m^3$	3.4E-05	$(\mu g/m^3)^{-1}$	5.3E-09	1.1E-05	mg/m^3	3.0E-03	mg/m^3	3.6E-03
			Exp. Route Total								5.3E-09					3.6E-03
		Exposure Point Total									5.3E-09					3.6E-03
	Exposure Medium Total										5.3E-09					3.6E-03
Soil* from inside and outside the Fenced Area											1.2E-05					4.1E-01
Soil*	Soil*	Soil* within Fenced Area of Youth Pond/Site 4	Ingestion	Benzo(a)anthracene	1.8E+02	mg/kg	4.2E-06	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-06	2.9E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	8.2E+02	mg/kg	1.9E-05	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-04	1.3E-03	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	4.6E-06	mg/kg/day	7.3E-01	1/mg/kg-day	3.4E-06	3.2E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	1.9E-06	mg/kg/day	7.3E-02	1/mg/kg-day	1.4E-07	1.3E-04	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	2.8E-06	mg/kg/day	2.0E-02	1/mg/kg-day	5.5E-08	1.9E-04	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	4.8E-06	mg/kg/day	7.3E-03	1/mg/kg-day	3.5E-08	3.4E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	5.1E-07	mg/kg/day	7.3E+00	1/mg/kg-day	3.7E-06	3.6E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	7.4E+00	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	1.2E-05	mg/kg/day	4.0E-03	mg/kg/day	3.0E-03
				Fluoranthene	5.0E+02	mg/kg	1.2E-05	mg/kg/day	N/A		N/A	8.1E-04	mg/kg/day	1.0E-01	mg/kg/day	8.1E-03
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	1.6E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-06	1.1E-04	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	6.0E-07	mg/kg/day	N/A		N/A	4.2E-05	mg/kg/day	6.0E-01	mg/kg/day	7.0E-05
				Pyrene	3.9E+02	mg/kg	9.0E-06	mg/kg/day	N/A		N/A	6.3E-04	mg/kg/day	3.0E-01	mg/kg/day	2.1E-03
				Dieldrin	6.5E-01	mg/kg	1.5E-08	mg/kg/day	1.6E+01	1/mg/kg-day	2.4E-07	1.0E-06	mg/kg/day	1.0E-04	mg/kg/day	1.0E-02
				gamma-BHC (Lindane)	8.6E-01	mg/kg	2.0E-08	mg/kg/day	1.1E+00	1/mg/kg-day	2.2E-08	1.4E-06	mg/kg/day	1.0E-05	mg/kg/day	1.4E-01
				Aluminum	1.1E+04	mg/kg	2.6E-04	mg/kg/day	N/A		N/A	1.8E-02	mg/kg/day	1.0E+00	mg/kg/day	1.8E-02
				Arsenic	4.8E+00	mg/kg	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.7E-07	7.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
				Chromium (hexavalent)	5.3E-01	mg/kg	1.2E-08	mg/kg/day	5.0E-01	1/mg/kg-day	6.1E-09	8.6E-07	mg/kg/day	5.0E-03	mg/kg/day	1.7E-04
				Cobalt	3.8E+00	mg/kg	8.7E-08	mg/kg/day	N/A		N/A	6.1E-06	mg/kg/day	3.0E-03	mg/kg/day	2.0E-03
				Iron	1.6E+04	mg/kg	3.8E-04	mg/kg/day	N/A		N/A	2.6E-02	mg/kg/day	7.0E-01	mg/kg/day	3.8E-02
				Lead	1.2E+02	mg/kg	2.7E-06	mg/kg/day	N/A		N/A	1.9E-04	mg/kg/day	N/A		N/A
				Manganese	2.1E+02	mg/kg	4.7E-06	mg/kg/day	N/A		N/A	3.3E-04	mg/kg/day	2.4E-02	mg/kg/day	1.4E-02
			Exp. Route Total								1.5E-04					2.6E-01
Soil* (cont'd)	Soil*	Soil* within Fenced Area of Youth Pond/Site 4	Dermal Absorption	Benzo(a)anthracene	1.8E+02	mg/kg	1.6E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-06	4.2E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	8.2E+02	mg/kg	7.4E-06	mg/kg/day	7.3E+00	1/mg/kg-day	5.4E-05	5.2E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	1.8E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.3E-06	1.3E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	7.3E-07	mg/kg/day	7.3E-02	1/mg/kg-day	5.3E-08	5.1E-05	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	8.3E-07	mg/kg/day	2.0E-02	1/mg/kg-day	1.7E-08	5.8E-05	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	1.9E-06	mg/kg/day	7.3E-03	1/mg/kg-day	1.4E-08	1.3E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	2.0E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-06	1.4E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	7.4E+00	mg/kg	5.1E-08	mg/kg/day	N/A		N/A	3.6E-06	mg/kg/day	4.0E-03	mg/kg/day	8.9E-04
				Fluoranthene	5.0E+02	mg/kg	4.5E-06	mg/kg/day	N/A		N/A	3.1E-04	mg/kg/day	1.0E-01	mg/kg/day	3.1E-03
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	6.2E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.5E-07	4.3E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	2.3E-07	mg/kg/day	N/A		N/A	1.6E-05	mg/kg/day	6.0E-01	mg/kg/day	2.7E-05
				Pyrene	3.9E+02	mg/kg	3.5E-06	mg/kg/day	N/A		N/A	2.5E-04	mg/kg/day	3.0E-01	mg/kg/day	8.2E-04
				Dieldrin	6.5E-01	mg/kg	4.5E-09	mg/kg/day	1.6E+01	1/mg/kg-day	7.2E-08	3.1E-07	mg/kg/day	1.0E-04	mg/kg/day	3.1E-03
				gamma-BHC (Lindane)	8.6E-01	mg/kg	2.4E-09	mg/kg/day	1.1E+00	1/mg/kg-day	2.6E-09	1.7E-07	mg/kg/day	1.0E-05	mg/kg/day	1.7E-02

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Aluminum	1.1E+04	mg/kg	7.8E-06	mg/kg/day	N/A	1/mg/kg-day	N/A	5.4E-04	mg/kg/day	1.0E+00	mg/kg/day	5.4E-04
				Arsenic	4.8E+00	mg/kg	1.0E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-08	7.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.3E-03
				Chromium (hexavalent)	5.3E-01	mg/kg	3.7E-10	mg/kg/day	2.0E+01	1/mg/kg-day	7.3E-09	2.6E-08	mg/kg/day	1.3E-04	mg/kg/day	2.1E-04
				Cobalt	3.8E+00	mg/kg	2.6E-09	mg/kg/day	N/A	1/mg/kg-day	N/A	1.8E-07	mg/kg/day	3.0E-03	mg/kg/day	6.1E-05
				Iron	1.6E+04	mg/kg	1.1E-05	mg/kg/day	N/A	1/mg/kg-day	N/A	7.9E-04	mg/kg/day	7.0E-01	mg/kg/day	1.1E-03
				Lead	1.2E+02	mg/kg	8.1E-08	mg/kg/day	N/A		N/A	5.7E-06	mg/kg/day	N/A		N/A
				Manganese	2.1E+02	mg/kg	1.4E-07	mg/kg/day	N/A	1/mg/kg-day	N/A	1.0E-05	mg/kg/day	9.6E-04	mg/kg/day	1.0E-02
			Exp. Route Total								5.9E-05					3.9E-02
		Exposure Point Total									2.1E-04					3.0E-01
	Exposure Medium Total										2.1E-04					3.0E-01
	Air	Emissions From Soil* within Fenced Area of Youth Pond/Site 4	Inhalation	Naphthalene	4.3E-01	$\mu g/m^3$	7.1E-04	$\mu g/m^3$	3.4E-05	$(\mu g/m^3)^{-1}$	2.4E-08	4.9E-05	mg/m^3	3.0E-03	mg/m^3	1.6E-02
			Exp. Route Total								2.4E-08					1.6E-02
		Exposure Point Total									2.4E-08					1.6E-02
	Exposure Medium Total										2.4E-08					1.6E-02
Soil* from within Fenced Area of Youth Pond/Site 4											2.1E-04					3.2E-01
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	2.8E-07	mg/kg/day	5.4E-03	1/mg/kg-day	1.5E-09	2.0E-05	mg/kg/day	7.0E-02	mg/kg/day	2.8E-04
				Benzene	1.4E+01	ug/L	6.8E-07	mg/kg/day	5.5E-02	1/mg/kg-day	3.8E-08	4.8E-05	mg/kg/day	1.0E-02	mg/kg/day	4.8E-03
				Ethylbenzene	1.0E+01	ug/L	1.5E-06	mg/kg/day	1.1E-02	1/mg/kg-day	1.7E-08	1.1E-04	mg/kg/day	5.0E-02	mg/kg/day	2.1E-03
				m- and p-Xylene	2.0E+01	ug/L	3.2E-06	mg/kg/day	N/A		N/A	2.3E-04	mg/kg/day	4.0E-01	mg/kg/day	5.6E-04
				Trichloroethene	4.0E-01	ug/L	1.6E-08	mg/kg/day	4.6E-02	1/mg/kg-day	7.5E-10	1.1E-06	mg/kg/day	4.8E-04	mg/kg/day	2.4E-03
				Xylene, total	1.8E+01	ug/L	2.8E-06	mg/kg/day	N/A		N/A	2.0E-04	mg/kg/day	4.0E-01	mg/kg/day	5.0E-04
				1,1-Biphenyl	8.0E+00	ug/L	2.3E-06	mg/kg/day	8.0E-03	1/mg/kg-day	1.8E-08	1.6E-04	mg/kg/day	1.0E-01	mg/kg/day	1.6E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	1.1E-06	mg/kg/day	N/A		N/A	7.7E-05	mg/kg/day	5.0E-02	mg/kg/day	1.5E-03
				2-Methylnaphthalene	8.3E+00	ug/L	2.3E-06	mg/kg/day	N/A		N/A	1.6E-04	mg/kg/day	4.0E-03	mg/kg/day	4.0E-02
				Benzo(a)anthracene	9.6E-01	ug/L	2.0E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-06	1.4E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	2.5E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.8E-05	1.7E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	3.5E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.5E-06	2.4E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	3.3E-06	mg/kg/day	7.3E-02	1/mg/kg-day	2.4E-07	2.3E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	1.2E-06	mg/kg/day	7.3E+00	1/mg/kg-day	9.0E-06	8.7E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	4.4E-06	mg/kg/day	N/A		N/A	3.1E-04	mg/kg/day	4.0E-03	mg/kg/day	7.6E-02
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	4.5E-06	mg/kg/day	7.3E-01	1/mg/kg-day	3.3E-06	3.2E-04	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	1.8E-05	mg/kg/day	N/A		N/A	1.2E-03	mg/kg/day	6.0E-01	mg/kg/day	2.1E-03
				Dieldrin	1.7E-02	ug/L	2.0E-09	mg/kg/day	1.6E+01	1/mg/kg-day	3.2E-08	1.4E-07	mg/kg/day	1.0E-04	mg/kg/day	1.4E-03
				Aluminum	1.1E+04	ug/L	3.5E-05	mg/kg/day	N/A		N/A	2.5E-03	mg/kg/day	1.0E+00	mg/kg/day	2.5E-03
				Antimony	5.5E-01	ug/L	1.8E-09	mg/kg/day	N/A		N/A	1.2E-07	mg/kg/day	6.0E-05	mg/kg/day	2.1E-03
				Arsenic	1.7E+01	ug/L	5.5E-08	mg/kg/day	1.5E+00	1/mg/kg-day	8.3E-08	3.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Barium	1.6E+02	ug/L	5.0E-07	mg/kg/day	N/A		N/A	3.5E-05	mg/kg/day	1.4E-02	mg/kg/day	2.5E-03
				Chromium	1.5E+01	ug/L	9.8E-08	mg/kg/day	2.0E+01	1/mg/kg-day	2.0E-06	6.9E-06	mg/kg/day	1.3E-04	mg/kg/day	5.3E-02
				Cobalt	2.4E+00	ug/L	3.1E-09	mg/kg/day	N/A		N/A	2.2E-07	mg/kg/day	3.0E-03	mg/kg/day	7.2E-05
				Iron	2.6E+04	ug/L	8.3E-05	mg/kg/day	N/A		N/A	5.8E-03	mg/kg/day	7.0E-01	mg/kg/day	8.3E-03
				Lead	4.5E+00	ug/L	1.4E-08	mg/kg/day	N/A		N/A	1.0E-06	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	1.1E-06	mg/kg/day	N/A		N/A	7.7E-05	mg/kg/day	9.6E-04	mg/kg/day	8.0E-02
				Mercury	5.9E-01	ug/L	1.9E-09	mg/kg/day	N/A		N/A	1.3E-07	mg/kg/day	1.4E-04	mg/kg/day	9.4E-04
				Thallium	1.1E+00	ug/L	3.5E-09	mg/kg/day	N/A		N/A	2.5E-07	mg/kg/day	4.0E-05	mg/kg/day	6.1E-03
				Vanadium	2.9E+01	ug/L	9.2E-08	mg/kg/day	N/A		N/A	6.4E-06	mg/kg/day	5.0E-03	mg/kg/day	1.3E-03
			Exp. Route Total								3.7E-05					3.0E-01
	Exposure Medium Total										3.7E-05					3.0E-01
	Air	Water Vapors in Excavation Trench	Inhalation	1,4-Dichlorobenzene	1.3E+01	$\mu g/m^3$	2.2E-02	$\mu g/m^3$	1.1E-05	$(ug/m^3)^{-1}$	2.4E-07	1.5E-03	mg/m^3	1.2E+00	mg/m^3	1.3E-03
				Benzene	1.3E+02	$\mu g/m^3$	2.1E-01	$\mu g/m^3$	7.8E-06	$(ug/m^3)^{-1}$	1.7E-06	1.5E-02	mg/m^3	8.0E-02	mg/m^3	1.9E-01
				Ethylbenzene	8.0E+01	$\mu g/m^3$	1.3E-01	$\mu g/m^3$	2.5E-06	$(ug/m^3)^{-1}$	3.3E-07	9.2E-03	mg/m^3	9.0E+00	mg/m^3	1.0E-03
				m- and p-Xylene	1.6E+02	$\mu g/m^3$	2.6E-01	$\mu g/m^3$	N/A		N/A	1.8E-02	mg/m^3	4.0E-01	mg/m^3	4.6E-02

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Water Vapors in Excavation Trench		Trichloroethene	2.9E+00	µg/m^3	4.7E-03	µg/m^3	4.1E-06	(ug/m^3)$^{-1}$	1.9E-08	3.3E-04	mg/m^3	2.0E-03	mg/m^3	1.7E-01
				Xylene, total	6.4E+01	µg/m^3	1.0E-01	µg/m^3	N/A		N/A	7.3E-03	mg/m^3	4.0E-01	mg/m^3	1.8E-02
				1,1-Biphenyl	1.0E+02	µg/m^3	1.6E-01	µg/m^3	N/A		N/A	1.1E-02	mg/m^3	4.0E-03	mg/m^3	2.9E+00
				2-Methylnaphthalene	5.3E+01	µg/m^3	8.6E-02	µg/m^3	N/A		N/A	6.0E-03	mg/m^3	N/A		N/A
				Dibenzofuran	9.8E+01	µg/m^3	1.6E-01	µg/m^3	N/A		N/A	1.1E-02	mg/m^3	N/A		N/A
				Naphthalene	7.9E+02	µg/m^3	1.3E+00	µg/m^3	3.4E-05	(ug/m^3)$^{-1}$	4.4E-05	9.0E-02	mg/m^3	3.0E-03	mg/m^3	3.0E+01
			Exp. Route Total								4.6E-05					3.3E+01
		Exposure Point Total									4.6E-05					3.3E+01
Groundwater Total											8.3E-05					3.4E+01
Total of Receptor Risk from soil inside and outside fenced area and groundwater											9.5E-05	Total of Receptor Hazard from soil inside and outside fenced area and groundwater				3.4E+01
Total of Receptor Risk from soil within fenced area and groundwater											3.0E-04	Total of Receptor Hazard from soil within fenced area and groundwater				3.4E+01

Notes-

N/A = Not applicable.

*Soil = surface and subsurface soil combined.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.7.RME Supplement A.

Inhalation exposure for groundwater calculated on Table 7.7.RME Supplement C.

Table 7.7.RME Supplement A
Calculation of DAevent for Groundwater
Adult Construction Worker
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm²-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	8	7.0E-07	3
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	8	1.7E-06	3
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	8	3.8E-06	3
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	8	8.1E-06	3
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	8	4.1E-08	3
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	8	7.1E-06	3
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	8	5.7E-06	3
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	8	2.8E-06	3
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	8	5.7E-06	3
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	8	5.0E-06	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	8	6.2E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	8	8.7E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	8	8.2E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	8	3.1E-06	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	8	1.1E-05	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	8	1.1E-05	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	8	4.5E-05	3
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	8	5.0E-09	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	8	8.9E-05	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	8	4.4E-09	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	8	1.4E-07	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	8	1.3E-06	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	8	2.5E-07	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	8	7.7E-09	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	8	2.1E-04	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	8	3.6E-08	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	8	2.8E-06	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	8	4.7E-09	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	8	8.8E-09	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	8	2.3E-07	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

Table 7.7.RME Supplement B
Calculation of DAevent
Cheatham AnnexSite 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	MW	log Kow	Kow	log Kp[1]	Kp (cm/hr)	B[1]	log D_{sc}/l_{sc}[1]	D_{sc}/l_{sc}[1]	l_{sc} (cm)	D_{sc} (cm^2/hr)	τ_{event}[1] (hr)	c[1]	b[1]	t*[1] (hr)
1,1-Biphenyl	1.54E+02	3.98E+00	9.55E+03	-1.04E+00	9.21E-02	4.40E-01	-3.66E+00	2.18E-04	1.00E-03	2.18E-07	7.66E-01	6.71E-01	6.48E-01	1.84E+00
2-Methylnaphthalene	1.42E+02	3.86E+00	7.24E+03	-1.05E+00	8.96E-02	4.11E-01	-3.60E+00	2.54E-04	1.00E-03	2.54E-07	6.56E-01	6.47E-01	6.20E-01	1.57E+00
Benzo(k)fluoranthene	2.52E+02	6.11E+00	1.29E+06	-1.79E-01	6.63E-01	4.05E+00	-4.21E+00	6.15E-05	1.00E-03	6.15E-08	2.71E+00	4.11E+00	1.21E+01	1.17E+01

1. Equations from Risk Assessment Guidance for Superfund Volume 1; Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005. July 2004.
MW and log Kow from Risk Assessment Information System (http://rais.ornl.gov/cgi-bin/tools/TOX_search)

Table 7.7.RME Supplement C
Calculation of Inhalation Concentration in Excavation Trench
Construction Worker
Cheatham AnnexSite 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep revised 10/5/07	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Concentration of Contaminant in Groundwater Cgw ug/L	Volatilization Factor VF L/m3	Concentration of Contaminant in Trench Ctrench ug/m3	Concentration of Contaminant in Trench Ctrench mg/m3
1,4-Dichlorobenzene (para)	106-46-7	147.00	2.43E-03	4.12E-01	9.33E-04	9.12E-04	2.00E+00	6.74E+00	1.35E+01	1.35E-02
Benzene	71-43-2	78.11	5.55E-03	5.09E-01	1.28E-03	1.27E-03	1.40E+01	9.35E+00	1.31E+02	1.31E-01
Ethylbenzene	100-41-4	106.17	7.88E-03	4.60E-01	1.10E-03	1.09E-03	1.00E+01	8.05E+00	8.05E+01	8.05E-02
m- and p-Xylene	108-38-3	106.17	5.18E-03	4.60E-01	1.10E-03	1.09E-03	2.00E+01	8.02E+00	1.60E+02	1.60E-01
Trichloroethene	79-01-6	131.39	9.85E-03	4.28E-01	9.87E-04	9.81E-04	4.00E-01	7.24E+00	2.90E+00	2.90E-03
Xylenes, total	1330-20-7	106.17	5.18E-03	4.60E-01	1.10E-03	1.09E-03	8.00E+00	8.02E+00	6.41E+01	6.41E-02
1,1-Biphenyl	92-52-4	154.21	3.08E-04	4.06E-01	9.11E-04	7.73E-04	1.76E+01	5.71E+00	1.01E+02	1.01E-01
2-Methylnaphthalene	91-57-6	142.20	5.18E-04	4.17E-01	9.49E-04	8.57E-04	8.35E+00	6.32E+00	5.28E+01	5.28E-02
Dibenzofuran	132-64-9	168.20	2.13E-04	3.94E-01	8.72E-04	6.96E-04	1.90E+01	5.14E+00	9.76E+01	9.76E-02
Naphthalene	91-20-3	128.18	4.40E-04	4.32E-01	9.99E-04	8.85E-04	1.20E+02	6.54E+00	7.86E+02	7.86E-01

Notes:
xylene used for m- and p-xylene

Equations

$$VF = (K_i \times A \times F \times 10^{-3} \times 10^{4} \times 3600) / (ACH \times V)$$

$$K_i = 1 / \{(1/k_{iL}) + [(R\ T) / (H_i\ k_{iG})]\}$$

$$k_{iL} = (MW_{O2}/MW_i)^{0.5} \times (T/298) \times k_{L,}O_2$$

$$k_{iG} = (MW_{H2O}/MW_i)^{0.335} \times (T/298)^{1.005} \times k_G,\ H_2O$$

Parameter Value

For Mass-Transfer Coefficients

Kg,H2O	0.833	cm/s
MWH2O	18	
Kg,O2	0.002	cm/s
MWO2	32	
T	**77**	F
T	298	K
R	8.20E-05	atm-m3/mol-K

For Emission Flux and Concentration in Trench

CF1	1.00E-03	L/cm3
CF2	1.00E+04	cm2/m2
CF3	3600	s/hr
F	**1**	
ACH	360	hr-1

Trench dimensions

Length	**10**	ft
	3.05	m
Width	**10**	ft
	3.05	m
Depth	**8**	ft
	2.44	m
Width/Depth	1.25	

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	1.4E-05	mg/kg/day	7.3E-01	1/mg/kg-day	1.0E-05	3.8E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	9.9E-06	mg/kg/day	7.3E+00	1/mg/kg-day	7.2E-05	2.8E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.5E-05	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-05	4.3E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	6.2E-06	mg/kg/day	7.3E-02	1/mg/kg-day	4.5E-07	1.7E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.6E-06	mg/kg/day	1.4E-02	1/mg/kg-day	2.2E-08	4.5E-06	mg/kg/day	2.0E-02	mg/kg/day	2.2E-04
				Carbazole	3.2E+01	mg/kg	1.1E-05	mg/kg/day	2.0E-02	1/mg/kg-day	2.3E-07	3.2E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.6E-05	mg/kg/day	7.3E-03	1/mg/kg-day	1.2E-07	4.5E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.7E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.2E-05	4.7E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.1E-06	mg/kg/day	N/A		N/A	6.0E-06	mg/kg/day	1.0E-03	mg/kg/day	6.0E-03
				Fluoranthene	1.1E+02	mg/kg	3.8E-05	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	4.0E-02	mg/kg/day	2.7E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	5.3E-06	mg/kg/day	7.3E-01	1/mg/kg-day	3.9E-06	1.5E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	2.0E-06	mg/kg/day	N/A		N/A	5.6E-06	mg/kg/day	2.0E-02	mg/kg/day	2.8E-04
				Pyrene	8.5E+01	mg/kg	3.0E-05	mg/kg/day	N/A		N/A	8.3E-05	mg/kg/day	3.0E-02	mg/kg/day	2.8E-03
				Aldrin	4.6E-03	mg/kg	1.6E-09	mg/kg/day	1.7E+01	1/mg/kg-day	2.7E-08	4.5E-09	mg/kg/day	3.0E-05	mg/kg/day	1.5E-04
				Aroclor-1242	1.1E+00	mg/kg	3.8E-07	mg/kg/day	2.0E+00	1/mg/kg-day	7.6E-07	1.1E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	2.8E-07	3.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	6.4E-08	mg/kg/day	1.6E+01	1/mg/kg-day	1.0E-06	1.8E-07	mg/kg/day	5.0E-05	mg/kg/day	3.6E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	8.5E-08	mg/kg/day	1.1E+00	1/mg/kg-day	9.3E-08	2.4E-07	mg/kg/day	3.0E-04	mg/kg/day	7.9E-04
				Aluminum	1.3E+04	mg/kg	4.7E-03	mg/kg/day	N/A		N/A	1.3E-02	mg/kg/day	1.0E+00	mg/kg/day	1.3E-02
				Arsenic	4.0E+01	mg/kg	1.4E-05	mg/kg/day	1.5E+00	1/mg/kg-day	2.1E-05	3.9E-05	mg/kg/day	3.0E-04	mg/kg/day	1.3E-01
				Chromium (hexavalent)	4.3E-01	mg/kg	1.5E-07	mg/kg/day	5.0E-01	1/mg/kg-day	7.5E-08	4.2E-07	mg/kg/day	3.0E-03	mg/kg/day	1.4E-04
				Cobalt	3.6E+00	mg/kg	1.2E-06	mg/kg/day	N/A		N/A	3.5E-06	mg/kg/day	3.0E-04	mg/kg/day	1.2E-02
				Iron	2.1E+04	mg/kg	7.3E-03	mg/kg/day	N/A		N/A	2.0E-02	mg/kg/day	7.0E-01	mg/kg/day	2.9E-02
				Lead	3.7E+01	mg/kg	1.3E-05	mg/kg/day	N/A		N/A	3.6E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	5.0E-05	mg/kg/day	N/A		N/A	1.4E-04	mg/kg/day	2.4E-02	mg/kg/day	5.8E-03
				Thallium	3.8E-01	mg/kg	1.3E-07	mg/kg/day	N/A		N/A	3.7E-07	mg/kg/day	1.0E-05	mg/kg/day	3.7E-02
				Vanadium	3.5E+01	mg/kg	1.2E-05	mg/kg/day	N/A		N/A	3.5E-05	mg/kg/day	5.0E-03	mg/kg/day	6.9E-03
			Exp. Route Total								1.3E-04					2.5E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	1.2E-05	mg/kg/day	7.3E-01	1/mg/kg-day	8.6E-06	3.3E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	8.5E-06	mg/kg/day	7.3E+00	1/mg/kg-day	6.2E-05	2.4E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.3E-05	mg/kg/day	7.3E-01	1/mg/kg-day	9.5E-06	3.7E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	5.3E-06	mg/kg/day	7.3E-02	1/mg/kg-day	3.9E-07	1.5E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.1E-06	mg/kg/day	1.4E-02	1/mg/kg-day	1.5E-08	3.0E-06	mg/kg/day	2.0E-02	mg/kg/day	1.5E-04
				Carbazole	3.2E+01	mg/kg	7.5E-06	mg/kg/day	2.0E-02	1/mg/kg-day	1.5E-07	2.1E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.4E-05	mg/kg/day	7.3E-03	1/mg/kg-day	1.0E-07	3.8E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.5E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-05	4.1E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.4E-06	mg/kg/day	N/A		N/A	4.0E-06	mg/kg/day	1.0E-03	mg/kg/day	4.0E-03
				Fluoranthene	1.1E+02	mg/kg	3.3E-05	mg/kg/day	N/A		N/A	9.1E-05	mg/kg/day	4.0E-02	mg/kg/day	2.3E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	4.5E-06	mg/kg/day	7.3E-01	1/mg/kg-day	3.3E-06	1.3E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	1.7E-06	mg/kg/day	N/A		N/A	4.8E-06	mg/kg/day	2.0E-02	mg/kg/day	2.4E-04
				Pyrene	8.5E+01	mg/kg	2.5E-05	mg/kg/day	N/A		N/A	7.1E-05	mg/kg/day	3.0E-02	mg/kg/day	2.4E-03
				Aldrin	4.6E-03	mg/kg	1.1E-09	mg/kg/day	1.7E+01	1/mg/kg-day	1.8E-08	3.0E-09	mg/kg/day	3.0E-05	mg/kg/day	9.9E-05
				Aroclor-1242	1.1E+00	mg/kg	3.5E-07	mg/kg/day	2.0E+00	1/mg/kg-day	7.0E-07	9.8E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.3E-07	mg/kg/day	2.0E+00	1/mg/kg-day	2.6E-07	3.6E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	4.2E-08	mg/kg/day	1.6E+01	1/mg/kg-day	6.8E-07	1.2E-07	mg/kg/day	5.0E-05	mg/kg/day	2.4E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	2.2E-08	mg/kg/day	1.1E+00	1/mg/kg-day	2.5E-08	6.3E-08	mg/kg/day	3.0E-04	mg/kg/day	2.1E-04

TABLE 7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Aluminum	1.3E+04	mg/kg	3.1E-04	mg/kg/day	N/A		N/A	8.7E-04	mg/kg/day	1.0E+00	mg/kg/day	8.7E-04
				Arsenic	4.0E+01	mg/kg	2.8E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-06	7.7E-06	mg/kg/day	3.0E-04	mg/kg/day	2.6E-02
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Chromium (hexavalent)	4.3E-01	mg/kg	9.9E-09	mg/kg/day	2.0E+01	1/mg/kg-day	2.0E-07	2.8E-08	mg/kg/day	7.5E-05	mg/kg/day	3.7E-04
				Cobalt	3.6E+00	mg/kg	8.2E-08	mg/kg/day	N/A		N/A	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	7.6E-04
				Iron	2.1E+04	mg/kg	4.8E-04	mg/kg/day	N/A		N/A	1.3E-03	mg/kg/day	7.0E-01	mg/kg/day	1.9E-03
				Lead	3.7E+01	mg/kg	8.5E-07	mg/kg/day	N/A		N/A	2.4E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	3.3E-06	mg/kg/day	N/A		N/A	9.3E-06	mg/kg/day	9.6E-04	mg/kg/day	9.6E-03
				Thallium	3.8E-01	mg/kg	8.8E-09	mg/kg/day	N/A		N/A	2.5E-08	mg/kg/day	1.0E-05	mg/kg/day	2.5E-03
				Vanadium	3.5E+01	mg/kg	8.1E-07	mg/kg/day	N/A		N/A	2.3E-06	mg/kg/day	5.0E-03	mg/kg/day	4.6E-04
			Exp. Route Total								1.0E-04					5.4E-02
		Exposure Point Total									2.3E-04					3.0E-01
	Exposure Medium Total										2.3E-04					3.0E-01
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	7.8E-03	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	2.7E-07	2.2E-05	mg/m^3	3.0E-03	mg/m^3	7.3E-03
			Exp. Route Total								2.7E-07					7.3E-03
		Exposure Point Total									2.7E-07					7.3E-03
	Exposure Medium Total										2.7E-07					7.3E-03
Soil* from inside and outside the Fenced Area											2.3E-04					3.1E-01
										Total of Receptor Risk	2.3E-04				Total of Receptor Hazard	3.1E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	2.8E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-06	8.0E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	2.1E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.5E-05	5.8E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	3.2E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.3E-06	8.9E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.3E-06	mg/kg/day	7.3E-02	1/mg/kg-day	9.5E-08	3.6E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	3.3E-07	mg/kg/day	1.4E-02	1/mg/kg-day	4.7E-09	9.3E-07	mg/kg/day	2.0E-02	mg/kg/day	4.7E-05
				Carbazole	3.2E+01	mg/kg	2.4E-06	mg/kg/day	2.0E-02	1/mg/kg-day	4.7E-08	6.6E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	3.3E-06	mg/kg/day	7.3E-03	1/mg/kg-day	2.4E-08	9.3E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	3.5E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.6E-06	9.9E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	4.5E-07	mg/kg/day	N/A		N/A	1.3E-06	mg/kg/day	1.0E-03	mg/kg/day	1.3E-03
				Fluoranthene	1.1E+02	mg/kg	7.9E-06	mg/kg/day	N/A		N/A	2.2E-05	mg/kg/day	4.0E-02	mg/kg/day	5.5E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	1.1E-06	mg/kg/day	7.3E-01	1/mg/kg-day	8.0E-07	3.1E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	4.2E-07	mg/kg/day	N/A		N/A	1.2E-06	mg/kg/day	2.0E-02	mg/kg/day	5.9E-05
				Pyrene	8.5E+01	mg/kg	6.2E-06	mg/kg/day	N/A		N/A	1.7E-05	mg/kg/day	3.0E-02	mg/kg/day	5.7E-04
				Aldrin	4.6E-03	mg/kg	3.4E-10	mg/kg/day	1.7E+01	1/mg/kg-day	5.7E-09	9.4E-10	mg/kg/day	3.0E-05	mg/kg/day	3.1E-05
				Aroclor-1242	1.1E+00	mg/kg	7.9E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.6E-07	2.2E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.9E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.8E-08	8.2E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.3E-08	mg/kg/day	1.6E+01	1/mg/kg-day	2.1E-07	3.7E-08	mg/kg/day	5.0E-05	mg/kg/day	7.5E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	1.8E-08	mg/kg/day	1.1E+00	1/mg/kg-day	1.9E-08	4.9E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
				Aluminum	1.3E+04	mg/kg	9.8E-04	mg/kg/day	N/A		N/A	2.7E-03	mg/kg/day	1.0E+00	mg/kg/day	2.7E-03
				Arsenic	4.0E+01	mg/kg	2.9E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.3E-06	8.1E-06	mg/kg/day	3.0E-04	mg/kg/day	2.7E-02
				Chromium (hexavalent)	4.3E-01	mg/kg	3.1E-08	mg/kg/day	5.0E-01	1/mg/kg-day	1.6E-08	8.8E-08	mg/kg/day	3.0E-03	mg/kg/day	2.9E-05
				Cobalt	3.6E+00	mg/kg	2.6E-07	mg/kg/day	N/A		N/A	7.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.4E-03
				Iron	2.1E+04	mg/kg	1.5E-03	mg/kg/day	N/A		N/A	4.2E-03	mg/kg/day	7.0E-01	mg/kg/day	6.1E-03
				Lead	3.7E+01	mg/kg	2.7E-06	mg/kg/day	N/A		N/A	7.5E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	1.0E-05	mg/kg/day	N/A		N/A	2.9E-05	mg/kg/day	2.4E-02	mg/kg/day	1.2E-03
				Thallium	3.8E-01	mg/kg	2.8E-08	mg/kg/day	N/A		N/A	7.8E-08	mg/kg/day	1.0E-05	mg/kg/day	7.8E-03
				Vanadium	3.5E+01	mg/kg	2.6E-06	mg/kg/day	N/A		N/A	7.2E-06	mg/kg/day	5.0E-03	mg/kg/day	1.4E-03
			Exp. Route Total								2.8E-05					5.2E-02
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	2.4E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-06	6.8E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	1.8E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.3E-05	5.0E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	2.7E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-06	7.6E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.1E-06	mg/kg/day	7.3E-02	1/mg/kg-day	8.1E-08	3.1E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.2E-07	mg/kg/day	1.4E-02	1/mg/kg-day	3.1E-09	6.1E-07	mg/kg/day	2.0E-02	mg/kg/day	3.1E-05
				Carbazole	3.2E+01	mg/kg	1.6E-06	mg/kg/day	2.0E-02	1/mg/kg-day	3.1E-08	4.4E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	2.9E-06	mg/kg/day	7.3E-03	1/mg/kg-day	2.1E-08	8.0E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	3.0E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-06	8.5E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.9E-07	mg/kg/day	N/A		N/A	8.3E-07	mg/kg/day	1.0E-03	mg/kg/day	8.3E-04
				Fluoranthene	1.1E+02	mg/kg	6.8E-06	mg/kg/day	N/A		N/A	1.9E-05	mg/kg/day	4.0E-02	mg/kg/day	4.7E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	9.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	6.9E-07	2.6E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.6E-07	mg/kg/day	N/A		N/A	1.0E-06	mg/kg/day	2.0E-02	mg/kg/day	5.0E-05
				Pyrene	8.5E+01	mg/kg	5.3E-06	mg/kg/day	N/A		N/A	1.5E-05	mg/kg/day	3.0E-02	mg/kg/day	4.9E-04
				Aldrin	4.6E-03	mg/kg	2.2E-10	mg/kg/day	1.7E+01	1/mg/kg-day	3.8E-09	6.2E-10	mg/kg/day	3.0E-05	mg/kg/day	2.1E-05
				Aroclor-1242	1.1E+00	mg/kg	7.3E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.5E-07	2.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.7E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.4E-08	7.5E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	8.8E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.4E-07	2.5E-08	mg/kg/day	5.0E-05	mg/kg/day	4.9E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	4.7E-09	mg/kg/day	1.1E+00	1/mg/kg-day	5.1E-09	1.3E-08	mg/kg/day	3.0E-04	mg/kg/day	4.3E-05
				Aluminum	1.3E+04	mg/kg	6.4E-05	mg/kg/day	N/A		N/A	1.8E-04	mg/kg/day	1.0E+00	mg/kg/day	1.8E-04
				Arsenic	4.0E+01	mg/kg	5.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.6E-07	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	5.3E-03
				Chromium (hexavalent)	4.3E-01	mg/kg	2.1E-09	mg/kg/day	2.0E+01	1/mg/kg-day	4.1E-08	5.8E-09	mg/kg/day	7.5E-05	mg/kg/day	7.7E-05
				Cobalt	3.6E+00	mg/kg	1.7E-08	mg/kg/day	N/A		N/A	4.8E-08	mg/kg/day	3.0E-04	mg/kg/day	1.6E-04
				Iron	2.1E+04	mg/kg	1.0E-04	mg/kg/day	N/A		N/A	2.8E-04	mg/kg/day	7.0E-01	mg/kg/day	4.0E-04
				Lead	3.7E+01	mg/kg	1.8E-07	mg/kg/day	N/A		N/A	4.9E-07	mg/kg/day	N/A		N/A

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Manganese	1.4E+02	mg/kg	6.9E-07	mg/kg/day	N/A		N/A	1.9E-06	mg/kg/day	9.6E-04	mg/kg/day	2.0E-03
				Thallium	3.8E-01	mg/kg	1.8E-09	mg/kg/day	N/A		N/A	5.1E-09	mg/kg/day	1.0E-05	mg/kg/day	5.1E-04
				Vanadium	3.5E+01	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	4.7E-07	mg/kg/day	5.0E-03	mg/kg/day	9.5E-05
			Exp. Route Total								2.1E-05					1.1E-02
		Exposure Point Total									4.9E-05					6.3E-02
	Exposure Medium Total										4.9E-05					6.3E-02
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	1.6E-03	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	5.5E-08	4.6E-06	mg/m^3	3.0E-03	mg/m^3	1.5E-03
			Exp. Route Total								5.5E-08					1.5E-03
		Exposure Point Total									5.5E-08					1.5E-03
	Exposure Medium Total										5.5E-08					1.5E-03
Soil* from inside and outside the Fenced Area											4.9E-05					6.5E-02
Surface Water	Surface Water	Youth Pond	Ingestion	Arsenic	1.6E+00	ug/L	1.8E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.7E-07	5.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
			Exp. Route Total								2.7E-07					1.7E-03
			Dermal Absorption	Arsenic	1.6E+00	ug/L	2.1E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.1E-08	5.8E-08	mg/kg/day	3.0E-04	mg/kg/day	1.9E-04
			Exp. Route Total								3.1E-08					1.9E-04
		Exposure Point Total									3.0E-07					1.9E-03
	Surface Water - Youth Pond Total										3.0E-07					1.9E-03
		Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.6E-08	mg/kg/day	7.3E+00	mg/kg/day	1.2E-07	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.7E-06	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Iron	1.3E+04	ug/L	1.5E-03	mg/kg/day	N/A		N/A	4.2E-03	mg/kg/day	7.0E-01	mg/kg/day	6.0E-03
			Exp. Route Total								1.8E-06					1.7E-02
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	2.1E-06	mg/kg/day	7.3E+00	mg/kg/day	1.5E-05	5.9E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	1.3E-07	mg/kg/day	1.5E+00	mg/kg/day	2.0E-07	3.7E-07	mg/kg/day	3.0E-04	mg/kg/day	1.2E-03
				Iron	1.3E+04	ug/L	1.7E-04	mg/kg/day	N/A		N/A	4.8E-04	mg/kg/day	7.0E-01	mg/kg/day	6.8E-04
			Exp. Route Total								1.5E-05					1.9E-03
		Exposure Point Total									1.7E-05					1.9E-02
	Surface Water - Upstream Pond Total										1.7E-05					1.9E-02
		Drainageways to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	6.5E-06	mg/kg/day	1.5E+00	mg/kg/day	9.7E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.1E-02
				Iron	3.0E+04	ug/L	3.4E-03	mg/kg/day	N/A		N/A	9.5E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-02
			Exp. Route Total								9.7E-06					7.4E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	7.4E-07	mg/kg/day	1.5E+00	mg/kg/day	1.1E-06	2.1E-06	mg/kg/day	3.0E-04	mg/kg/day	6.9E-03
				Iron	3.0E+04	ug/L	3.9E-04	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.5E-03
											1.1E-06					8.4E-03
			Exp. Route Total								1.1E-06					8.4E-03
		Exposure Point Total									1.1E-05					8.3E-02
	Surface Water - Drainage Channel to Upstream Pond Total										1.1E-05					8.3E-02

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	2.6E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.9E-08	7.6E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	9.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	2.9E-07	mg/kg/day	3.0E-04	mg/kg/day	9.5E-04
				Chromium	4.0E+01	mg/kg	5.3E-07	mg/kg/day	5.0E-01	1/mg/kg-day	2.7E-07	1.6E-06	mg/kg/day	3.0E-03	mg/kg/day	5.2E-04
			Exp. Route Total								4.3E-07					1.5E-03
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	8.4E-08	3.4E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	2.9E-07	mg/kg/day	3.0E-04	mg/kg/day	9.8E-04
				Chromium	4.0E+01	mg/kg	1.8E-07	mg/kg/day	2.0E+01	1/mg/kg-day	3.7E-06	5.3E-07	mg/kg/day	7.5E-05	mg/kg/day	7.1E-03
			Exp. Route Total								3.9E-06					8.1E-03
		Exposure Point Total									4.3E-06					9.6E-03
	Surface Sediment - Drainage Channel to Upstream Pond Total										4.3E-06					9.6E-03
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.2E-09	3.3E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	9.0E-08	3.6E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.7E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-08	4.9E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	2.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.0E-08	7.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	3.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-09	1.0E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.0E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-06	2.9E-06	mg/kg/day	3.0E-04	mg/kg/day	9.7E-03
				Chromium	2.5E+01	mg/kg	3.4E-07	mg/kg/day	5.0E-01	1/mg/kg-day	1.7E-07	9.8E-07	mg/kg/day	3.0E-03	mg/kg/day	3.3E-04
				Thallium	1.4E+00	mg/kg	1.8E-08	mg/kg/day	N/A		N/A	5.3E-08	mg/kg/day	1.0E-05	mg/kg/day	5.3E-03
			Exp. Route Total								1.8E-06					1.5E-02
			Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	5.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.6E-08	1.5E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	5.5E-08	mg/kg/day	7.3E+00	1/mg/kg-day	4.0E-07	1.6E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	7.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	5.5E-08	2.2E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	8.7E-08	3.5E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	1.6E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-08	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.0E-06	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-06	3.0E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Chromium	2.5E+01	mg/kg	1.1E-07	mg/kg/day	2.0E+01	1/mg/kg-day	2.3E-06	3.3E-07	mg/kg/day	7.5E-05	mg/kg/day	4.5E-03
				Thallium	1.4E+00	mg/kg	6.2E-09	mg/kg/day	N/A		N/A	1.8E-08	mg/kg/day	1.0E-05	mg/kg/day	1.8E-03
			Exp. Route Total								4.4E-06					1.6E-02
		Exposure Point Total									6.2E-06					3.2E-02
	Surface and Subsurface Sediment - Youth Pond Total										6.2E-06					3.2E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	4.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	3.3E-09	1.3E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	7.7E-09	mg/kg/day	7.3E+00	1/mg/kg-day	5.6E-08	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-08	4.3E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-08	4.3E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.0E-09	3.2E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	7.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-07	2.1E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	2.7E-08	4.0E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	2.7E-09	mg/kg/day	1.6E+01	1/mg/kg-day	4.3E-08	7.9E-09	mg/kg/day	5.0E-05	mg/kg/day	1.6E-04
				Heptachlor epoxide	8.2E-02	mg/kg	1.1E-09	mg/kg/day	9.1E+00	1/mg/kg-day	1.0E-08	3.2E-09	mg/kg/day	1.3E-05	mg/kg/day	2.5E-04
				Arsenic	2.0E+01	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-07	7.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Chromium	2.8E-02	mg/kg	3.7E-10	mg/kg/day	5.0E-01	1/mg/kg-day	1.9E-10	1.1E-09	mg/kg/day	3.0E-03	mg/kg/day	3.6E-07
				Lead	6.0E+01	mg/kg	8.1E-07	mg/kg/day	N/A		N/A	2.4E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								7.1E-07					3.0E-03

TABLE 7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Upstream Pond	Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	2.0E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-08	5.9E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	3.4E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.5E-07	1.0E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	6.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-08	1.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	6.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.7E-08	1.9E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	4.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.6E-08	1.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	3.4E-07	mg/kg/day	2.0E+00	1/mg/kg-day	6.9E-07	1.0E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	6.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-07	1.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	9.3E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.5E-07	2.7E-08	mg/kg/day	5.0E-05	mg/kg/day	5.4E-04
				Heptachlor epoxide	8.2E-02	mg/kg	3.8E-09	mg/kg/day	9.1E+00	1/mg/kg-day	3.4E-08	1.1E-08	mg/kg/day	1.3E-05	mg/kg/day	8.5E-04
				Arsenic	2.0E+01	mg/kg	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.0E-07	7.9E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Chromium	2.8E-02	mg/kg	1.3E-10	mg/kg/day	2.0E+01	1/mg/kg-day	2.6E-09	3.7E-10	mg/kg/day	7.5E-05	mg/kg/day	5.0E-06
				Lead	6.0E+01	mg/kg	2.8E-07	mg/kg/day	N/A		N/A	8.1E-07	mg/kg/day	N/A		N/A
			Exp. Route Total								1.8E-06					4.0E-03
		Exposure Point Total									2.5E-06					7.0E-03
	Surface and Subsurface Sediment - Upstream Pond Total										2.5E-06					7.0E-03
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	6.0E-09	mg/kg/day	7.3E-01	1/mg/kg-day	4.4E-09	1.8E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	6.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	4.4E-08	1.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	7.9E-09	3.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	7.2E-10	mg/kg/day	7.3E+00	1/mg/kg-day	5.3E-09	2.1E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-09	7.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.5E-07	3.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Cobalt	2.7E+00	mg/kg	3.6E-08	mg/kg/day	N/A		N/A	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.5E-04
				Iron	1.1E+04	mg/kg	1.5E-04	mg/kg/day	N/A		N/A	4.4E-04	mg/kg/day	7.0E-01	mg/kg/day	6.3E-04
				Manganese	2.2E+02	mg/kg	2.9E-06	mg/kg/day	N/A		N/A	8.5E-06	mg/kg/day	2.4E-02	mg/kg/day	3.5E-04
			Exp. Route Total								2.2E-07					2.3E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	2.7E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-08	7.8E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	2.7E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.0E-07	7.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	4.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.5E-08	1.4E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	3.2E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.4E-08	9.4E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.1E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.3E-09	3.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-07	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.0E-03
				Cobalt	1.9E-01	mg/kg	8.7E-10	mg/kg/day	N/A		N/A	2.5E-09	mg/kg/day	3.0E-04	mg/kg/day	8.5E-06
				Iron	7.7E+00	mg/kg	3.5E-08	mg/kg/day	N/A		N/A	1.0E-07	mg/kg/day	7.0E-01	mg/kg/day	1.5E-07
				Manganese	2.7E+00	mg/kg	1.2E-08	mg/kg/day	N/A		N/A	3.6E-08	mg/kg/day	9.6E-04	mg/kg/day	3.8E-05
			Exp. Route Total								4.4E-07					1.1E-03
		Exposure Point Total									6.6E-07					3.4E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond ouside Fenced Area										6.6E-07					3.4E-03
Total of Receptor Risk from Youth Pond											7.2E-06	Total of Receptor Hazard from Youth Pond				3.7E-02
Total of Receptor Risk from Upstream Pond											8.4E-05	Total of Receptor Hazard from Upstream Pond				1.8E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.4.RME Supplements A, B, and C.

Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area.

Upstream Pond total includes soil inside and outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, and surface and subsurface sediment to Upstream Pond.

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	5.4E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	3.9E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	6.0E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	2.4E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	6.3E-06	mg/kg/day	2.0E-02	mg/kg/day	3.1E-04
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	4.5E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	6.3E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	6.6E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	8.4E-06	mg/kg/day	1.0E-03	mg/kg/day	8.4E-03
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	1.5E-04	mg/kg/day	4.0E-02	mg/kg/day	3.7E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	2.1E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	7.9E-06	mg/kg/day	2.0E-02	mg/kg/day	3.9E-04
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	1.2E-04	mg/kg/day	3.0E-02	mg/kg/day	3.9E-03
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	6.3E-09	mg/kg/day	3.0E-05	mg/kg/day	2.1E-04
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	1.5E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	5.5E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	2.5E-07	mg/kg/day	5.0E-05	mg/kg/day	5.0E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	3.3E-07	mg/kg/day	3.0E-04	mg/kg/day	1.1E-03
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	1.8E-02	mg/kg/day	1.0E+00	mg/kg/day	1.8E-02
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	5.4E-05	mg/kg/day	3.0E-04	mg/kg/day	1.8E-01
				Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	5.9E-07	mg/kg/day	3.0E-03	mg/kg/day	2.0E-04
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	4.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.6E-02
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	2.9E-02	mg/kg/day	7.0E-01	mg/kg/day	4.1E-02
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	5.0E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	2.0E-04	mg/kg/day	2.4E-02	mg/kg/day	8.2E-03
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	5.2E-07	mg/kg/day	1.0E-05	mg/kg/day	5.2E-02
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	4.8E-05	mg/kg/day	5.0E-03	mg/kg/day	9.7E-03
			Exp. Route Total								N/A					3.5E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	2.9E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	2.1E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	3.2E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	1.3E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	2.6E-06	mg/kg/day	2.0E-02	mg/kg/day	1.3E-04
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	1.8E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	3.4E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	3.6E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	3.5E-06	mg/kg/day	1.0E-03	mg/kg/day	3.5E-03
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	8.0E-05	mg/kg/day	4.0E-02	mg/kg/day	2.0E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	1.1E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	4.3E-06	mg/kg/day	2.0E-02	mg/kg/day	2.1E-04
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	6.3E-05	mg/kg/day	3.0E-02	mg/kg/day	2.1E-03
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	2.6E-09	mg/kg/day	3.0E-05	mg/kg/day	8.7E-05
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	8.6E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	3.2E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	1.0E-07	mg/kg/day	5.0E-05	mg/kg/day	2.1E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	5.5E-08	mg/kg/day	3.0E-04	mg/kg/day	1.8E-04
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	7.6E-04	mg/kg/day	1.0E+00	mg/kg/day	7.6E-04
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	6.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.3E-02

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	2.4E-08	mg/kg/day	7.5E-05	mg/kg/day	3.3E-04
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	6.7E-04
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	1.2E-03	mg/kg/day	7.0E-01	mg/kg/day	1.7E-03
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	2.1E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	8.2E-06	mg/kg/day	9.6E-04	mg/kg/day	8.5E-03
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	2.2E-08	mg/kg/day	1.0E-05	mg/kg/day	2.2E-03
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	2.0E-06	mg/kg/day	5.0E-03	mg/kg/day	4.0E-04
			Exp. Route Total								N/A					4.7E-02
		Exposure Point Total									N/A					4.0E-01
	Exposure Medium Total										N/A					4.0E-01
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	N/A		N/A		N/A	9.2E-05	mg/m^3	3.0E-03	mg/m^3	3.1E-02
			Exp. Route Total								N/A					3.1E-02
		Exposure Point Total									N/A					3.1E-02
	Exposure Medium Total										N/A					3.1E-02
Soil* from inside and outside the Fenced Area											N/A					4.3E-01
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	5.5E-05	mg/kg/day	7.0E-02	mg/kg/day	7.8E-04
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	3.8E-04	mg/kg/day	4.0E-03	mg/kg/day	9.6E-02
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	2.7E-04	mg/kg/day	1.0E-01	mg/kg/day	2.7E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	5.5E-04	mg/kg/day	2.0E-01	mg/kg/day	2.7E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	1.1E-05	mg/kg/day	5.0E-04	mg/kg/day	2.2E-02
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	4.8E-04	mg/kg/day	2.0E-01	mg/kg/day	2.4E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	2.2E-04	mg/kg/day	5.0E-02	mg/kg/day	4.4E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	7.9E-04	mg/kg/day	2.0E-02	mg/kg/day	4.0E-02
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	2.3E-04	mg/kg/day	4.0E-03	mg/kg/day	5.7E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	2.6E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	1.9E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	2.6E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	2.5E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	6.1E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	5.2E-04	mg/kg/day	1.0E-03	mg/kg/day	5.2E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	3.3E-05	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	3.3E-03	mg/kg/day	2.0E-02	mg/kg/day	1.6E-01
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	4.7E-07	mg/kg/day	5.0E-05	mg/kg/day	9.3E-03
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	3.0E-01	mg/kg/day	1.0E+00	mg/kg/day	3.0E-01
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	1.5E-05	mg/kg/day	4.0E-04	mg/kg/day	3.8E-02
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	4.7E-04	mg/kg/day	3.0E-04	mg/kg/day	1.6E+00
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	4.3E-03	mg/kg/day	2.0E-01	mg/kg/day	2.2E-02
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	4.2E-04	mg/kg/day	3.0E-03	mg/kg/day	1.4E-01
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	6.6E-05	mg/kg/day	3.0E-04	mg/kg/day	2.2E-01
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	7.1E-01	mg/kg/day	7.0E-01	mg/kg/day	1.0E+00
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	1.2E-04	mg/kg/day	N/A		N/A

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	N/A		N/A		N/A	9.5E-03	mg/kg/day	2.4E-02	mg/kg/day	3.9E-01
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	1.6E-05	mg/kg/day	3.0E-04	mg/kg/day	5.4E-02
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	3.0E-05	mg/kg/day	1.0E-05	mg/kg/day	3.0E+00
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	7.9E-04	mg/kg/day	5.0E-03	mg/kg/day	1.6E-01
			Exp. Route Total								N/A					7.9E+00
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	3.7E-05	mg/kg/day	7.0E-02	mg/kg/day	5.2E-04
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	5.8E-05	mg/kg/day	4.0E-03	mg/kg/day	1.5E-02
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	1.7E-04	mg/kg/day	1.0E-01	mg/kg/day	1.7E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	3.6E-04	mg/kg/day	2.0E-01	mg/kg/day	1.8E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	1.8E-06	mg/kg/day	5.0E-04	mg/kg/day	3.7E-03
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	3.1E-04	mg/kg/day	2.0E-01	mg/kg/day	1.6E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	3.3E-04	mg/kg/day	5.0E-02	mg/kg/day	6.7E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	1.2E-04	mg/kg/day	2.0E-02	mg/kg/day	5.9E-03
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	3.2E-04	mg/kg/day	4.0E-03	mg/kg/day	8.0E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	3.3E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	4.1E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	5.8E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	5.5E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	2.1E-04	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	4.2E-04	mg/kg/day	1.0E-03	mg/kg/day	4.2E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	7.6E-04	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	2.2E-03	mg/kg/day	2.0E-02	mg/kg/day	1.1E-01
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	3.3E-07	mg/kg/day	5.0E-05	mg/kg/day	6.6E-03
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	1.6E-03	mg/kg/day	1.0E+00	mg/kg/day	1.6E-03
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	7.9E-08	mg/kg/day	6.0E-05	mg/kg/day	1.3E-03
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	2.5E-06	mg/kg/day	3.0E-04	mg/kg/day	8.2E-03
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	2.3E-05	mg/kg/day	1.4E-02	mg/kg/day	1.6E-03
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	4.4E-06	mg/kg/day	7.5E-05	mg/kg/day	5.9E-02
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	1.4E-07	mg/kg/day	3.0E-04	mg/kg/day	4.6E-04
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	3.7E-03	mg/kg/day	7.0E-01	mg/kg/day	5.3E-03
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	6.4E-07	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	N/A		N/A		N/A	4.9E-05	mg/kg/day	9.6E-04	mg/kg/day	5.1E-02
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	8.4E-08	mg/kg/day	2.1E-05	mg/kg/day	4.0E-03
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	1.6E-07	mg/kg/day	1.0E-05	mg/kg/day	1.6E-02
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	4.1E-06	mg/kg/day	5.0E-03	mg/kg/day	8.2E-04
			Exp. Route Total								N/A					8.1E-01
		Exposure Point Total									N/A					8.1E-01
	Exposure Medium Total										N/A					8.7E+00

TABLE 7.10.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Air	Water Vapors at Showerhead	Inhalation													
				1,4-Dichlorobenzene	3.1E-03	mg/m^3	N/A		N/A		N/A	7.1E-05	mg/m^3	8.0E-01	mg/m^3	8.9E-05
				Benzene	3.0E-02	mg/m^3	N/A		N/A		N/A	7.0E-04	mg/m^3	3.0E-02	mg/m^3	2.3E-02
				Ethylbenzene	1.9E-02	mg/m^3	N/A		N/A		N/A	4.4E-04	mg/m^3	1.0E+00	mg/m^3	4.4E-04
				m- and p-Xylene	3.8E-02	mg/m^3	N/A		N/A		N/A	8.7E-04	mg/m^3	1.0E-01	mg/m^3	8.7E-03
				Trichloroethene	6.9E-04	mg/m^3	N/A		N/A		N/A	1.6E-05	mg/m^3	2.0E-03	mg/m^3	8.0E-03
				Xylene, total	3.3E-02	mg/m^3	N/A		N/A		N/A	7.7E-04	mg/m^3	1.0E-01	mg/m^3	7.7E-03
				1,1-Biphenyl	7.5E-03	mg/m^3	N/A		N/A		N/A	1.7E-04	mg/m^3	4.0E-04	mg/m^3	4.3E-01
				2-Methylnaphthalene	9.8E-03	mg/m^3	N/A		N/A		N/A	2.3E-04	mg/m^3	N/A		N/A
				Dibenzofuran	1.4E-02	mg/m^3	N/A		N/A		N/A	3.3E-04	mg/m^3	N/A		N/A
				Naphthalene	1.4E-01	mg/m^3	N/A		N/A		N/A	3.3E-03	mg/m^3	3.0E-03	mg/m^3	1.1E+00
			Exp. Route Total								N/A					1.6E+00
		Exposure Point Total									N/A					1.6E+00
	Exposure Medium Total										N/A					1.6E+00
Groundwater Total											N/A					1.0E+01
										Total of Receptor Risk	N/A				Total of Receptor Hazard	1.1E+01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.10.RME Supplement A.

Inhalation exposure for groundwater while showering calculated on Table 7.10.RME Supplement B.

Table 7.10.RME Supplement A
Calculation of DAevent for Groundwater
Resident Adult
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	0.58	1.5E-07	2
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.58	2.4E-07	2
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	0.58	6.7E-07	2
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.58	1.4E-06	2
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.58	7.5E-09	2
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.58	1.3E-06	2
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	0.58	1.4E-06	2
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	0.58	4.8E-07	2
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	0.58	1.3E-06	2
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	0.58	1.4E-06	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	0.58	1.7E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	0.58	2.3E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	0.58	2.2E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	0.58	8.4E-07	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	0.58	1.7E-06	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	0.58	3.1E-06	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	0.58	8.8E-06	2
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	0.58	1.3E-09	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	0.58	6.4E-06	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	0.58	3.2E-10	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	0.58	1.0E-08	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	0.58	9.1E-08	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	0.58	1.8E-08	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	0.58	5.6E-10	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	0.58	1.5E-05	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	0.58	2.6E-09	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	0.58	2.0E-07	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	0.58	3.4E-10	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	0.58	6.4E-10	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	0.58	1.7E-08	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

Table 7.10.RME Supplement B
Inhalation Exposure Concentrations from Foster and Chrostowski Shower Model
Adult Resident
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)	Ca (ug/m^3)
1,4-Dichlorobenzene	2.0E+00	1.5E+02	2.4E-03	1.0E+03	1.1E+01	9.9E+00	1.3E+01	2.1E-01	1.8E-01	3.1E-03	3.1E-06
Benzene	1.4E+01	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	2.1E+00	1.7E+00	3.0E-02	3.0E-05
Ethylbenzene	1.0E+01	1.1E+02	7.9E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	1.3E+00	1.1E+00	1.9E-02	1.9E-05
m- and p-Xylene	2.0E+01	1.1E+02	5.2E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	2.6E+00	2.2E+00	3.8E-02	3.8E-05
Trichloroethene	4.0E-01	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	4.8E-02	4.0E-02	6.9E-04	6.9E-07
Xylene, total	1.8E+01	1.1E+02	5.2E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	2.3E+00	1.9E+00	3.3E-02	3.3E-05
1,1-Biphenyl	8.0E+00	1.5E+02	3.1E-04	1.0E+03	1.1E+01	5.9E+00	8.0E+00	5.1E-01	4.3E-01	7.5E-03	7.5E-06
2-Methylnaphthalene	8.3E+00	1.4E+02	5.2E-04	1.1E+03	1.1E+01	7.5E+00	1.0E+01	6.8E-01	5.6E-01	9.8E-03	9.8E-06
Dibenzofuran	1.9E+01	1.7E+02	2.1E-04	9.8E+02	1.0E+01	4.7E+00	6.4E+00	9.8E-01	8.2E-01	1.4E-02	1.4E-05
Naphthalene	1.2E+02	1.3E+02	4.4E-04	1.1E+03	1.2E+01	7.5E+00	1.0E+01	9.7E+00	8.1E+00	1.4E-01	1.4E-04

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	34.8
Dt = total duration in shower room	min	60
R = air exchange rate	min^{-1}	0.01667
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))
Equation 6:	S =	(Cwd * FR / SV)
Equation 7:	Ca =	If t>Ds [(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	5.0E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	3.6E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	5.6E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	2.3E-04	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	5.8E-05	mg/kg/day	2.0E-02	mg/kg/day	2.9E-03
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	4.2E-04	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	5.8E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	6.2E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	7.9E-05	mg/kg/day	1.0E-03	mg/kg/day	7.9E-02
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	1.4E-03	mg/kg/day	4.0E-02	mg/kg/day	3.5E-02
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	1.9E-04	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	7.4E-05	mg/kg/day	2.0E-02	mg/kg/day	3.7E-03
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	1.1E-03	mg/kg/day	3.0E-02	mg/kg/day	3.6E-02
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	5.9E-08	mg/kg/day	3.0E-05	mg/kg/day	2.0E-03
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	1.4E-05	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	5.1E-06	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	2.3E-06	mg/kg/day	5.0E-05	mg/kg/day	4.7E-02
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	1.7E-01	mg/kg/day	1.0E+00	mg/kg/day	1.7E-01
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	5.1E-04	mg/kg/day	3.0E-04	mg/kg/day	1.7E+00
				Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	5.5E-06	mg/kg/day	3.0E-03	mg/kg/day	1.8E-03
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	4.5E-05	mg/kg/day	3.0E-04	mg/kg/day	1.5E-01
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	2.7E-01	mg/kg/day	7.0E-01	mg/kg/day	3.8E-01
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	4.7E-04	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	1.8E-03	mg/kg/day	2.4E-02	mg/kg/day	7.6E-02
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	4.9E-06	mg/kg/day	1.0E-05	mg/kg/day	4.9E-01
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	4.5E-04	mg/kg/day	5.0E-03	mg/kg/day	9.0E-02
			Exp. Route Total								N/A					3.3E+00
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	1.8E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	1.3E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	2.0E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	8.3E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	1.6E-05	mg/kg/day	2.0E-02	mg/kg/day	8.2E-04
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	1.2E-04	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	2.1E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	2.3E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	2.2E-05	mg/kg/day	1.0E-03	mg/kg/day	2.2E-02
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	5.0E-04	mg/kg/day	4.0E-02	mg/kg/day	1.3E-02
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	7.1E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	2.7E-05	mg/kg/day	2.0E-02	mg/kg/day	1.3E-03
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	3.9E-04	mg/kg/day	3.0E-02	mg/kg/day	1.3E-02
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	1.7E-08	mg/kg/day	3.0E-05	mg/kg/day	5.5E-04
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	5.4E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	2.0E-06	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	6.6E-07	mg/kg/day	5.0E-05	mg/kg/day	1.3E-02
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	3.5E-07	mg/kg/day	3.0E-04	mg/kg/day	1.2E-03
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	4.8E-03	mg/kg/day	1.0E+00	mg/kg/day	4.8E-03
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	4.3E-05	mg/kg/day	3.0E-04	mg/kg/day	1.4E-01

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* from inside and outside Fenced Area	Dermal Absorption[1]	Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	1.5E-07	mg/kg/day	7.5E-05	mg/kg/day	2.1E-03
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	1.3E-06	mg/kg/day	3.0E-04	mg/kg/day	4.2E-03
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	7.5E-03	mg/kg/day	7.0E-01	mg/kg/day	1.1E-02
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	1.3E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	5.1E-05	mg/kg/day	9.6E-04	mg/kg/day	5.3E-02
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	1.4E-07	mg/kg/day	1.0E-05	mg/kg/day	1.4E-02
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	1.3E-05	mg/kg/day	5.0E-03	mg/kg/day	2.5E-03
			Exp. Route Total								N/A					3.0E-01
		Exposure Point Total									N/A					3.6E+00
	Exposure Medium Total										N/A					3.6E+00
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	N/A		N/A		N/A	9.2E-05	mg/m^3	3.0E-03	mg/m^3	3.1E-02
			Exp. Route Total								N/A					3.1E-02
		Exposure Point Total									N/A					3.1E-02
	Exposure Medium Total										N/A					3.1E-02
Soil* from inside and outside the Fenced Area											N/A					3.6E+00
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	1.3E-04	mg/kg/day	7.0E-02	mg/kg/day	1.8E-03
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	8.9E-04	mg/kg/day	4.0E-03	mg/kg/day	2.2E-01
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	6.4E-04	mg/kg/day	1.0E-01	mg/kg/day	6.4E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	1.3E-03	mg/kg/day	2.0E-01	mg/kg/day	6.4E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	2.6E-05	mg/kg/day	5.0E-04	mg/kg/day	5.1E-02
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	1.1E-03	mg/kg/day	2.0E-01	mg/kg/day	5.6E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	5.1E-04	mg/kg/day	5.0E-02	mg/kg/day	1.0E-02
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	1.9E-03	mg/kg/day	2.0E-02	mg/kg/day	9.3E-02
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	5.3E-04	mg/kg/day	4.0E-03	mg/kg/day	1.3E-01
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	6.1E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	4.4E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	6.1E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	5.9E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	1.4E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	1.2E-03	mg/kg/day	1.0E-03	mg/kg/day	1.2E+00
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	7.7E-05	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	7.7E-03	mg/kg/day	2.0E-02	mg/kg/day	3.8E-01
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	1.1E-06	mg/kg/day	5.0E-05	mg/kg/day	2.2E-02
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	7.1E-01	mg/kg/day	1.0E+00	mg/kg/day	7.1E-01
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	3.5E-05	mg/kg/day	4.0E-04	mg/kg/day	8.8E-02
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	1.1E-03	mg/kg/day	3.0E-04	mg/kg/day	3.7E+00
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	1.0E-02	mg/kg/day	2.0E-01	mg/kg/day	5.0E-02
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	9.9E-04	mg/kg/day	3.0E-03	mg/kg/day	3.3E-01
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	1.5E-04	mg/kg/day	3.0E-04	mg/kg/day	5.1E-01
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	1.7E+00	mg/kg/day	7.0E-01	mg/kg/day	2.4E+00
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	2.9E-04	mg/kg/day	N/A		N/A

TABLE 7.11.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	N/A		N/A		N/A	2.2E-02	mg/kg/day	2.4E-02	mg/kg/day	9.2E-01
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	3.8E-05	mg/kg/day	3.0E-04	mg/kg/day	1.3E-01
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	7.0E-05	mg/kg/day	1.0E-05	mg/kg/day	7.0E+00
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	1.8E-03	mg/kg/day	5.0E-03	mg/kg/day	3.7E-01
			Exp. Route Total								N/A					1.8E+01
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	8.3E-05	mg/kg/day	7.0E-02	mg/kg/day	1.2E-03
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	1.4E-04	mg/kg/day	4.0E-03	mg/kg/day	3.4E-02
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	3.7E-04	mg/kg/day	1.0E-01	mg/kg/day	3.7E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	8.0E-04	mg/kg/day	2.0E-01	mg/kg/day	4.0E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	4.1E-06	mg/kg/day	5.0E-04	mg/kg/day	8.3E-03
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	7.1E-04	mg/kg/day	2.0E-01	mg/kg/day	3.5E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	7.5E-04	mg/kg/day	5.0E-02	mg/kg/day	1.5E-02
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	2.6E-04	mg/kg/day	2.0E-02	mg/kg/day	1.3E-02
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	7.2E-04	mg/kg/day	4.0E-03	mg/kg/day	1.8E-01
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	7.5E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	9.3E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	1.3E-03	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	1.2E-03	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	4.6E-04	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	9.5E-04	mg/kg/day	1.0E-03	mg/kg/day	9.5E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	1.7E-03	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	4.9E-03	mg/kg/day	2.0E-02	mg/kg/day	2.4E-01
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	7.4E-07	mg/kg/day	5.0E-05	mg/kg/day	1.5E-02
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	4.7E-03	mg/kg/day	1.0E+00	mg/kg/day	4.7E-03
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	2.3E-07	mg/kg/day	6.0E-05	mg/kg/day	3.9E-03
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	7.3E-06	mg/kg/day	3.0E-04	mg/kg/day	2.4E-02
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	6.6E-05	mg/kg/day	1.4E-02	mg/kg/day	4.7E-03
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	1.3E-05	mg/kg/day	7.5E-05	mg/kg/day	1.7E-01
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	4.1E-07	mg/kg/day	3.0E-04	mg/kg/day	1.4E-03
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	1.1E-02	mg/kg/day	7.0E-01	mg/kg/day	1.6E-02
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	1.9E-06	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	N/A		N/A		N/A	1.5E-04	mg/kg/day	9.6E-04	mg/kg/day	1.5E-01
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	2.5E-07	mg/kg/day	2.1E-05	mg/kg/day	1.2E-02
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	4.6E-07	mg/kg/day	1.0E-05	mg/kg/day	4.6E-02
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	1.2E-05	mg/kg/day	5.0E-03	mg/kg/day	2.4E-03
			Exp. Route Total								N/A					1.9E+00
		Exposure Point Total									N/A					1.9E+00
	Exposure Medium Total										N/A					2.0E+01
Groundwater Total											N/A					2.0E+01
										Total of Receptor Risk	N/A				Total of Receptor Hazard	2.4E+01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.11.RME Supplement A.

Table 7.11.RME Supplement A
Calculation of DAevent for Groundwater
Resident Child
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	1	2.0E-07	2
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	1	3.3E-07	3
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	1	8.8E-07	2
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	1	1.9E-06	2
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	1	9.8E-09	2
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	1	1.7E-06	2
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	1	1.8E-06	2
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	1	6.3E-07	2
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	1	1.7E-06	2
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	1	1.8E-06	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	1	2.2E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	1	3.1E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	1	2.9E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	1	1.1E-06	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	1	2.2E-06	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	1	4.0E-06	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	1	1.2E-05	2
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	1	1.8E-09	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	1	1.1E-05	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	1	5.5E-10	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	1	1.7E-08	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	1	1.6E-07	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	1	3.1E-08	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	1	9.6E-10	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	1	2.6E-05	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	1	4.5E-09	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	1	3.5E-07	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	1	5.9E-10	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	1	1.1E-09	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	1	2.9E-08	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

TABLE 7.12.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	1.9E-04	N/A		N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	1.4E-03	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	2.1E-04	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	8.7E-06	N/A		N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	7.2E-06	mg/kg/day	1.4E-02	1/mg/kg-day	1.0E-07	N/A		N/A		N/A
				Carbazole	3.2E+01	mg/kg	5.1E-05	mg/kg/day	2.0E-02	1/mg/kg-day	1.0E-06	N/A		N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	2.2E-06	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	2.4E-04	N/A		N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	9.6E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Fluoranthene	1.1E+02	mg/kg	1.7E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	7.4E-05	N/A		N/A		N/A
				Naphthalene	5.8E+00	mg/kg	9.0E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Pyrene	8.5E+01	mg/kg	1.3E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Aldrin	4.6E-03	mg/kg	7.2E-09	mg/kg/day	1.7E+01	1/mg/kg-day	1.2E-07	N/A		N/A		N/A
				Aroclor-1242	1.1E+00	mg/kg	1.7E-06	mg/kg/day	2.0E+00	1/mg/kg-day	3.4E-06	N/A		N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	6.3E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-06	N/A		N/A		N/A
				Dieldrin	1.8E-01	mg/kg	2.9E-07	mg/kg/day	1.6E+01	1/mg/kg-day	4.6E-06	N/A		N/A		N/A
				gamma-BHC (Lindane)	2.4E-01	mg/kg	3.8E-07	mg/kg/day	1.1E+00	1/mg/kg-day	4.2E-07	N/A		N/A		N/A
				Aluminum	1.3E+04	mg/kg	2.1E-02	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	4.0E+01	mg/kg	6.2E-05	mg/kg/day	1.5E+00	1/mg/kg-day	9.3E-05	N/A		N/A		N/A
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			5.0E-01	1/mg/kg-day	1.4E-06	N/A		N/A		N/A
				Cobalt	3.6E+00	mg/kg	5.6E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.1E+04	mg/kg	3.3E-02	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	3.7E+01	mg/kg	5.8E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	1.4E+02	mg/kg	2.2E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	3.8E-01	mg/kg	6.0E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.5E+01	mg/kg	5.5E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								2.2E-03					N/A
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	7.4E-05	N/A		N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	5.3E-04	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	8.2E-05	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	3.3E-06	N/A		N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.3E-06	mg/kg/day	1.4E-02	1/mg/kg-day	3.2E-08	N/A		N/A		N/A
				Carbazole	3.2E+01	mg/kg	1.6E-05	mg/kg/day	2.0E-02	1/mg/kg-day	3.2E-07	N/A		N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	8.6E-07	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	9.1E-05	N/A		N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	3.0E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Fluoranthene	1.1E+02	mg/kg	7.0E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	2.8E-05	N/A		N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.7E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Pyrene	8.5E+01	mg/kg	5.4E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Aldrin	4.6E-03	mg/kg	2.3E-09	mg/kg/day	1.7E+01	1/mg/kg-day	3.9E-08	N/A		N/A		N/A
				Aroclor-1242	1.1E+00	mg/kg	7.5E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.5E-06	N/A		N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.8E-07	mg/kg/day	2.0E+00	1/mg/kg-day	5.5E-07	N/A		N/A		N/A
				Dieldrin	1.8E-01	mg/kg	9.1E-08	mg/kg/day	1.6E+01	1/mg/kg-day	1.5E-06	N/A		N/A		N/A
				gamma-BHC (Lindane)	2.4E-01	mg/kg	4.8E-08	mg/kg/day	1.1E+00	1/mg/kg-day	5.3E-08	N/A		N/A		N/A
				Aluminum	1.3E+04	mg/kg	6.6E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	4.0E+01	mg/kg	5.9E-06	mg/kg/day	1.5E+00	1/mg/kg-day	8.8E-06	N/A		N/A		N/A
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			2.0E+01	1/mg/kg-day	1.7E-06	N/A		N/A		N/A

TABLE 7.12.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	1.8E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.1E+04	mg/kg	1.0E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	3.7E+01	mg/kg	1.8E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	1.4E+02	mg/kg	7.1E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	3.8E-01	mg/kg	1.9E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.5E+01	mg/kg	1.7E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								8.3E-04					N/A
		Exposure Point Total									3.1E-03					N/A
	Exposure Medium Total										3.1E-03					N/A
	Air	Emissions from Soil* from inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	3.9E-02	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	1.3E-06	N/A		N/A		N/A
			Exp. Route Total								1.3E-06					N/A
		Exposure Point Total									1.3E-06					N/A
	Exposure Medium Total										1.3E-06					N/A
Soil* from inside and outside the Fenced Area											3.1E-03					N/A
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	3.0E-05	mg/kg/day	5.4E-03		1.6E-07	N/A		N/A		N/A
				Benzene	1.4E+01	ug/L	2.1E-04	mg/kg/day	5.5E-02		1.1E-05	N/A		N/A		N/A
				Ethylbenzene	1.0E+01	ug/L	1.5E-04	mg/kg/day	1.1E-02		1.6E-06	N/A		N/A		N/A
				m- and p-Xylene	2.0E+01	ug/L	3.0E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene (†)	4.0E-01	ug/L			N/A		N/A	N/A		N/A		N/A
				Trichloroethene (Kidney)	4.0E-01	ug/L			9.3E-03	1/mg/kg-day	1.7E-07	N/A		N/A		N/A
				Trichloroethene (NHL + Liver)	4.0E-01	ug/L	6.0E-06	mg/kg/day	3.7E-02	1/mg/kg-day	2.2E-07	N/A		N/A		N/A
				Xylene, total	1.8E+01	ug/L	2.6E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	8.0E+00	ug/L	1.2E-04	mg/kg/day	8.0E-03	1/mg/kg-day	9.6E-07	N/A		N/A		N/A
				2,4-Dimethylphenol	2.9E+01	ug/L	4.3E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	8.3E+00	ug/L	1.2E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Benzo(a)anthracene[2]	9.6E-01	ug/L	N/A		7.3E-01	1/mg/kg-day	3.2E-05	N/A		N/A		N/A
				Benzo(a)pyrene[2]	6.9E-01	ug/L	N/A		7.3E+00	1/mg/kg-day	2.3E-04	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	9.5E-01	ug/L	N/A		7.3E-01	1/mg/kg-day	3.2E-05	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	9.3E-01	ug/L	N/A		7.3E-02	1/mg/kg-day	3.1E-06	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	ug/L	N/A		7.3E+00	1/mg/kg-day	7.6E-05	N/A		N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	2.8E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.2E+00	ug/L	N/A		7.3E-01	1/mg/kg-day	4.1E-05	N/A		N/A		N/A
				Naphthalene	1.2E+02	ug/L	1.8E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dieldrin	1.7E-02	ug/L	2.5E-07	mg/kg/day	1.6E+01	1/mg/kg-day	4.1E-06	N/A		N/A		N/A
				Aluminum	1.1E+04	ug/L	1.7E-01	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Antimony	5.5E-01	ug/L	8.3E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	1.7E+01	ug/L	2.6E-04	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-04	N/A		N/A		N/A
				Barium	1.6E+02	ug/L	2.4E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Chromium[2]	1.5E+01	ug/L			5.0E-01	1/mg/kg-day	3.6E-04	N/A		N/A		N/A
				Cobalt	2.4E+00	ug/L	3.6E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.6E+04	ug/L	3.9E-01	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	4.5E+00	ug/L	6.7E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A

TABLE 7.12.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	5.2E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Mercury	5.9E-01	ug/L	8.8E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	1.1E+00	ug/L	1.6E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	2.9E+01	ug/L	4.3E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								1.2E-03					N/A
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	2.0E-05	mg/kg/day	5.4E-03	1/mg/kg-day	1.1E-07	N/A		N/A		N/A
				Benzene	1.4E+01	ug/L	3.2E-05	mg/kg/day	5.5E-02	1/mg/kg-day	1.7E-06	N/A		N/A		N/A
				Ethylbenzene	1.0E+01	ug/L	8.9E-05	mg/kg/day	1.1E-02	1/mg/kg-day	9.8E-07	N/A		N/A		N/A
				m- and p-Xylene	2.0E+01	ug/L	1.9E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene (†)	4.0E-01	ug/L	N/A		N/A		N/A	N/A		N/A		N/A
				Trichloroethene (Kidney)	4.0E-01	ug/L			9.3E-03	1/mg/kg-day	2.8E-08	N/A		N/A		N/A
				Trichloroethene (NHL + Liver)	4.0E-01	ug/L	9.9E-07	mg/kg/day	3.7E-02	1/mg/kg-day	3.6E-08	N/A		N/A		N/A
				Xylene, total	1.8E+01	ug/L	1.7E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	8.0E+00	ug/L	1.8E-04	mg/kg/day	8.0E-03	1/mg/kg-day	1.4E-06	N/A		N/A		N/A
				2,4-Dimethylphenol	2.9E+01	ug/L	6.3E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	8.3E+00	ug/L	1.7E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Benzo(a)anthracene[2]	9.6E-01	ug/L			7.3E-01	1/mg/kg-day	4.0E-04	N/A		N/A		N/A
				Benzo(a)pyrene[2]	6.9E-01	ug/L			7.3E+00	1/mg/kg-day	5.0E-03	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	9.5E-01	ug/L			7.3E-01	1/mg/kg-day	7.0E-04	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	9.3E-01	ug/L			7.3E-02	1/mg/kg-day	6.6E-05	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	ug/L			7.3E+00	1/mg/kg-day	2.5E-03	N/A		N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	2.3E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.2E+00	ug/L			7.3E-01	1/mg/kg-day	9.1E-04	N/A		N/A		N/A
				Naphthalene	1.2E+02	ug/L	1.2E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dieldrin	1.7E-02	ug/L	1.8E-07	mg/kg/day	1.6E+01	1/mg/kg-day	2.8E-06	N/A		N/A		N/A
				Aluminum	1.1E+04	ug/L	9.4E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Antimony	5.5E-01	ug/L	4.7E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	1.7E+01	ug/L	1.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.2E-06	N/A		N/A		N/A
				Barium	1.6E+02	ug/L	1.3E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Chromium[2]	1.5E+01	ug/L			2.0E+01	1/mg/kg-day	1.7E-04	N/A		N/A		N/A
				Cobalt	2.4E+00	ug/L	8.2E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.6E+04	ug/L	2.2E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	4.5E+00	ug/L	3.8E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	3.5E+02	ug/L	2.9E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Mercury	5.9E-01	ug/L	5.0E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	1.1E+00	ug/L	9.4E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	2.9E+01	ug/L	2.4E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								9.8E-03					N/A
		Exposure Point Total									1.1E-02					N/A
	Exposure Medium Total										1.1E-02					N/A

TABLE 7.12.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Air	Water Vapors at Showerhead	Inhalation													
				1,4-Dichlorobenzene	3.1E-06	$\mu g/m^3$	2.4E-05	mg/kg/day	1.1E-05	$(\mu g/m^3)^{-1}$	2.7E-10	N/A		N/A		N/A
				Benzene	3.0E-05	$\mu g/m^3$	2.4E-04	mg/kg/day	7.8E-06	$(\mu g/m^3)^{-1}$	1.9E-09	N/A		N/A		N/A
				Ethylbenzene	1.9E-05	$\mu g/m^3$	1.5E-04	mg/kg/day	2.5E-06	$(\mu g/m^3)^{-1}$	3.8E-10	N/A		N/A		N/A
				m- and p-Xylene	3.8E-05	$\mu g/m^3$	3.0E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	6.9E-07	$\mu g/m^3$	5.5E-06	mg/kg/day	4.1E-06	$(\mu g/m^3)^{-1}$	2.3E-11	N/A		N/A		N/A
				Xylene, total	3.3E-05	$\mu g/m^3$	2.6E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	7.5E-06	$\mu g/m^3$	5.9E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	9.8E-06	$\mu g/m^3$	7.8E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dibenzofuran	1.4E-05	$\mu g/m^3$	1.1E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Naphthalene	1.4E-04	$\mu g/m^3$	1.1E-03	mg/kg/day	3.4E-05	$(\mu g/m^3)^{-1}$	3.8E-08	N/A		N/A		N/A
			Exp. Route Total								4.1E-08					N/A
		Exposure Point Total									4.1E-08					N/A
	Exposure Medium Total										4.1E-08					N/A
Groundwater Total											1.1E-02					N/A
										Total of Receptor Risk	1.4E-02				Total of Receptor Hazard	N/A

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

DAevent for exposure to groundwater calculated on Tables 7.10.RME Supplement A and 7.11.RME Supplement A.

Inhalation exposure for groundwater while showering calculated on Table 7.10.RME Supplement B.

[2] See Table 7.12.RME Supplement A for calculation of cancer intake and cancer risk following MMOA method.

TABLE 7.12.RME Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	1.4E-05	2.9E-05	7.7E-06	1.1E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	1.9E-04
				Benzo(a)pyrene	2.8E+01	mg/kg	1.0E-05	2.1E-05	5.6E-06	7.8E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	1.4E-03
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.6E-05	3.2E-05	8.5E-06	1.2E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	2.1E-04
				Benzo(k)fluoranthene	1.8E+01	mg/kg	6.5E-06	1.3E-05	3.5E-06	4.9E-06	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	8.7E-06
				Chrysene	4.6E+01	mg/kg	1.7E-05	3.3E-05	9.0E-06	1.3E-05	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	1/(mg/kg-day)	2.2E-06
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.8E-06	3.5E-06	9.5E-07	1.3E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	2.4E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	5.5E-06	1.1E-05	3.0E-06	4.2E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	7.4E-05
				Chromium (hexavalent)	4.3E-01	mg/kg	1.6E-07	3.1E-07	8.4E-08	1.2E-07	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	1.4E-06
			Dermal	Benzo(a)anthracene	3.9E+01	mg/kg	5.2E-06	1.0E-05	4.0E-06	5.6E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	7.4E-05
				Benzo(a)pyrene	2.8E+01	mg/kg	3.8E-06	7.6E-06	2.9E-06	4.0E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	5.3E-04
				Benzo(b)fluoranthene	4.4E+01	mg/kg	5.8E-06	1.2E-05	4.4E-06	6.2E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	8.2E-05
				Benzo(k)fluoranthene	1.8E+01	mg/kg	2.4E-06	4.7E-06	1.8E-06	2.5E-06	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	3.3E-06
				Chrysene	4.6E+01	mg/kg	6.1E-06	1.2E-05	4.6E-06	6.5E-06	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	1/(mg/kg-day)	8.6E-07
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	6.4E-07	1.3E-06	4.9E-07	6.9E-07	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	9.1E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	2.0E-06	4.0E-06	1.5E-06	2.2E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	2.8E-05
				Chromium (hexavalent)	4.3E-01	mg/kg	4.4E-09	8.8E-09	3.4E-09	4.7E-09	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	1.7E-06
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Trichloroethene (Kidney)	4.0E-01	ug/L	7.3E-07	1.5E-06	1.6E-06	2.2E-06	mg/kg/day	9.3E-02	2.8E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	1.7E-07
				Benzo(a)anthracene	9.6E-01	ug/L	1.7E-06	3.5E-06	3.7E-06	5.2E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	3.2E-05
				Benzo(a)pyrene	6.9E-01	ug/L	1.3E-06	2.5E-06	2.7E-06	3.8E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	2.3E-04
				Benzo(b)fluoranthene	9.5E-01	ug/L	1.7E-06	3.5E-06	3.7E-06	5.2E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	3.2E-05
				Benzo(k)fluoranthene	9.3E-01	ug/L	1.7E-06	3.4E-06	3.6E-06	5.1E-06	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	3.1E-06
				Dibenz(a,h)anthracene	2.2E-01	ug/L	4.1E-07	8.1E-07	8.7E-07	1.2E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	7.6E-05
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	2.2E-06	4.4E-06	4.7E-06	6.6E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	4.1E-05
				Chromium	1.5E+01	ug/L	2.8E-05	5.6E-05	6.0E-05	8.5E-05	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	3.6E-04
			Dermal	Trichloroethene (Kidney)	4.0E-01	ug/L	1.2E-07	2.4E-07	2.6E-07	3.7E-07	mg/kg/day	9.3E-02	2.8E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	2.8E-08
				Benzo(a)anthracene	9.6E-01	ug/L	2.1E-05	4.3E-05	4.8E-05	6.7E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	4.0E-04
				Benzo(a)pyrene	6.9E-01	ug/L	2.7E-05	5.3E-05	5.9E-05	8.3E-05	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	5.0E-03
				Benzo(b)fluoranthene	9.5E-01	ug/L	3.7E-05	7.4E-05	8.2E-05	1.2E-04	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	7.0E-04
				Benzo(k)fluoranthene	9.3E-01	ug/L	3.5E-05	7.0E-05	7.8E-05	1.1E-04	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	6.6E-05
				Dibenz(a,h)anthracene	2.2E-01	ug/L	1.3E-05	2.6E-05	2.9E-05	4.1E-05	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	2.5E-03
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	4.9E-05	9.7E-05	1.1E-04	1.5E-04	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	9.1E-04
				Chromium	1.5E+01	ug/L	3.7E-07	7.4E-07	6.3E-07	8.8E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	1.7E-04

Cancer risk = $(Intake_{0\text{-}2} \times CSF_{0\text{-}2}) + (Intake_{2\text{-}6} \times CSF_{2\text{-}6}) + (Intake_{6\text{-}16} \times CSF_{6\text{-}16}) + (Intake_{16\text{-}30} \times CSF_{16\text{-}30})$

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Ingestion	Benzo(a)anthracene	1.8E+02	mg/kg	9.9E-06	mg/kg/day	7.3E-01	1/mg/kg-day	7.2E-06	7.7E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	1.3E+02	mg/kg	7.2E-06	mg/kg/day	7.3E+00	1/mg/kg-day	5.2E-05	5.6E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	1.1E-05	mg/kg/day	7.3E-01	1/mg/kg-day	8.0E-06	8.6E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	4.5E-06	mg/kg/day	7.3E-02	1/mg/kg-day	3.3E-07	3.5E-05	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	6.6E-06	mg/kg/day	2.0E-02	1/mg/kg-day	1.3E-07	5.1E-05	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	1.2E-05	mg/kg/day	7.3E-03	1/mg/kg-day	8.4E-08	9.0E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	1.2E-06	mg/kg/day	7.3E+00	1/mg/kg-day	8.8E-06	9.4E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	mg/kg	1.0E-06	mg/kg/day	N/A		N/A	8.1E-06	mg/kg/day	1.0E-03	mg/kg/day	8.1E-03
				Fluoranthene	5.0E+02	mg/kg	2.8E-05	mg/kg/day	N/A		N/A	2.1E-04	mg/kg/day	4.0E-02	mg/kg/day	5.4E-03
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	3.8E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.8E-06	3.0E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	1.4E-06	mg/kg/day	N/A		N/A	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	5.6E-04
				Pyrene	3.9E+02	mg/kg	2.1E-05	mg/kg/day	N/A		N/A	1.7E-04	mg/kg/day	3.0E-02	mg/kg/day	5.6E-03
				Dieldrin	6.5E-01	mg/kg	3.6E-08	mg/kg/day	1.6E+01	1/mg/kg-day	5.7E-07	2.8E-07	mg/kg/day	5.0E-05	mg/kg/day	5.6E-03
				gamma-BHC (Lindane)	8.6E-01	mg/kg	4.7E-08	mg/kg/day	1.1E+00	1/mg/kg-day	5.2E-08	3.7E-07	mg/kg/day	3.0E-04	mg/kg/day	1.2E-03
				Aluminum	1.3E+04	mg/kg	6.9E-04	mg/kg/day	N/A		N/A	5.4E-03	mg/kg/day	1.0E+00	mg/kg/day	5.4E-03
				Arsenic	7.3E+00	mg/kg	4.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	6.0E-07	3.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.0E-02
				Chromium (hexavalent)	5.3E-01	mg/kg	2.9E-08	mg/kg/day	5.0E-01	1/mg/kg-day	1.5E-08	2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	7.6E-05
				Cobalt	4.9E+00	mg/kg	2.7E-07	mg/kg/day	N/A		N/A	2.1E-06	mg/kg/day	3.0E-04	mg/kg/day	7.0E-03
				Iron	1.9E+04	mg/kg	1.1E-03	mg/kg/day	N/A		N/A	8.3E-03	mg/kg/day	7.0E-01	mg/kg/day	1.2E-02
				Lead	1.5E+02	mg/kg	8.3E-06	mg/kg/day	N/A		N/A	6.5E-05	mg/kg/day	N/A		N/A
				Manganese	3.2E+02	mg/kg	1.7E-05	mg/kg/day	N/A		N/A	1.4E-04	mg/kg/day	2.4E-02	mg/kg/day	5.6E-03
			Exp. Route Total								8.1E-05					6.7E-02
			Dermal Absorption[1]	Benzo(a)anthracene	1.8E+02	mg/kg	1.7E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-06	1.3E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	1.3E+02	mg/kg	1.2E-06	mg/kg/day	7.3E+00	1/mg/kg-day	9.0E-06	9.6E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	1.9E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.4E-06	1.5E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	7.7E-07	mg/kg/day	7.3E-02	1/mg/kg-day	5.6E-08	6.0E-06	mg/kg/day	N/A		N/A
				Carbazole	1.2E+02	mg/kg	8.7E-07	mg/kg/day	2.0E-02	1/mg/kg-day	1.7E-08	6.8E-06	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	2.0E-06	mg/kg/day	7.3E-03	1/mg/kg-day	1.4E-08	1.5E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	2.1E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.5E-06	1.6E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	mg/kg	1.4E-07	mg/kg/day	N/A		N/A	1.1E-06	mg/kg/day	1.0E-03	mg/kg/day	1.1E-03
				Fluoranthene	5.0E+02	mg/kg	4.7E-06	mg/kg/day	N/A		N/A	3.7E-05	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	6.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.8E-07	5.1E-06	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	2.5E-07	mg/kg/day	N/A		N/A	1.9E-06	mg/kg/day	2.0E-02	mg/kg/day	9.6E-05
				Pyrene	3.9E+02	mg/kg	3.7E-06	mg/kg/day	N/A		N/A	2.9E-05	mg/kg/day	3.0E-02	mg/kg/day	9.6E-04
				Dieldrin	6.5E-01	mg/kg	4.7E-09	mg/kg/day	1.6E+01	1/mg/kg-day	7.6E-08	3.7E-08	mg/kg/day	5.0E-05	mg/kg/day	7.4E-04
				gamma-BHC (Lindane)	8.6E-01	mg/kg	2.5E-09	mg/kg/day	1.1E+00	1/mg/kg-day	2.8E-09	1.9E-08	mg/kg/day	3.0E-04	mg/kg/day	6.5E-05
				Aluminum	1.3E+04	mg/kg	9.2E-06	mg/kg/day	N/A		N/A	7.1E-05	mg/kg/day	1.0E+00	mg/kg/day	7.1E-05
				Arsenic	7.3E+00	mg/kg	1.6E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.4E-08	1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	4.1E-04
				Chromium (hexavalent)	5.3E-01	mg/kg	3.9E-10	mg/kg/day	2.0E+01	1/mg/kg-day	7.7E-09	3.0E-09	mg/kg/day	7.5E-05	mg/kg/day	4.0E-05
				Cobalt	4.9E+00	mg/kg	3.6E-09	mg/kg/day	N/A		N/A	2.8E-08	mg/kg/day	3.0E-04	mg/kg/day	9.2E-05
				Iron	1.9E+04	mg/kg	1.4E-05	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	7.0E-01	mg/kg/day	1.6E-04
				Lead	1.5E+02	mg/kg	1.1E-07	mg/kg/day	N/A		N/A	8.6E-07	mg/kg/day	N/A		N/A
				Manganese	3.2E+02	mg/kg	2.3E-07	mg/kg/day	N/A		N/A	1.8E-06	mg/kg/day	9.6E-04	mg/kg/day	1.9E-03
			Exp. Route Total								1.4E-05					5.6E-03
		Exposure Point Total									9.5E-05					7.2E-02
	Exposure Medium Total										9.5E-05					7.2E-02

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil (cont'd)	Air	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Inhalation	Naphthalene	4.3E-01	µg/m^3	1.1E-02	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	3.8E-07	8.7E-05	mg/m^3	3.0E-03	mg/m^3	2.9E-02
			Exp. Route Total								3.8E-07					2.9E-02
		Exposure Point Total									3.8E-07					2.9E-02
	Exposure Medium Total										3.8E-07					2.9E-02
Surface Soil within Fenced Area of Site 4											9.5E-05					1.0E-01
										Total of Receptor Risk	9.5E-05				Total of Receptor Hazard	1.0E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.03 used for arsenic, DABS of 0.04 for lindane, DABS of 0.01 for all other inorganics, DABS of 0.13 for PAHs.

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene	4.2E+00	mg/kg	2.8E-08	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-08	2.1E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	2.3E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.7E-07	1.8E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	2.3E-08	mg/kg/day	7.3E-01	1/mg/kg-day	1.7E-08	1.8E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	1.1E-08	mg/kg/day	7.3E-02	1/mg/kg-day	8.0E-10	8.6E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	1.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-08	1.1E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	1.2E-08	mg/kg/day	7.3E-01	1/mg/kg-day	8.6E-09	9.2E-08	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	2.2E-10	mg/kg/day	1.7E+01	1/mg/kg-day	3.7E-09	1.7E-09	mg/kg/day	3.0E-05	mg/kg/day	5.6E-05
				Aroclor-1242	1.0E+00	mg/kg	6.5E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-08	5.1E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	5.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-08	4.4E-08	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	7.6E-05	mg/kg/day	N/A		N/A	5.9E-04	mg/kg/day	1.0E+00	mg/kg/day	5.9E-04
				Arsenic	7.7E+01	mg/kg	5.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.5E-07	3.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Cobalt	3.9E+00	mg/kg	2.5E-08	mg/kg/day	N/A		N/A	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	6.6E-04
				Iron	4.0E+04	mg/kg	2.6E-04	mg/kg/day	N/A		N/A	2.0E-03	mg/kg/day	7.0E-01	mg/kg/day	2.9E-03
				Manganese	1.6E+02	mg/kg	1.0E-06	mg/kg/day	N/A		N/A	7.9E-06	mg/kg/day	2.4E-02	mg/kg/day	3.3E-04
				Thallium	5.6E-01	mg/kg	3.7E-09	mg/kg/day	N/A		N/A	2.8E-08	mg/kg/day	1.0E-05	mg/kg/day	2.8E-03
				Vanadium	2.7E+01	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	1.4E-06	mg/kg/day	5.0E-03	mg/kg/day	2.7E-04
			Exp. Route Total								1.0E-06					2.1E-02
			Dermal Absorption[1]	Benzo(a)anthracene	4.2E+00	mg/kg	4.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-09	3.2E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	3.5E+00	mg/kg	3.4E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.5E-08	2.6E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	3.5E+00	mg/kg	3.4E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.5E-09	2.6E-08	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.7E+00	mg/kg	1.6E-09	mg/kg/day	7.3E-02	1/mg/kg-day	1.2E-10	1.3E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	2.2E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.6E-09	1.7E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	1.7E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.3E-09	1.4E-08	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	2.5E-11	mg/kg/day	1.7E+01	1/mg/kg-day	4.2E-10	1.9E-10	mg/kg/day	3.0E-05	mg/kg/day	6.4E-06
				Aroclor-1242	1.0E+00	mg/kg	1.0E-09	mg/kg/day	2.0E+00	1/mg/kg-day	2.1E-09	8.1E-09	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	9.0E-10	mg/kg/day	2.0E+00	1/mg/kg-day	1.8E-09	7.0E-09	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	8.7E-07	mg/kg/day	N/A		N/A	6.7E-06	mg/kg/day	1.0E+00	mg/kg/day	6.7E-06
				Arsenic	7.7E+01	mg/kg	1.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.6E-08	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	4.5E-04
				Cobalt	3.9E+00	mg/kg	2.9E-10	mg/kg/day	N/A		N/A	2.3E-09	mg/kg/day	3.0E-04	mg/kg/day	7.5E-06
				Iron	4.0E+04	mg/kg	3.0E-06	mg/kg/day	N/A		N/A	2.3E-05	mg/kg/day	7.0E-01	mg/kg/day	3.3E-05
				Manganese	1.6E+02	mg/kg	1.2E-08	mg/kg/day	N/A		N/A	9.0E-08	mg/kg/day	9.6E-04	mg/kg/day	9.4E-05
				Thallium	5.6E-01	mg/kg	4.2E-11	mg/kg/day	N/A		N/A	3.2E-10	mg/kg/day	1.0E-05	mg/kg/day	3.2E-05
				Vanadium	2.7E+01	mg/kg	2.0E-09	mg/kg/day	N/A		N/A	1.5E-08	mg/kg/day	5.0E-03	mg/kg/day	3.1E-06
			Exp. Route Total								6.3E-08					6.3E-04
		Exposure Point									1.1E-06					2.1E-02
	Exposure Medium Total										1.1E-06					2.1E-02
Surface Soil outside Fenced Area of Site 4											1.1E-06					2.1E-02

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.2E-09	mg/kg/day	7.3E+00	1/mg/kg-day	9.1E-09	9.7E-09	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	8.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.3E-07	6.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.3E-03
				Iron	1.3E+04	ug/L	1.1E-04	mg/kg/day	N/A		N/A	8.8E-04	mg/kg/day	7.0E-01	mg/kg/day	1.3E-03
			Exp. Route Total								1.4E-07					3.5E-03
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	5.6E-07	mg/kg/day	7.3E+00	1/mg/kg-day	4.1E-06	4.3E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.0E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.0E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.2E-04
				Iron	1.3E+04	ug/L	2.6E-05	mg/kg/day	N/A		N/A	2.0E-04	mg/kg/day	7.0E-01	mg/kg/day	2.9E-04
			Exp. Route Total								4.1E-06					8.0E-04
		Exposure Point Total									4.2E-06					4.3E-03
	Surface Water - Upstream Pond Total										4.2E-06					4.3E-03
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	4.9E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.4E-07	3.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Iron	3.0E+04	ug/L	2.6E-04	mg/kg/day	N/A		N/A	2.0E-03	mg/kg/day	7.0E-01	mg/kg/day	2.9E-03
			Exp. Route Total								7.4E-07					1.6E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.7E-07	8.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.9E-03
				Iron	3.0E+04	ug/L	5.9E-05	mg/kg/day	N/A		N/A	4.6E-04	mg/kg/day	7.0E-01	mg/kg/day	6.5E-04
			Exp. Route Total								1.7E-07					3.6E-03
		Exposure Point Total									9.1E-07					1.9E-02
	Surface Water - Drainage Channel to Upstream Pond Total										9.1E-07					1.9E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	6.3E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.6E-09	4.9E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.6E-08	1.9E-07	mg/kg/day	3.0E-04	mg/kg/day	6.2E-04
				Chromium	4.0E+01	mg/kg	1.3E-07	mg/kg/day	5.0E-01	1/mg/kg-day	6.5E-08	1.0E-06	mg/kg/day	3.0E-03	mg/kg/day	3.4E-04
			Exp. Route Total								1.1E-07					9.6E-04
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	1.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-09	1.5E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.6E-09	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-09	1.3E-08	mg/kg/day	3.0E-04	mg/kg/day	4.2E-05
				Chromium	4.0E+01	mg/kg	3.0E-09	mg/kg/day	2.0E+01	1/mg/kg-day	5.9E-08	2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.1E-04
			Exp. Route Total								6.3E-08					3.5E-04
		Exposure Point Total									1.7E-07					1.3E-03
	Surface Sediment - Drainage Channel to Upstream Pond Total										1.7E-07					1.3E-03

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	2.7E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-09	2.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	3.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-08	2.3E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-09	3.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	6.5E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-09	5.1E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	8.6E-10	mg/kg/day	7.3E-01	1/mg/kg-day	6.3E-10	6.7E-09	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.7E-07	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	6.3E-03
				Chromium	2.5E+01	mg/kg	8.2E-08	mg/kg/day	5.0E-01	1/mg/kg-day	4.1E-08	6.4E-07	mg/kg/day	3.0E-03	mg/kg/day	2.1E-04
				Thallium	1.4E+00	mg/kg	4.4E-09	mg/kg/day	N/A		N/A	3.5E-08	mg/kg/day	1.0E-05	mg/kg/day	3.5E-03
			Exp. Route Total								4.4E-07					1.0E-02
			Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	8.1E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.9E-10	6.3E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	8.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	6.5E-09	6.9E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.2E-09	mg/kg/day	7.3E-01	1/mg/kg-day	8.9E-10	9.5E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-09	1.5E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	2.6E-10	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-10	2.0E-09	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-08	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	4.3E-04
				Chromium	2.5E+01	mg/kg	1.9E-09	mg/kg/day	2.0E+01	1/mg/kg-day	3.7E-08	1.4E-08	mg/kg/day	7.5E-05	mg/kg/day	1.9E-04
				Thallium	1.4E+00	mg/kg	1.0E-10	mg/kg/day	N/A		N/A	7.9E-10	mg/kg/day	1.0E-05	mg/kg/day	7.9E-05
			Exp. Route Total								7.2E-08					7.0E-04
		Exposure Point Total									5.1E-07					1.1E-02
	Surface and Subsurface Sediment - Youth Pond Total										5.1E-07					1.1E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	1.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	8.1E-10	8.6E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	1.9E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-08	1.5E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	3.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-09	2.8E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	3.6E-10	mg/kg/day	7.3E+00	1/mg/kg-day	2.6E-09	2.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	2.7E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-09	2.1E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.7E-08	mg/kg/day	2.0E+00	1/mg/kg-day	3.5E-08	1.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	3.3E-09	mg/kg/day	2.0E+00	1/mg/kg-day	6.6E-09	2.6E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.6E-10	mg/kg/day	1.6E+01	1/mg/kg-day	1.1E-08	5.1E-09	mg/kg/day	5.0E-05	mg/kg/day	1.0E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.7E-10	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-09	2.1E-09	mg/kg/day	1.3E-05	mg/kg/day	1.6E-04
				Arsenic	2.0E+01	mg/kg	6.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	9.6E-08	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Chromium	2.8E-02	mg/kg	9.1E-11	mg/kg/day	5.0E-01	1/mg/kg-day	4.5E-11	7.1E-10	mg/kg/day	3.0E-03	mg/kg/day	2.4E-07
				Lead	6.0E+01	mg/kg	2.0E-07	mg/kg/day	N/A		N/A	1.5E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								1.7E-07					1.9E-03
			Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	3.3E-10	mg/kg/day	7.3E-01	1/mg/kg-day	2.4E-10	2.6E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	5.6E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.1E-09	4.3E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	7.7E-10	8.2E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.1E-10	mg/kg/day	7.3E+00	1/mg/kg-day	7.7E-10	8.2E-10	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	7.9E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.8E-10	6.2E-09	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	5.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-08	4.3E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.1E-09	mg/kg/day	2.0E+00	1/mg/kg-day	2.1E-09	8.2E-09	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	1.5E-10	mg/kg/day	1.6E+01	1/mg/kg-day	2.4E-09	1.2E-09	mg/kg/day	5.0E-05	mg/kg/day	2.3E-05
				Heptachlor epoxide	8.2E-02	mg/kg	6.1E-11	mg/kg/day	9.1E+00	1/mg/kg-day	5.6E-10	4.8E-10	mg/kg/day	1.3E-05	mg/kg/day	3.7E-05
				Arsenic	2.0E+01	mg/kg	4.4E-09	mg/kg/day	1.5E+00	1/mg/kg-day	6.6E-09	3.4E-08	mg/kg/day	3.0E-04	mg/kg/day	1.1E-04
				Chromium	2.8E-02	mg/kg	2.1E-12	mg/kg/day	2.0E+01	1/mg/kg-day	4.1E-11	1.6E-11	mg/kg/day	7.5E-05	mg/kg/day	2.2E-07
				Lead	6.0E+01	mg/kg	4.5E-09	mg/kg/day	N/A		N/A	3.5E-08	mg/kg/day	N/A		N/A
			Exp. Route Total								2.9E-08					1.7E-04
		Exposure Point Total									2.0E-07					2.1E-03
	Surface and Subsurface Sediment - Upstream Pond Total										2.0E-07					2.1E-03

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	1.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-09	1.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	1.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-08	1.1E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	2.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-09	2.1E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	1.8E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.3E-09	1.4E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	6.2E-10	mg/kg/day	7.3E-01	1/mg/kg-day	4.5E-10	4.8E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.5E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.8E-08	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	6.5E-04
				Cobalt	2.7E+00	mg/kg	8.8E-09	mg/kg/day	N/A		N/A	6.8E-08	mg/kg/day	3.0E-04	mg/kg/day	2.3E-04
				Iron	1.1E+04	mg/kg	3.7E-05	mg/kg/day	N/A		N/A	2.9E-04	mg/kg/day	7.0E-01	mg/kg/day	4.1E-04
				Manganese	2.2E+02	mg/kg	7.1E-07	mg/kg/day	N/A		N/A	5.5E-06	mg/kg/day	2.4E-02	mg/kg/day	2.3E-04
			Exp. Route Total								5.3E-08					1.5E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	4.4E-10	mg/kg/day	7.3E-01	1/mg/kg-day	3.2E-10	3.4E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	4.4E-10	mg/kg/day	7.3E+00	1/mg/kg-day	3.2E-09	3.4E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	7.9E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.7E-10	6.1E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	5.2E-11	mg/kg/day	7.3E+00	1/mg/kg-day	3.8E-10	4.1E-10	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.8E-10	mg/kg/day	7.3E-01	1/mg/kg-day	1.3E-10	1.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.7E-09	mg/kg/day	1.5E+00	1/mg/kg-day	2.6E-09	1.3E-08	mg/kg/day	3.0E-04	mg/kg/day	4.5E-05
				Cobalt	1.9E-01	mg/kg	1.4E-11	mg/kg/day	N/A		N/A	1.1E-10	mg/kg/day	3.0E-04	mg/kg/day	3.7E-07
				Iron	7.7E+00	mg/kg	5.7E-10	mg/kg/day	N/A		N/A	4.5E-09	mg/kg/day	7.0E-01	mg/kg/day	6.4E-09
				Manganese	2.7E+00	mg/kg	2.0E-10	mg/kg/day	N/A		N/A	1.6E-09	mg/kg/day	9.6E-04	mg/kg/day	1.6E-06
			Exp. Route Total								7.2E-09					4.7E-05
		Exposure Point Total									6.0E-08					1.6E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										6.0E-08					1.6E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	5.8E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-06	4.5E-06	mg/kg/day	2.0E-05	mg/kg/day	2.2E-01
				Aroclor-1260	4.2E-01	mg/kg	3.0E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.9E-06	2.3E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	5.7E-11	mg/kg/day	1.3E+05	1/mg/kg-day	7.4E-06	4.4E-10	mg/kg/day	7.0E-10	mg/kg/day	6.3E-01
				Chromium	1.4E-01	mg/kg	2.0E-06	mg/kg/day	5.0E-01	1/mg/kg-day	9.9E-07	1.5E-05	mg/kg/day	3.0E-03	mg/kg/day	5.1E-03
				Mercury	9.0E-02	mg/kg	1.3E-06	mg/kg/day	N/A		N/A	9.9E-06	mg/kg/day	1.0E-04	mg/kg/day	9.9E-02
			Exp. Route Total								1.5E-05					9.6E-01
		Exposure Point Total									1.5E-05					9.6E-01
	Fish - Youth and Upstream Pond Fish Tissue Total										1.5E-05					9.6E-01
Total of Receptor Risk from Youth Pond											1.6E-05	Total of Receptor Hazard from Youth Pond				9.7E-01
Total of Receptor Risk from Upstream Pond											2.2E-05	Total of Receptor Hazard from Upstream Pond				1.0E+00

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements B, and C.

Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene[2]	4.2E+00	mg/kg			7.3E-01	1/mg/kg-day	6.7E-07	2.0E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	3.5E+00	mg/kg			7.3E+00	1/mg/kg-day	5.5E-06	1.7E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	3.5E+00	mg/kg			7.3E-01	1/mg/kg-day	5.6E-07	1.7E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.7E+00	mg/kg			7.3E-02	1/mg/kg-day	2.7E-08	8.0E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	mg/kg			7.3E+00	1/mg/kg-day	3.5E-07	1.1E-07	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.8E+00	mg/kg			7.3E-01	1/mg/kg-day	2.9E-07	8.5E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	1.3E-09	mg/kg/day	1.7E+01	1/mg/kg-day	2.3E-08	1.6E-08	mg/kg/day	3.0E-05	mg/kg/day	5.2E-04
				Aroclor-1242	1.0E+00	mg/kg	4.1E-08	mg/kg/day	2.0E+00	1/mg/kg-day	8.1E-08	4.7E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	3.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	7.0E-08	4.1E-07	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	4.7E-04	mg/kg/day	N/A		N/A	5.5E-03	mg/kg/day	1.0E+00	mg/kg/day	5.5E-03
				Arsenic	7.7E+01	mg/kg	3.1E-06	mg/kg/day	1.5E+00	1/mg/kg-day	4.7E-06	3.6E-05	mg/kg/day	3.0E-04	mg/kg/day	1.2E-01
				Cobalt	3.9E+00	mg/kg	1.6E-07	mg/kg/day	N/A		N/A	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.2E-03
				Iron	4.0E+04	mg/kg	1.6E-03	mg/kg/day	N/A		N/A	1.9E-02	mg/kg/day	7.0E-01	mg/kg/day	2.7E-02
				Manganese	1.6E+02	mg/kg	6.3E-06	mg/kg/day	N/A		N/A	7.4E-05	mg/kg/day	2.4E-02	mg/kg/day	3.1E-03
				Thallium	5.6E-01	mg/kg	2.3E-08	mg/kg/day	N/A		N/A	2.6E-07	mg/kg/day	1.0E-05	mg/kg/day	2.6E-02
				Vanadium	2.7E+01	mg/kg	1.1E-06	mg/kg/day	N/A		N/A	1.3E-05	mg/kg/day	5.0E-03	mg/kg/day	2.5E-03
			Exp. Route Total								1.2E-05					1.9E-01
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.2E+00	mg/kg			7.3E-01	1/mg/kg-day	9.7E-08	2.9E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	3.5E+00	mg/kg			7.3E+00	1/mg/kg-day	8.1E-07	2.4E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	3.5E+00	mg/kg			7.3E-01	1/mg/kg-day	8.1E-08	2.4E-07	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.7E+00	mg/kg			7.3E-02	1/mg/kg-day	3.9E-09	1.2E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	mg/kg			7.3E+00	1/mg/kg-day	5.2E-08	1.5E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.8E+00	mg/kg			7.3E-01	1/mg/kg-day	4.2E-08	1.2E-07	mg/kg/day	N/A		N/A
				Aldrin	3.3E-02	mg/kg	1.5E-10	mg/kg/day	1.7E+01	1/mg/kg-day	2.6E-09	1.8E-09	mg/kg/day	3.0E-05	mg/kg/day	5.9E-05
				Aroclor-1242	1.0E+00	mg/kg	6.4E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.3E-08	7.4E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	8.6E-01	mg/kg	5.5E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-08	6.4E-08	mg/kg/day	N/A		N/A
				Aluminum	1.2E+04	mg/kg	5.3E-06	mg/kg/day	N/A		N/A	6.2E-05	mg/kg/day	1.0E+00	mg/kg/day	6.2E-05
				Arsenic	7.7E+01	mg/kg	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.6E-07	1.2E-06	mg/kg/day	3.0E-04	mg/kg/day	4.1E-03
				Cobalt	3.9E+00	mg/kg	1.8E-09	mg/kg/day	N/A		N/A	2.1E-08	mg/kg/day	3.0E-04	mg/kg/day	6.9E-05
				Iron	4.0E+04	mg/kg	1.8E-05	mg/kg/day	N/A		N/A	2.1E-04	mg/kg/day	7.0E-01	mg/kg/day	3.1E-04
				Manganese	1.6E+02	mg/kg	7.1E-08	mg/kg/day	N/A		N/A	8.3E-07	mg/kg/day	9.6E-04	mg/kg/day	8.6E-04
				Thallium	5.6E-01	mg/kg	2.5E-10	mg/kg/day	N/A		N/A	3.0E-09	mg/kg/day	1.0E-05	mg/kg/day	3.0E-04
				Vanadium	2.7E+01	mg/kg	1.2E-08	mg/kg/day	N/A		N/A	1.4E-07	mg/kg/day	5.0E-03	mg/kg/day	2.8E-05
			Exp. Route Total								1.3E-06					5.8E-03
		Exposure Point Total									1.4E-05					2.0E-01
	Exposure Medium Total										1.4E-05					2.0E-01
Surface Soil outside Fenced Area of Site 4											1.4E-05					2.0E-01

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	1.5E-07	4.5E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-07	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Iron	1.3E+04	ug/L	3.5E-04	mg/kg/day	N/A		N/A	4.1E-03	mg/kg/day	7.0E-01	mg/kg/day	5.9E-03
			Exp. Route Total								5.6E-07					1.6E-02
			Dermal Absorption	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	2.3E-05	7.0E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.2E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.2E-08	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.4E-04
				Iron	1.3E+04	ug/L	2.8E-05	mg/kg/day	N/A		N/A	3.3E-04	mg/kg/day	7.0E-01	mg/kg/day	4.7E-04
			Exp. Route Total								2.4E-05					1.3E-03
		Exposure Point Total									2.4E-05					1.8E-02
	Surface Water - Upstream Pond Total										2.4E-05					1.8E-02
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	1.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.3E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.0E-02
				Iron	3.0E+04	ug/L	8.0E-04	mg/kg/day	N/A		N/A	9.4E-03	mg/kg/day	7.0E-01	mg/kg/day	1.3E-02
			Exp. Route Total								2.3E-06					7.3E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	1.2E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.8E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.7E-03
				Iron	3.0E+04	ug/L	6.3E-05	mg/kg/day	N/A		N/A	7.4E-04	mg/kg/day	7.0E-01	mg/kg/day	1.1E-03
			Exp. Route Total								1.8E-07					5.8E-03
		Exposure Point Total									2.5E-06					7.9E-02
	Surface Water - Drainage Channel to Upstream Pond Total										2.5E-06					7.9E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	2.1E-07	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.5E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.2E-07	1.7E-06	mg/kg/day	3.0E-04	mg/kg/day	5.8E-03
				Chromium[2]	4.0E+01	mg/kg			5.0E-01	1/mg/kg-day	3.0E-06	9.5E-06	mg/kg/day	3.0E-03	mg/kg/day	3.2E-03
			Exp. Route Total								3.4E-06					8.9E-03
			Dermal Absorption[1]	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	3.1E-08	9.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	7.1E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-08	8.3E-08	mg/kg/day	3.0E-04	mg/kg/day	2.8E-04
				Chromium[2]	4.0E+01	mg/kg			2.0E+01	1/mg/kg-day	1.4E-06	1.5E-07	mg/kg/day	7.5E-05	mg/kg/day	2.0E-03
			Exp. Route Total								1.4E-06					2.3E-03
		Exposure Point Total									4.8E-06					1.1E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										4.8E-06					1.1E-02

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	6.6E-08	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-07	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	1.0E-07	3.0E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	1.6E-07	4.7E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	2.1E-08	6.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.3E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	5.9E-02
				Chromium[2]	2.5E+01	mg/kg			5.0E-01	1/mg/kg-day	1.4E-06	5.9E-06	mg/kg/day	3.0E-03	mg/kg/day	2.0E-03
				Thallium	1.4E+00	mg/kg	2.8E-08	mg/kg/day	N/A		N/A	3.2E-07	mg/kg/day	1.0E-05	mg/kg/day	3.2E-02
			Exp. Route Total								4.7E-06					9.3E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-08	4.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	1.5E-07	4.5E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	2.1E-08	6.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	3.3E-08	9.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	4.3E-09	1.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	7.2E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	8.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.8E-03
				Chromium[2]	2.5E+01	mg/kg			2.0E+01	1/mg/kg-day	8.6E-07	9.4E-08	mg/kg/day	7.5E-05	mg/kg/day	1.3E-03
				Thallium	1.4E+00	mg/kg	4.4E-10	mg/kg/day	N/A		N/A	5.1E-09	mg/kg/day	1.0E-05	mg/kg/day	5.1E-04
			Exp. Route Total								1.2E-06					4.6E-03
		Exposure Point Total									5.9E-06					9.8E-02
	Surface and Subsurface Sediment - Youth Pond Total										5.9E-06					9.8E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	2.7E-08	8.0E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	4.6E-07	1.4E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	8.7E-08	2.6E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	8.6E-08	2.6E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	6.5E-08	1.9E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.1E-07	mg/kg/day	2.0E+00	1/mg/kg-day	2.2E-07	1.3E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	2.1E-08	mg/kg/day	2.0E+00	1/mg/kg-day	4.1E-08	2.4E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	4.1E-09	mg/kg/day	1.6E+01	1/mg/kg-day	6.6E-08	4.8E-08	mg/kg/day	5.0E-05	mg/kg/day	9.6E-04
				Heptachlor epoxide	8.2E-02	mg/kg	1.7E-09	mg/kg/day	9.1E+00	1/mg/kg-day	1.5E-08	1.9E-08	mg/kg/day	1.3E-05	mg/kg/day	1.5E-03
				Arsenic	2.0E+01	mg/kg	4.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	6.0E-07	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	1.5E-02
				Chromium[2]	2.8E-02	mg/kg			5.0E-01	1/mg/kg-day	1.5E-09	6.6E-09	mg/kg/day	3.0E-03	mg/kg/day	2.2E-06
				Lead	6.0E+01	mg/kg	1.2E-06	mg/kg/day	N/A		N/A	1.4E-05	mg/kg/day	N/A		N/A
			Exp. Route Total								1.7E-06					1.8E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	5.5E-09	1.7E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	9.4E-08	2.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	1.8E-08	5.3E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-08	5.3E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-08	4.0E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	2.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	4.8E-08	2.8E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	4.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	9.1E-09	5.3E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.5E-10	mg/kg/day	1.6E+01	1/mg/kg-day	1.0E-08	7.6E-09	mg/kg/day	5.0E-05	mg/kg/day	1.5E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.6E-10	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-09	3.1E-09	mg/kg/day	1.3E-05	mg/kg/day	2.4E-04
				Arsenic	2.0E+01	mg/kg	1.9E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.8E-08	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.4E-04
				Chromium[2]	2.8E-02	mg/kg			2.0E+01	1/mg/kg-day	9.6E-10	1.0E-10	mg/kg/day	7.5E-05	mg/kg/day	1.4E-06
				Lead	6.0E+01	mg/kg	1.9E-08	mg/kg/day	N/A		N/A	2.3E-07	mg/kg/day	N/A		N/A
			Exp. Route Total								2.5E-07					1.1E-03
		Exposure Point Total									1.9E-06					1.9E-02

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Surface and Subsurface Sediment - Upstream Pond Total										1.9E-06					1.9E-02
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	3.6E-08	1.1E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	3.6E-07	1.1E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	6.4E-08	1.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	4.3E-08	1.3E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	1.5E-08	4.5E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.3E-07	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.1E-03
				Cobalt	2.7E+00	mg/kg	5.5E-08	mg/kg/day	N/A		N/A	6.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.1E-03
				Iron	1.1E+04	mg/kg	2.3E-04	mg/kg/day	N/A		N/A	2.7E-03	mg/kg/day	7.0E-01	mg/kg/day	3.8E-03
				Manganese	2.2E+02	mg/kg	4.4E-06	mg/kg/day	N/A		N/A	5.2E-05	mg/kg/day	2.4E-02	mg/kg/day	2.1E-03
			Exp. Route Total								7.5E-07					1.4E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	7.3E-09	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-08	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-08	4.0E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	8.8E-09	2.6E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	3.1E-09	9.3E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	7.4E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-08	8.7E-08	mg/kg/day	3.0E-04	mg/kg/day	2.9E-04
				Cobalt	1.9E-01	mg/kg	6.1E-11	mg/kg/day	N/A		N/A	7.1E-10	mg/kg/day	3.0E-04	mg/kg/day	2.4E-06
				Iron	7.7E+00	mg/kg	2.5E-09	mg/kg/day	N/A		N/A	2.9E-08	mg/kg/day	7.0E-01	mg/kg/day	4.1E-08
				Manganese	2.7E+00	mg/kg	8.7E-10	mg/kg/day	N/A		N/A	1.0E-08	mg/kg/day	9.6E-04	mg/kg/day	1.1E-05
			Exp. Route								1.2E-07					3.0E-04
		Exposure Point Total									8.7E-07					1.4E-02
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										8.7E-07					1.4E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	4.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	9.9E-07	5.8E-06	mg/kg/day	2.0E-05	mg/kg/day	2.9E-01
				Aroclor-1260	4.2E-01	mg/kg	2.5E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.1E-06	3.0E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	4.9E-11	mg/kg/day	1.3E+05	1/mg/kg-day	6.3E-06	5.7E-10	mg/kg/day	7.0E-10	mg/kg/day	8.1E-01
				Chromium[2]	1.4E-01	mg/kg			5.0E-01	1/mg/kg-day	4.5E-06	2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	6.6E-03
				Mercury	9.0E-02	mg/kg	1.1E-06	mg/kg/day	N/A		N/A	1.3E-05	mg/kg/day	1.0E-04	mg/kg/day	1.3E-01
			Exp. Route								1.7E-05					1.2E+00
		Exposure Point Total									1.7E-05					1.2E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										1.7E-05					1.2E+00
										Total of Receptor Risk from Youth Pond	2.4E-05				Total of Receptor Risk from Youth Pon	1.3E+00
										Total of Receptor Risk from Upstream Pond	6.4E-05				Total of Receptor Hazard from Upstream Pond	1.6E+00

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements B, and C.

[2] See Table 7.3.CTE Supplement A for calculation of cancer intake and cancer risk following MMOA method.

Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

TABLE 7.3.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Ingestion	Benzo(a)anthracene	4.2E+00	mg/kg	5.7E-08	1.1E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.7E-07
				Benzo(a)pyrene	3.5E+00	mg/kg	4.7E-08	9.5E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	5.5E-06
				Benzo(b)fluoranthene	3.5E+00	mg/kg	4.8E-08	9.5E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	5.6E-07
				Benzo(k)fluoranthene	1.7E+00	mg/kg	2.3E-08	4.6E-08	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	2.7E-08
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	3.0E-09	6.1E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.5E-07
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	2.4E-08	4.9E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.9E-07
			Dermal	Benzo(a)anthracene	4.2E+00	mg/kg	8.3E-09	1.7E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	9.7E-08
				Benzo(a)pyrene	3.5E+00	mg/kg	6.9E-09	1.4E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.1E-07
				Benzo(b)fluoranthene	3.5E+00	mg/kg	6.9E-09	1.4E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	8.1E-08
				Benzo(k)fluoranthene	1.7E+00	mg/kg	3.3E-09	6.6E-09	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	3.9E-09
				Dibenz(a,h)anthracene	2.2E-01	mg/kg	4.4E-10	8.8E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	5.2E-08
				Indeno(1,2,3-cd)pyrene	1.8E+00	mg/kg	3.6E-09	7.1E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.2E-08
Surface Water	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.5E-07
			Dermal	Benzo(a)pyrene	1.5E-01	ug/L	2.0E-07	4.0E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	2.3E-05
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	1.3E-09	5.2E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	2.1E-07
				Chromium	4.0E+01	mg/kg	2.7E-07	1.1E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	3.0E-06
			Dermal	Benzo(a)pyrene	1.9E-01	mg/kg	2.7E-10	5.4E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	3.1E-08
				Chromium	4.0E+01	mg/kg	4.3E-09	8.6E-09	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	1.4E-06
Sediment	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	5.7E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.6E-08
				Benzo(a)pyrene	9.2E-01	mg/kg	6.2E-09	1.2E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.3E-07
				Benzo(b)fluoranthene	1.3E+00	mg/kg	8.6E-09	1.7E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.0E-07
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.4E-09	2.7E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.6E-07
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	1.8E-09	3.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.1E-08
				Chromium	2.5E+01	mg/kg	1.7E-07	3.4E-07	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	1.4E-06
			Dermal	Benzo(a)anthracene	8.3E-01	mg/kg	1.2E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.4E-08
				Benzo(a)pyrene	9.2E-01	mg/kg	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.5E-07
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.8E-09	3.5E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.1E-08
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	2.8E-10	5.6E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.3E-08
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	3.7E-10	7.4E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.3E-09
				Chromium	2.5E+01	mg/kg	2.7E-09	5.4E-09	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	8.6E-07

TABLE 7.3.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Sediment	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	2.3E-09	4.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.7E-08
				Benzo(a)pyrene	5.7E-01	mg/kg	3.9E-09	7.8E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	4.6E-07
				Benzo(b)fluoranthene	1.1E+00	mg/kg	7.4E-09	1.5E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	8.7E-08
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	7.4E-10	1.5E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.6E-08
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	5.6E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.5E-08
				Chromium	2.8E-02	mg/kg	1.9E-10	3.8E-10	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	1.5E-09
			Dermal	Benzo(a)anthracene	3.4E-01	mg/kg	4.7E-10	9.5E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	5.5E-09
				Benzo(a)pyrene	5.7E-01	mg/kg	8.0E-10	1.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	9.4E-08
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.5E-09	3.1E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.8E-08
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.5E-10	3.0E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.8E-08
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.1E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-08
				Chromium	2.8E-02	mg/kg	3.0E-12	6.0E-12	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	9.6E-10
Sediment/ Surface Soil	Sediment/ Surface Soil	Drainage Diches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	3.1E-09	6.1E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.6E-08
				Benzo(a)pyrene	4.5E-01	mg/kg	3.1E-09	6.1E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.6E-07
				Benzo(b)fluoranthene	8.1E-01	mg/kg	5.5E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.4E-08
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	3.7E-10	7.3E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	4.3E-08
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.5E-08
			Dermal	Benzo(a)anthracene	4.5E-01	mg/kg	6.3E-10	1.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	7.3E-09
				Benzo(a)pyrene	4.5E-01	mg/kg	6.3E-10	1.3E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.3E-08
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.1E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-08
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	7.5E-11	1.5E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.8E-09
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.7E-10	5.3E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.1E-09
Fish	Fish	Youth and Upstream Pond Fish Tissue	Ingestion	Chromium	1.4E-01	mg/kg	5.6E-07	1.1E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	4.5E-06

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.2E-09	mg/kg/day	7.3E+00	1/mg/kg-day	9.1E-09	9.7E-09	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	8.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.3E-07	6.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.3E-03
				Iron	1.3E+04	ug/L	1.1E-04	mg/kg/day	N/A		N/A	8.8E-04	mg/kg/day	7.0E-01	mg/kg/day	1.3E-03
			Exp. Route Total								1.4E-07					3.5E-03
			Dermal Absorption	Benzo(a)pyrene	1.5E-01	ug/L	5.6E-07	mg/kg/day	7.3E+00	1/mg/kg-day	4.1E-06	4.3E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.0E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.0E-08	1.6E-07	mg/kg/day	3.0E-04	mg/kg/day	5.2E-04
				Iron	1.3E+04	ug/L	2.6E-05	mg/kg/day	N/A		N/A	2.0E-04	mg/kg/day	7.0E-01	mg/kg/day	2.9E-04
			Exp. Route Total								4.1E-06					8.0E-04
		Exposure Point Total									4.2E-06					4.3E-03
	Surface Water - Upstream Pond Total										4.2E-06					4.3E-03
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	4.9E-07	mg/kg/day	1.5E+00	1/mg/kg-day	7.4E-07	3.8E-06	mg/kg/day	3.0E-04	mg/kg/day	1.3E-02
				Iron	3.0E+04	ug/L	2.6E-04	mg/kg/day	N/A		N/A	2.0E-03	mg/kg/day	7.0E-01	mg/kg/day	2.9E-03
			Exp. Route Total								7.4E-07					1.6E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	1.1E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.7E-07	8.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.9E-03
				Iron	3.0E+04	ug/L	5.9E-05	mg/kg/day	N/A		N/A	4.6E-04	mg/kg/day	7.0E-01	mg/kg/day	6.5E-04
			Exp. Route Total								1.7E-07					3.6E-03
		Exposure Point Total									9.1E-07					1.9E-02
	Surface Water - Drainage Channel to Upstream Pond Total										9.1E-07					1.9E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	6.3E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.6E-09	4.9E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	2.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.6E-08	1.9E-07	mg/kg/day	3.0E-04	mg/kg/day	6.2E-04
				Chromium	4.0E+01	mg/kg	1.3E-07	mg/kg/day	5.0E-01	1/mg/kg-day	6.5E-08	1.0E-06	mg/kg/day	3.0E-03	mg/kg/day	3.4E-04
			Exp. Route Total								1.1E-07					9.6E-04
			Dermal Absorption[1]	Benzo(a)pyrene	1.9E-01	mg/kg	1.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-09	1.5E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.6E-09	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-09	1.3E-08	mg/kg/day	3.0E-04	mg/kg/day	4.2E-05
				Chromium	4.0E+01	mg/kg	3.0E-09	mg/kg/day	2.0E+01	1/mg/kg-day	5.9E-08	2.3E-08	mg/kg/day	7.5E-05	mg/kg/day	3.1E-04
			Exp. Route Total								6.3E-08					3.5E-04
		Exposure Point Total									1.7E-07					1.3E-03
	Surface Sediment - Drainage Channel to Upstream Pond Total										1.7E-07					1.3E-03
	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	2.7E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-09	2.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	3.0E-09	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-08	2.3E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	4.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-09	3.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	6.5E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-09	5.1E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	8.6E-10	mg/kg/day	7.3E-01	1/mg/kg-day	6.3E-10	6.7E-09	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	2.4E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.7E-07	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	6.3E-03
				Chromium	2.5E+01	mg/kg	8.2E-08	mg/kg/day	5.0E-01	1/mg/kg-day	4.1E-08	6.4E-07	mg/kg/day	3.0E-03	mg/kg/day	2.1E-04
				Thallium	1.4E+00	mg/kg	4.4E-09	mg/kg/day	N/A		N/A	3.5E-08	mg/kg/day	1.0E-05	mg/kg/day	3.5E-03
			Exp. Route Total								4.4E-07					1.0E-02

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Dermal Absorption[1]	Benzo(a)anthracene	8.3E-01	mg/kg	8.1E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.9E-10	6.3E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	9.2E-01	mg/kg	8.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	6.5E-09	6.9E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.2E-09	mg/kg/day	7.3E-01	1/mg/kg-day	8.9E-10	9.5E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.9E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-09	1.5E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	2.6E-10	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-10	2.0E-09	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-08	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	4.3E-04
				Chromium	2.5E+01	mg/kg	1.9E-09	mg/kg/day	2.0E+01	1/mg/kg-day	3.7E-08	1.4E-08	mg/kg/day	7.5E-05	mg/kg/day	1.9E-04
				Thallium	1.4E+00	mg/kg	1.0E-10	mg/kg/day	N/A		N/A	7.9E-10	mg/kg/day	1.0E-05	mg/kg/day	7.9E-05
			Exp. Route Total								7.2E-08					7.0E-04
		Exposure Point Total									5.1E-07					1.1E-02
	Surface and Subsurface Sediment - Youth Pond Total										5.1E-07					1.1E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	1.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	8.1E-10	8.6E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	1.9E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-08	1.5E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	3.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.6E-09	2.8E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	3.6E-10	mg/kg/day	7.3E+00	1/mg/kg-day	2.6E-09	2.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	2.7E-09	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-09	2.1E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.7E-08	mg/kg/day	2.0E+00	1/mg/kg-day	3.5E-08	1.4E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	3.3E-09	mg/kg/day	2.0E+00	1/mg/kg-day	6.6E-09	2.6E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.6E-10	mg/kg/day	1.6E+01	1/mg/kg-day	1.1E-08	5.1E-09	mg/kg/day	5.0E-05	mg/kg/day	1.0E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.7E-10	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-09	2.1E-09	mg/kg/day	1.3E-05	mg/kg/day	1.6E-04
				Arsenic	2.0E+01	mg/kg	6.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	9.6E-08	5.0E-07	mg/kg/day	3.0E-04	mg/kg/day	1.7E-03
				Chromium	2.8E-02	mg/kg	9.1E-11	mg/kg/day	5.0E-01	1/mg/kg-day	4.5E-11	7.1E-10	mg/kg/day	3.0E-03	mg/kg/day	2.4E-07
				Lead	6.0E+01	mg/kg	2.0E-07	mg/kg/day	N/A		N/A	1.5E-06	mg/kg/day	N/A		N/A
			Exp. Route Total								1.7E-07					1.9E-03
			Dermal Absorption[1]	Benzo(a)anthracene	3.4E-01	mg/kg	3.3E-10	mg/kg/day	7.3E-01	1/mg/kg-day	2.4E-10	2.6E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	5.7E-01	mg/kg	5.6E-10	mg/kg/day	7.3E+00	1/mg/kg-day	4.1E-09	4.3E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.1E-09	mg/kg/day	7.3E-01	1/mg/kg-day	7.7E-10	8.2E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.1E-10	mg/kg/day	7.3E+00	1/mg/kg-day	7.7E-10	8.2E-10	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	7.9E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.8E-10	6.2E-09	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	5.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-08	4.3E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	1.1E-09	mg/kg/day	2.0E+00	1/mg/kg-day	2.1E-09	8.2E-09	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	1.5E-10	mg/kg/day	1.6E+01	1/mg/kg-day	2.4E-09	1.2E-09	mg/kg/day	5.0E-05	mg/kg/day	2.3E-05
				Heptachlor epoxide	8.2E-02	mg/kg	6.1E-11	mg/kg/day	9.1E+00	1/mg/kg-day	5.6E-10	4.8E-10	mg/kg/day	1.3E-05	mg/kg/day	3.7E-05
				Arsenic	2.0E+01	mg/kg	4.4E-09	mg/kg/day	1.5E+00	1/mg/kg-day	6.6E-09	3.4E-08	mg/kg/day	3.0E-04	mg/kg/day	1.1E-04
				Chromium	2.8E-02	mg/kg	2.1E-12	mg/kg/day	2.0E+01	1/mg/kg-day	4.1E-11	1.6E-11	mg/kg/day	7.5E-05	mg/kg/day	2.2E-07
				Lead	6.0E+01	mg/kg	4.5E-09	mg/kg/day	N/A		N/A	3.5E-08	mg/kg/day	N/A		N/A
			Exp. Route Total								2.9E-08					1.7E-04
		Exposure Point Total									2.0E-07					2.1E-03
	Surface and Subsurface Sediment - Upstream Pond Total										2.0E-07					2.1E-03

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

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Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	1.5E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-09	1.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	1.5E-09	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-08	1.1E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	2.6E-09	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-09	2.1E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	1.8E-10	mg/kg/day	7.3E+00	1/mg/kg-day	1.3E-09	1.4E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	6.2E-10	mg/kg/day	7.3E-01	1/mg/kg-day	4.5E-10	4.8E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	2.5E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.8E-08	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	6.5E-04
				Cobalt	2.7E+00	mg/kg	8.8E-09	mg/kg/day	N/A		N/A	6.8E-08	mg/kg/day	3.0E-04	mg/kg/day	2.3E-04
				Iron	1.1E+04	mg/kg	3.7E-05	mg/kg/day	N/A		N/A	2.9E-04	mg/kg/day	7.0E-01	mg/kg/day	4.1E-04
				Manganese	2.2E+02	mg/kg	7.1E-07	mg/kg/day	N/A		N/A	5.5E-06	mg/kg/day	2.4E-02	mg/kg/day	2.3E-04
			Exp. Route Total								5.3E-08					1.5E-03
			Dermal Absorption[1]	Benzo(a)anthracene	4.5E-01	mg/kg	4.4E-10	mg/kg/day	7.3E-01	1/mg/kg-day	3.2E-10	3.4E-09	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	4.5E-01	mg/kg	4.4E-10	mg/kg/day	7.3E+00	1/mg/kg-day	3.2E-09	3.4E-09	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	8.1E-01	mg/kg	7.9E-10	mg/kg/day	7.3E-01	1/mg/kg-day	5.7E-10	6.1E-09	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	5.2E-11	mg/kg/day	7.3E+00	1/mg/kg-day	3.8E-10	4.1E-10	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.8E-10	mg/kg/day	7.3E-01	1/mg/kg-day	1.3E-10	1.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.7E-09	mg/kg/day	1.5E+00	1/mg/kg-day	2.6E-09	1.3E-08	mg/kg/day	3.0E-04	mg/kg/day	4.5E-05
				Cobalt	1.9E-01	mg/kg	1.4E-11	mg/kg/day	N/A		N/A	1.1E-10	mg/kg/day	3.0E-04	mg/kg/day	3.7E-07
				Iron	7.7E+00	mg/kg	5.7E-10	mg/kg/day	N/A		N/A	4.5E-09	mg/kg/day	7.0E-01	mg/kg/day	6.4E-09
				Manganese	2.7E+00	mg/kg	2.0E-10	mg/kg/day	N/A		N/A	1.6E-09	mg/kg/day	9.6E-04	mg/kg/day	1.6E-06
			Exp. Route Total								7.2E-09					4.7E-05
		Exposure Point Total									6.0E-08					1.6E-03
	Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area										6.0E-08					1.6E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	5.8E-07	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-06	4.5E-06	mg/kg/day	2.0E-05	mg/kg/day	2.2E-01
				Aroclor-1260	4.2E-01	mg/kg	3.0E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.9E-06	2.3E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	5.7E-11	mg/kg/day	1.3E+05	1/mg/kg-day	7.4E-06	4.4E-10	mg/kg/day	7.0E-10	mg/kg/day	6.3E-01
				Chromium	1.4E-01	mg/kg	2.0E-06	mg/kg/day	5.0E-01	1/mg/kg-day	9.9E-07	1.5E-05	mg/kg/day	3.0E-03	mg/kg/day	5.1E-03
				Mercury	9.0E-02	mg/kg	1.3E-06	mg/kg/day	N/A		N/A	9.9E-06	mg/kg/day	3.0E-04	mg/kg/day	3.3E-02
			Exp. Route Total								1.5E-05					9.0E-01
		Exposure Point Total									1.5E-05					9.0E-01
	Fish - Youth and Upstream Pond Fish Tissue Total										1.5E-05					9.0E-01

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	2.6E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.9E-07	2.0E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	1.9E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-06	1.4E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	2.8E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.1E-07	2.2E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.2E-07	mg/kg/day	7.3E-02	1/mg/kg-day	8.5E-09	9.1E-07	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	3.0E-08	mg/kg/day	1.4E-02	1/mg/kg-day	4.2E-10	2.3E-07	mg/kg/day	2.0E-02	mg/kg/day	1.2E-05
				Carbazole	3.2E+01	mg/kg	2.1E-07	mg/kg/day	2.0E-02	1/mg/kg-day	4.3E-09	1.7E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	3.0E-07	mg/kg/day	7.3E-03	1/mg/kg-day	2.2E-09	2.3E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	3.2E-08	mg/kg/day	7.3E+00	1/mg/kg-day	2.3E-07	2.5E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	4.0E-08	mg/kg/day	N/A		N/A	3.1E-07	mg/kg/day	1.0E-03	mg/kg/day	3.1E-04
				Fluoranthene	1.1E+02	mg/kg	7.1E-07	mg/kg/day	N/A		N/A	5.5E-06	mg/kg/day	4.0E-02	mg/kg/day	1.4E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	9.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	7.2E-08	7.7E-07	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.8E-08	mg/kg/day	N/A		N/A	2.9E-07	mg/kg/day	2.0E-02	mg/kg/day	1.5E-05
				Pyrene	8.5E+01	mg/kg	5.5E-07	mg/kg/day	N/A		N/A	4.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.4E-04
				Aldrin	4.6E-03	mg/kg	3.0E-11	mg/kg/day	1.7E+01	1/mg/kg-day	5.1E-10	2.3E-10	mg/kg/day	3.0E-05	mg/kg/day	7.8E-06
				Aroclor-1242	1.1E+00	mg/kg	7.1E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-08	5.5E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	5.2E-09	2.0E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.2E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.9E-08	9.3E-09	mg/kg/day	5.0E-05	mg/kg/day	1.9E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	1.6E-09	mg/kg/day	1.1E+00	1/mg/kg-day	1.7E-09	1.2E-08	mg/kg/day	3.0E-04	mg/kg/day	4.1E-05
				Aluminum	1.3E+04	mg/kg	8.8E-05	mg/kg/day	N/A		N/A	6.8E-04	mg/kg/day	1.0E+00	mg/kg/day	6.8E-04
				Arsenic	4.0E+01	mg/kg	2.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.9E-07	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	6.7E-03
				Chromium (hexavalent)	4.3E-01	mg/kg	2.8E-09	mg/kg/day	5.0E-01	1/mg/kg-day	1.4E-09	2.2E-08	mg/kg/day	3.0E-03	mg/kg/day	7.3E-06
				Cobalt	3.6E+00	mg/kg	2.3E-08	mg/kg/day	N/A		N/A	1.8E-07	mg/kg/day	3.0E-04	mg/kg/day	6.0E-04
				Iron	2.1E+04	mg/kg	1.4E-04	mg/kg/day	N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.5E-03
				Lead	3.7E+01	mg/kg	2.4E-07	mg/kg/day	N/A		N/A	1.9E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	9.4E-07	mg/kg/day	N/A		N/A	7.3E-06	mg/kg/day	2.4E-02	mg/kg/day	3.0E-04
				Thallium	3.8E-01	mg/kg	2.5E-09	mg/kg/day	N/A		N/A	1.9E-08	mg/kg/day	1.0E-05	mg/kg/day	1.9E-03
				Vanadium	3.5E+01	mg/kg	2.3E-07	mg/kg/day	N/A		N/A	1.8E-06	mg/kg/day	5.0E-03	mg/kg/day	3.6E-04
			Exp. Route Total								2.5E-06					1.3E-02
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	1.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.1E-07	1.2E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	1.1E-07	mg/kg/day	7.3E+00	1/mg/kg-day	8.0E-07	8.6E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.7E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.2E-07	1.3E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	6.9E-08	mg/kg/day	7.3E-02	1/mg/kg-day	5.0E-09	5.4E-07	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.4E-08	mg/kg/day	1.4E-02	1/mg/kg-day	1.9E-10	1.1E-07	mg/kg/day	2.0E-02	mg/kg/day	5.3E-06
				Carbazole	3.2E+01	mg/kg	9.7E-08	mg/kg/day	2.0E-02	1/mg/kg-day	1.9E-09	7.5E-07	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.8E-07	mg/kg/day	7.3E-03	1/mg/kg-day	1.3E-09	1.4E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.9E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.4E-07	1.5E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.8E-08	mg/kg/day	N/A		N/A	1.4E-07	mg/kg/day	1.0E-03	mg/kg/day	1.4E-04
				Fluoranthene	1.1E+02	mg/kg	4.2E-07	mg/kg/day	N/A		N/A	3.3E-06	mg/kg/day	4.0E-02	mg/kg/day	8.2E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	5.9E-08	mg/kg/day	7.3E-01	1/mg/kg-day	4.3E-08	4.6E-07	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	2.2E-08	mg/kg/day	N/A		N/A	1.7E-07	mg/kg/day	2.0E-02	mg/kg/day	8.7E-06
				Pyrene	8.5E+01	mg/kg	3.3E-07	mg/kg/day	N/A		N/A	2.6E-06	mg/kg/day	3.0E-02	mg/kg/day	8.5E-05
				Aldrin	4.6E-03	mg/kg	1.4E-11	mg/kg/day	1.7E+01	1/mg/kg-day	2.3E-10	1.1E-10	mg/kg/day	3.0E-05	mg/kg/day	3.6E-06
				Aroclor-1242	1.1E+00	mg/kg	4.5E-09	mg/kg/day	2.0E+00	1/mg/kg-day	9.1E-09	3.5E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.7E-09	mg/kg/day	2.0E+00	1/mg/kg-day	3.3E-09	1.3E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	5.5E-10	mg/kg/day	1.6E+01	1/mg/kg-day	8.8E-09	4.3E-09	mg/kg/day	5.0E-05	mg/kg/day	8.5E-05
				gamma-BHC (Lindane)	2.4E-01	mg/kg	2.9E-10	mg/kg/day	1.1E+00	1/mg/kg-day	3.2E-10	2.3E-09	mg/kg/day	3.0E-04	mg/kg/day	7.5E-06
				Aluminum	1.3E+04	mg/kg	4.0E-06	mg/kg/day	N/A		N/A	3.1E-05	mg/kg/day	1.0E+00	mg/kg/day	3.1E-05
				Arsenic	4.0E+01	mg/kg	3.6E-08	mg/kg/day	1.5E+00	1/mg/kg-day	5.3E-08	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	9.2E-04
				Chromium (hexavalent)	4.3E-01	mg/kg	1.3E-10	mg/kg/day	2.0E+01	1/mg/kg-day	2.6E-09	1.0E-09	mg/kg/day	7.5E-05	mg/kg/day	1.3E-05

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* from inside and outside the Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	1.1E-09	mg/kg/day	N/A		N/A	8.2E-09	mg/kg/day	3.0E-04	mg/kg/day	2.7E-05
				Iron	2.1E+04	mg/kg	6.2E-06	mg/kg/day	N/A		N/A	4.8E-05	mg/kg/day	7.0E-01	mg/kg/day	6.9E-05
				Lead	3.7E+01	mg/kg	1.1E-08	mg/kg/day	N/A		N/A	8.5E-08	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	4.3E-08	mg/kg/day	N/A		N/A	3.3E-07	mg/kg/day	9.6E-04	mg/kg/day	3.5E-04
				Thallium	3.8E-01	mg/kg	1.1E-10	mg/kg/day	N/A		N/A	8.8E-10	mg/kg/day	1.0E-05	mg/kg/day	8.8E-05
				Vanadium	3.5E+01	mg/kg	1.1E-08	mg/kg/day	N/A		N/A	8.2E-08	mg/kg/day	5.0E-03	mg/kg/day	1.6E-05
			Exp. Route Total								1.3E-06					1.9E-03
		Exposure Point									3.8E-06					1.5E-02
	Exposure Medium Total										3.8E-06					1.5E-02
	Air	Emissions from Soil* from inside and outside the Fenced Area	Inhalation	Naphthalene	9.6E-02	$\mu g/m^3$	1.5E-04	$\mu g/m^3$	3.4E-05	$(\mu g/m^3)^{-1}$	5.0E-09	4.3E-07	mg/m^3	3.0E-03	mg/m^3	1.4E-04
			Exp. Route Total								5.0E-09					1.4E-04
		Exposure Point Total									5.0E-09					1.4E-04
	Exposure Medium Total										5.0E-09					1.4E-04
Soil* from inside and outside the Fenced Area											3.8E-06					1.5E-02
Total of Receptor Risk from Youth Pond											1.6E-05	Total of Receptor Hazard from Youth Pond				9.1E-01
Total of Receptor Risk from Upstream Pond											2.5E-05	Total of Receptor Hazard from Upstream Pond				9.4E-01

* Surface soil & subsurface soil combined.

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements B, and C.

Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	1.5E-07	4.5E-08	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-07	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Iron	1.3E+04	ug/L	3.5E-04	mg/kg/day	N/A		N/A	4.1E-03	mg/kg/day	7.0E-01	mg/kg/day	5.9E-03
			Exp. Route Total								5.6E-07					1.6E-02
			Dermal Absorption	Benzo(a)pyrene[2]	1.5E-01	ug/L			7.3E+00	1/mg/kg-day	2.3E-05	7.0E-06	mg/kg/day	N/A		N/A
				Arsenic	1.0E+01	ug/L	2.2E-08	mg/kg/day	1.5E+00	1/mg/kg-day	3.2E-08	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.4E-04
				Iron	1.3E+04	ug/L	2.8E-05	mg/kg/day	N/A		N/A	3.3E-04	mg/kg/day	7.0E-01	mg/kg/day	4.7E-04
			Exp. Route Total								2.4E-05					1.3E-03
		Exposure Point Total									2.4E-05					1.8E-02
	Surface Water - Upstream Pond Total										2.4E-05					1.8E-02
	Surface Water	Drainage Channel to Upstream Pond	Ingestion	Arsenic	5.8E+01	ug/L	1.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.3E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.0E-02
				Iron	3.0E+04	ug/L	8.0E-04	mg/kg/day	N/A		N/A	9.4E-03	mg/kg/day	7.0E-01	mg/kg/day	1.3E-02
			Exp. Route Total								2.3E-06					7.3E-02
			Dermal Absorption	Arsenic	5.8E+01	ug/L	1.2E-07	mg/kg/day	1.5E+00	1/mg/kg-day	1.8E-07	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.7E-03
				Iron	3.0E+04	ug/L	6.3E-05	mg/kg/day	N/A		N/A	7.4E-04	mg/kg/day	7.0E-01	mg/kg/day	1.1E-03
			Exp. Route Total								1.8E-07					5.8E-03
		Exposure Point Total									2.5E-06					7.9E-02
	Surface Water - Drainage Channel to Upstream Pond Total										2.5E-06					7.9E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	1.5E-07	4.6E-08	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	1.5E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.2E-07	1.7E-06	mg/kg/day	3.0E-04	mg/kg/day	5.8E-03
				Chromium[2]	4.0E+01	mg/kg			5.0E-01	1/mg/kg-day	2.2E-06	9.5E-06	mg/kg/day	3.0E-03	mg/kg/day	3.2E-03
			Exp. Route Total								2.5E-06					8.9E-03
			Dermal Absorption[1]	Benzo(a)pyrene[2]	1.9E-01	mg/kg			7.3E+00	1/mg/kg-day	3.1E-08	9.4E-09	mg/kg/day	N/A		N/A
				Arsenic	7.3E+00	mg/kg	7.1E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-08	8.3E-08	mg/kg/day	3.0E-04	mg/kg/day	2.8E-04
				Chromium[2]	4.0E+01	mg/kg			2.0E+01	1/mg/kg-day	1.4E-06	1.5E-07	mg/kg/day	7.5E-05	mg/kg/day	2.0E-03
			Exp. Route Total								1.4E-06					2.3E-03
		Exposure Point Total									4.0E-06					1.1E-02
	Surface Sediment - Drainage Channel to Upstream Pond Total										4.0E-06					1.1E-02
	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	6.6E-08	2.0E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-07	2.2E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	1.0E-07	3.0E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	1.6E-07	4.7E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	2.1E-08	6.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	1.5E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.3E-06	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	5.9E-02
				Chromium[2]	2.5E+01	mg/kg			5.0E-01	1/mg/kg-day	1.4E-06	5.9E-06	mg/kg/day	3.0E-03	mg/kg/day	2.0E-03
				Thallium	1.4E+00	mg/kg	2.8E-08	mg/kg/day	N/A		N/A	3.2E-07	mg/kg/day	1.0E-05	mg/kg/day	3.2E-02
			Exp. Route Total								4.7E-06					9.3E-02

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (cont'd)	Surface and Subsurface Sediment	Youth Pond	Dermal Absorption[1]	Benzo(a)anthracene[2]	8.3E-01	mg/kg			7.3E-01	1/mg/kg-day	1.4E-08	4.1E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	9.2E-01	mg/kg			7.3E+00	1/mg/kg-day	1.5E-07	4.5E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.3E+00	mg/kg			7.3E-01	1/mg/kg-day	2.1E-08	6.2E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	2.0E-01	mg/kg			7.3E+00	1/mg/kg-day	3.3E-08	9.8E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	2.6E-01	mg/kg			7.3E-01	1/mg/kg-day	4.3E-09	1.3E-08	mg/kg/day	N/A		N/A
				Arsenic	7.5E+01	mg/kg	7.2E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-07	8.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.8E-03
				Chromium[2]	2.5E+01	mg/kg			2.0E+01	1/mg/kg-day	8.6E-07	9.4E-08	mg/kg/day	7.5E-05	mg/kg/day	1.3E-03
				Thallium	1.4E+00	mg/kg	4.4E-10	mg/kg/day	N/A		N/A	5.1E-09	mg/kg/day	1.0E-05	mg/kg/day	5.1E-04
			Exp. Route Total								1.2E-06					4.6E-03
		Exposure Point Total									5.9E-06					9.8E-02
	Surface and Subsurface Sediment - Youth Pond Total										5.9E-06					9.8E-02
	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	2.7E-08	3.2E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	4.6E-07	1.4E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	8.7E-08	2.6E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	8.6E-08	2.6E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	6.5E-08	1.9E-07	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	1.1E-07	mg/kg/day	2.0E+00	1/mg/kg-day	2.2E-07	1.3E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	2.1E-08	mg/kg/day	2.0E+00	1/mg/kg-day	4.1E-08	2.4E-07	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	4.1E-09	mg/kg/day	1.6E+01	1/mg/kg-day	6.6E-08	4.8E-08	mg/kg/day	5.0E-05	mg/kg/day	9.6E-04
				Heptachlor epoxide	8.2E-02	mg/kg	1.7E-09	mg/kg/day	9.1E+00	1/mg/kg-day	1.5E-08	1.9E-08	mg/kg/day	1.3E-05	mg/kg/day	1.5E-03
				Arsenic	2.0E+01	mg/kg	4.0E-07	mg/kg/day	1.5E+00	1/mg/kg-day	6.0E-07	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	1.5E-02
				Chromium[2]	2.8E-02	mg/kg			5.0E-01	1/mg/kg-day	1.5E-09	6.6E-09	mg/kg/day	3.0E-03	mg/kg/day	2.2E-06
				Lead	6.0E+01	mg/kg	1.2E-06	mg/kg/day	N/A		N/A	1.4E-05	mg/kg/day	N/A		N/A
			Exp. Route Total								1.7E-06					1.8E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.4E-01	mg/kg			7.3E-01	1/mg/kg-day	5.5E-09	1.7E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	5.7E-01	mg/kg			7.3E+00	1/mg/kg-day	9.4E-08	2.8E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	1.1E+00	mg/kg			7.3E-01	1/mg/kg-day	1.8E-08	5.3E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	1.1E-01	mg/kg			7.3E+00	1/mg/kg-day	1.8E-08	5.3E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	8.2E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-08	4.0E-08	mg/kg/day	N/A		N/A
				Aroclor-1242	5.3E+00	mg/kg	2.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	4.8E-08	2.8E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	1.0E+00	mg/kg	4.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	9.1E-09	5.3E-08	mg/kg/day	N/A		N/A
				Dieldrin	2.0E-01	mg/kg	6.5E-10	mg/kg/day	1.6E+01	1/mg/kg-day	1.0E-08	7.6E-09	mg/kg/day	5.0E-05	mg/kg/day	1.5E-04
				Heptachlor epoxide	8.2E-02	mg/kg	2.6E-10	mg/kg/day	9.1E+00	1/mg/kg-day	2.4E-09	3.1E-09	mg/kg/day	1.3E-05	mg/kg/day	2.4E-04
				Arsenic	2.0E+01	mg/kg	1.9E-08	mg/kg/day	1.5E+00	1/mg/kg-day	2.8E-08	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.4E-04
				Chromium[2]	2.8E-02	mg/kg			2.0E+01	1/mg/kg-day	9.6E-10	1.0E-10	mg/kg/day	7.5E-05	mg/kg/day	1.4E-06
				Lead	6.0E+01	mg/kg	1.9E-08	mg/kg/day	N/A		N/A	2.3E-07	mg/kg/day	N/A		N/A
			Exp. Route Total								2.5E-07					1.1E-03
		Exposure Point Total									1.9E-06					1.9E-02
	Surface and Subsurface Sediment - Upstream Pond Total										1.9E-06					1.9E-02

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	3.6E-08	1.1E-07	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	3.6E-07	1.1E-07	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	6.4E-08	1.9E-07	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	4.3E-08	1.3E-08	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	1.5E-08	4.5E-08	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	1.5E-07	mg/kg/day	1.5E+00	1/mg/kg-day	2.2E-07	1.8E-06	mg/kg/day	3.0E-04	mg/kg/day	6.1E-03
				Cobalt	2.7E+00	mg/kg	5.1E-08	mg/kg/day	N/A		N/A	6.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.1E-03
				Iron	1.1E+04	mg/kg	2.2E-04	mg/kg/day	N/A		N/A	2.7E-03	mg/kg/day	7.0E-01	mg/kg/day	3.8E-03
				Manganese	2.2E+02	mg/kg	4.1E-06	mg/kg/day	N/A		N/A	5.2E-05	mg/kg/day	2.4E-02	mg/kg/day	2.1E-03
			Exp. Route Total								7.3E-07					1.4E-02
			Dermal Absorption[1]	Benzo(a)anthracene[2]	4.5E-01	mg/kg			7.3E-01	1/mg/kg-day	7.3E-09	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	4.5E-01	mg/kg			7.3E+00	1/mg/kg-day	7.3E-08	2.2E-08	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	8.1E-01	mg/kg			7.3E-01	1/mg/kg-day	1.3E-08	4.0E-08	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	5.4E-02	mg/kg			7.3E+00	1/mg/kg-day	8.8E-09	2.6E-09	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.9E-01	mg/kg			7.3E-01	1/mg/kg-day	3.1E-09	9.3E-09	mg/kg/day	N/A		N/A
				Arsenic	7.7E+00	mg/kg	7.4E-09	mg/kg/day	1.5E+00	1/mg/kg-day	1.1E-08	8.7E-08	mg/kg/day	3.0E-04	mg/kg/day	2.9E-04
				Cobalt	1.9E-01	mg/kg	6.1E-11	mg/kg/day	N/A		N/A	7.1E-10	mg/kg/day	3.0E-04	mg/kg/day	2.4E-06
				Iron	7.7E+00	mg/kg	2.5E-09	mg/kg/day	N/A		N/A	2.9E-08	mg/kg/day	7.0E-01	mg/kg/day	4.1E-08
				Manganese	2.7E+00	mg/kg	8.7E-10	mg/kg/day	N/A		N/A	1.0E-08	mg/kg/day	9.6E-04	mg/kg/day	1.1E-05
			Exp. Route Total								1.2E-07					3.0E-04
		Exposure Point Total									8.5E-07					1.4E-02
	Sediment/Surface Soil - Drainage Ditches to Youth Pond ouside Fenced Area										8.5E-07					1.4E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Ingestion	Aroclor-1254	8.2E-02	mg/kg	4.9E-07	mg/kg/day	2.0E+00	1/mg/kg-day	9.9E-07	5.8E-06	mg/kg/day	2.0E-05	mg/kg/day	2.9E-01
				Aroclor-1260	4.2E-01	mg/kg	2.5E-06	mg/kg/day	2.0E+00	1/mg/kg-day	5.1E-06	3.0E-05	mg/kg/day	N/A		N/A
				Dioxin-Like PCB TEQ	8.1E-06	mg/kg	4.9E-11	mg/kg/day	1.3E+05	1/mg/kg-day	6.3E-06	5.7E-10	mg/kg/day	7.0E-10	mg/kg/day	8.1E-01
				Chromium[2]	1.4E-01	mg/kg			5.0E-01	1/mg/kg-day	4.5E-06	2.0E-05	mg/kg/day	3.0E-03	mg/kg/day	6.6E-03
				Mercury	9.0E-02	mg/kg	1.1E-06	mg/kg/day	N/A		N/A	1.3E-05	mg/kg/day	3.0E-04	mg/kg/day	4.2E-02
			Exp. Route Total								1.7E-05					1.1E+00
		Exposure Point Total									1.7E-05					1.1E+00
	Fish - Youth and Upstream Pond Fish Tissue Total										1.7E-05					1.1E+00

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Ingestion	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	6.2E-06	1.9E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	4.5E-05	1.3E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	6.9E-06	2.1E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	2.8E-07	8.5E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.9E-07	mg/kg/day	1.4E-02	1/mg/kg-day	2.6E-09	2.2E-06	mg/kg/day	2.0E-02	mg/kg/day	1.1E-04
				Carbazole	3.2E+01	mg/kg	1.3E-06	mg/kg/day	2.0E-02	1/mg/kg-day	2.6E-08	1.5E-05	mg/kg/day	N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	7.2E-08	2.2E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	7.7E-06	2.3E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.5E-07	mg/kg/day	N/A		N/A	2.9E-06	mg/kg/day	1.0E-03	mg/kg/day	2.9E-03
				Fluoranthene	1.1E+02	mg/kg	4.4E-06	mg/kg/day	N/A		N/A	5.2E-05	mg/kg/day	4.0E-02	mg/kg/day	1.3E-03
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	2.4E-06	7.2E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	2.3E-07	mg/kg/day	N/A		N/A	2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.4E-04
				Pyrene	8.5E+01	mg/kg	3.4E-06	mg/kg/day	N/A		N/A	4.0E-05	mg/kg/day	3.0E-02	mg/kg/day	1.3E-03
				Aldrin	4.6E-03	mg/kg	1.9E-10	mg/kg/day	1.7E+01	1/mg/kg-day	3.2E-09	2.2E-09	mg/kg/day	3.0E-05	mg/kg/day	7.3E-05
				Aroclor-1242	1.1E+00	mg/kg	4.4E-08	mg/kg/day	2.0E+00	1/mg/kg-day	8.8E-08	5.2E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.6E-08	mg/kg/day	2.0E+00	1/mg/kg-day	3.3E-08	1.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	7.5E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.2E-07	8.7E-08	mg/kg/day	5.0E-05	mg/kg/day	1.7E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	9.9E-09	mg/kg/day	1.1E+00	1/mg/kg-day	1.1E-08	1.2E-07	mg/kg/day	3.0E-04	mg/kg/day	3.8E-04
				Aluminum	1.3E+04	mg/kg	5.5E-04	mg/kg/day	N/A		N/A	6.4E-03	mg/kg/day	1.0E+00	mg/kg/day	6.4E-03
				Arsenic	4.0E+01	mg/kg	1.6E-06	mg/kg/day	1.5E+00	1/mg/kg-day	2.4E-06	1.9E-05	mg/kg/day	3.0E-04	mg/kg/day	6.3E-02
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			5.0E-01	1/mg/kg-day	4.7E-08	2.0E-07	mg/kg/day	3.0E-03	mg/kg/day	6.8E-05
				Cobalt	3.6E+00	mg/kg	1.4E-07	mg/kg/day	N/A		N/A	1.7E-06	mg/kg/day	3.0E-04	mg/kg/day	5.6E-03
				Iron	2.1E+04	mg/kg	8.5E-04	mg/kg/day	N/A		N/A	9.9E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-02
				Lead	3.7E+01	mg/kg	1.5E-06	mg/kg/day	N/A		N/A	1.7E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	5.8E-06	mg/kg/day	N/A		N/A	6.8E-05	mg/kg/day	2.4E-02	mg/kg/day	2.8E-03
				Thallium	3.8E-01	mg/kg	1.6E-08	mg/kg/day	N/A		N/A	1.8E-07	mg/kg/day	1.0E-05	mg/kg/day	1.8E-02
				Vanadium	3.5E+01	mg/kg	1.4E-06	mg/kg/day	N/A		N/A	1.7E-05	mg/kg/day	5.0E-03	mg/kg/day	3.3E-03
			Exp. Route Total								7.1E-05					1.2E-01
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	9.0E-07	2.7E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	6.6E-06	2.0E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	1.0E-06	3.0E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	4.1E-08	1.2E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.1E-08	mg/kg/day	1.4E-02	1/mg/kg-day	2.9E-10	2.4E-07	mg/kg/day	2.0E-02	mg/kg/day	1.2E-05
				Carbazole	3.2E+01	mg/kg	1.5E-07	mg/kg/day	2.0E-02	1/mg/kg-day	3.0E-09	1.7E-06	mg/kg/day	N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	1.1E-08	3.2E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	1.1E-06	3.3E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.8E-08	mg/kg/day	N/A		N/A	3.3E-07	mg/kg/day	1.0E-03	mg/kg/day	3.3E-04
				Fluoranthene	1.1E+02	mg/kg	6.4E-07	mg/kg/day	N/A		N/A	7.5E-06	mg/kg/day	4.0E-02	mg/kg/day	1.9E-04
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	3.5E-07	1.0E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.4E-08	mg/kg/day	N/A		N/A	4.0E-07	mg/kg/day	2.0E-02	mg/kg/day	2.0E-05
				Pyrene	8.5E+01	mg/kg	5.0E-07	mg/kg/day	N/A		N/A	5.9E-06	mg/kg/day	3.0E-02	mg/kg/day	2.0E-04
				Aldrin	4.6E-03	mg/kg	2.1E-11	mg/kg/day	1.7E+01	1/mg/kg-day	3.6E-10	2.5E-10	mg/kg/day	3.0E-05	mg/kg/day	8.2E-06
				Aroclor-1242	1.1E+00	mg/kg	6.9E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-08	8.1E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	5.1E-09	3.0E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	8.4E-10	mg/kg/day	1.6E+01	1/mg/kg-day	1.3E-08	9.8E-09	mg/kg/day	5.0E-05	mg/kg/day	2.0E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	4.4E-10	mg/kg/day	1.1E+00	1/mg/kg-day	4.9E-10	5.2E-09	mg/kg/day	3.0E-04	mg/kg/day	1.7E-05
				Aluminum	1.3E+04	mg/kg	6.1E-06	mg/kg/day	N/A		N/A	7.1E-05	mg/kg/day	1.0E+00	mg/kg/day	7.1E-05
				Arsenic	4.0E+01	mg/kg	5.4E-08	mg/kg/day	1.5E+00	1/mg/kg-day	8.2E-08	6.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.1E-03
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			2.0E+01	1/mg/kg-day	2.1E-08	2.3E-09	mg/kg/day	7.5E-05	mg/kg/day	3.0E-05

TABLE 7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* from inside and outside the Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	1.6E-09	mg/kg/day	N/A		N/A	1.9E-08	mg/kg/day	3.0E-04	mg/kg/day	6.3E-05
				Iron	2.1E+04	mg/kg	9.5E-06	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	7.0E-01	mg/kg/day	1.6E-04
				Lead	3.7E+01	mg/kg	1.7E-08	mg/kg/day	N/A		N/A	2.0E-07	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	6.5E-08	mg/kg/day	N/A		N/A	7.6E-07	mg/kg/day	9.6E-04	mg/kg/day	7.9E-04
				Thallium	3.8E-01	mg/kg	1.7E-10	mg/kg/day	N/A		N/A	2.0E-09	mg/kg/day	1.0E-05	mg/kg/day	2.0E-04
				Vanadium	3.5E+01	mg/kg	1.6E-08	mg/kg/day	N/A		N/A	1.9E-07	mg/kg/day	5.0E-03	mg/kg/day	3.8E-05
			Exp. Route Total								1.0E-05					4.4E-03
		Exposure Point Total									8.1E-05					1.3E-01
	Exposure Medium Total										8.1E-05					1.3E-01
	Air	Emissions from Soil* from inside and outside Fenced Area	Inhalation	Naphthalene	1.8E-05	µg/m^3	1.8E-08	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	6.1E-13	2.1E-10	mg/m^3	3.0E-03	mg/m^3	6.9E-08
			Exp. Route Total								6.1E-13					6.9E-08
		Exposure Point Total									6.1E-13					6.9E-08
	Exposure Medium Total										6.1E-13					6.9E-08
Soil* from inside and outside the Fenced Area											8.1E-05					1.3E-01
Total of Receptor Risk from Youth Pond											2.4E-05	Total of Receptor Hazard from Youth Pond				1.3E+00
Total of Receptor Risk from Upstream Pond											1.3E-04	Total of Receptor Hazard from Upstream Pond				1.4E+00

* Surface soil & subsurface soil combined.

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to surface water calculated on Table 7.2.RME Supplements B, and C.

[2] See Table 7.5.CTE Supplement A for calculation of cancer intake and cancer risk following MMOA method.

TABLE 7.5.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Surface Water	Surface Water	Upstream Pond	Ingestion	Benzo(a)pyrene	1.5E-01	ug/L	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	1.5E-07
			Dermal	Benzo(a)pyrene	1.5E-01	ug/L	2.0E-07	4.0E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	2.3E-05
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Ingestion	Benzo(a)pyrene	1.9E-01	mg/kg	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	1.5E-07
				Chromium	4.0E+01	mg/kg	2.7E-07	5.4E-07	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	2.2E-06
			Dermal	Benzo(a)pyrene	1.9E-01	mg/kg	2.7E-10	5.4E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	NA	NA	1/(mg/kg-day)	3.1E-08
				Chromium	4.0E+01	mg/kg	4.3E-09	8.6E-09	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	1.4E-06
Sediment	Surface and Subsurface Sediment	Youth Pond	Ingestion	Benzo(a)anthracene	8.3E-01	mg/kg	5.7E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.6E-08
				Benzo(a)pyrene	9.2E-01	mg/kg	6.2E-09	1.2E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.3E-07
				Benzo(b)fluoranthene	1.3E+00	mg/kg	8.6E-09	1.7E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.0E-07
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	1.4E-09	2.7E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.6E-07
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	1.8E-09	3.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.1E-08
				Chromium	2.5E+01	mg/kg	1.7E-07	3.4E-07	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	1.4E-06
			Dermal	Benzo(a)anthracene	8.3E-01	mg/kg	1.2E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.4E-08
				Benzo(a)pyrene	9.2E-01	mg/kg	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.5E-07
				Benzo(b)fluoranthene	1.3E+00	mg/kg	1.8E-09	3.5E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.1E-08
				Dibenz(a,h)anthracene	2.0E-01	mg/kg	2.8E-10	5.6E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.3E-08
				Indeno(1,2,3-cd)pyrene	2.6E-01	mg/kg	3.7E-10	7.4E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	4.3E-09
				Chromium	2.5E+01	mg/kg	2.7E-09	5.4E-09	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	8.6E-07
Sediment	Surface and Subsurface Sediment	Upstream Pond	Ingestion	Benzo(a)anthracene	3.4E-01	mg/kg	2.3E-09	4.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.7E-08
				Benzo(a)pyrene	5.7E-01	mg/kg	3.9E-09	7.8E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	4.6E-07
				Benzo(b)fluoranthene	1.1E+00	mg/kg	7.4E-09	1.5E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	8.7E-08
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	7.4E-10	1.5E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.6E-08
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	5.6E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.5E-08
				Chromium	2.8E-02	mg/kg	1.9E-10	3.8E-10	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	1.5E-09
			Dermal	Benzo(a)anthracene	3.4E-01	mg/kg	4.7E-10	9.5E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	5.5E-09
				Benzo(a)pyrene	5.7E-01	mg/kg	8.0E-10	1.6E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	9.4E-08
				Benzo(b)fluoranthene	1.1E+00	mg/kg	1.5E-09	3.1E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.8E-08
				Dibenz(a,h)anthracene	1.1E-01	mg/kg	1.5E-10	3.0E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.8E-08
				Indeno(1,2,3-cd)pyrene	8.2E-01	mg/kg	1.1E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-08
				Chromium	2.8E-02	mg/kg	3.0E-12	6.0E-12	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	9.6E-10

TABLE 7.5.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Sediment/ Surface Soil	Sediment/ Surface Soil	Drainage Diches to Youth Pond outside Fenced Area	Ingestion	Benzo(a)anthracene	4.5E-01	mg/kg	3.1E-09	6.1E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.6E-08
				Benzo(a)pyrene	4.5E-01	mg/kg	3.1E-09	6.1E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	3.6E-07
				Benzo(b)fluoranthene	8.1E-01	mg/kg	5.5E-09	1.1E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.4E-08
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	3.7E-10	7.3E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	4.3E-08
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	1.3E-09	2.6E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.5E-08
			Dermal	Benzo(a)anthracene	4.5E-01	mg/kg	6.3E-10	1.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	7.3E-09
				Benzo(a)pyrene	4.5E-01	mg/kg	6.3E-10	1.3E-09	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.3E-08
				Benzo(b)fluoranthene	8.1E-01	mg/kg	1.1E-09	2.3E-09	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.3E-08
				Dibenz(a,h)anthracene	5.4E-02	mg/kg	7.5E-11	1.5E-10	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	8.8E-09
				Indeno(1,2,3-cd)pyrene	1.9E-01	mg/kg	2.7E-10	5.3E-10	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.1E-09
Fish	Fish	Youth and Upstream Pond Fish Tissue	Ingestion	Chromium	1.4E-01	mg/kg	5.6E-07	1.1E-06	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	4.5E-06
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	5.3E-07	1.1E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.2E-06
				Benzo(a)pyrene	2.8E+01	mg/kg	3.9E-07	7.7E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	4.5E-05
				Benzo(b)fluoranthene	4.4E+01	mg/kg	5.9E-07	1.2E-06	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	6.9E-06
				Benzo(k)fluoranthene	1.8E+01	mg/kg	2.4E-07	4.8E-07	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	2.8E-07
				Chrysene	4.6E+01	mg/kg	6.2E-07	1.2E-06	N/A	N/A	mg/kg/day	7.3E-02	2.2E-02	N/A	N/A	1/(mg/kg-day)	7.2E-08
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	6.6E-08	1.3E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	7.7E-06
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	2.1E-07	4.1E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	2.4E-06
				Chromium (hexavalent)	4.3E-01	mg/kg	5.8E-09	1.2E-08	N/A	N/A	mg/kg/day	5.0E+00	1.5E+00	N/A	N/A	1/(mg/kg-day)	4.7E-08
			Dermal	Benzo(a)anthracene	3.9E+01	mg/kg	7.7E-08	1.5E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	9.0E-07
				Benzo(a)pyrene	2.8E+01	mg/kg	5.6E-08	1.1E-07	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	6.6E-06
				Benzo(b)fluoranthene	4.4E+01	mg/kg	8.6E-08	1.7E-07	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	1.0E-06
				Benzo(k)fluoranthene	1.8E+01	mg/kg	3.5E-08	7.0E-08	N/A	N/A	mg/kg/day	7.3E-01	2.2E-01	N/A	N/A	1/(mg/kg-day)	4.1E-08
				Chrysene	4.6E+01	mg/kg	9.0E-08	1.8E-07	N/A	N/A	mg/kg/day	7.3E-02	2.2E-02	N/A	N/A	1/(mg/kg-day)	1.1E-08
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	9.6E-09	1.9E-08	N/A	N/A	mg/kg/day	7.3E+01	2.2E+01	N/A	N/A	1/(mg/kg-day)	1.1E-06
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	3.0E-08	6.0E-08	N/A	N/A	mg/kg/day	7.3E+00	2.2E+00	N/A	N/A	1/(mg/kg-day)	3.5E-07
				Chromium (hexavalent)	4.3E-01	mg/kg	6.5E-11	1.3E-10	N/A	N/A	mg/kg/day	2.0E+02	6.0E+01	N/A	N/A	1/(mg/kg-day)	2.1E-08

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil*inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	5.5E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.0E-07	3.8E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	4.0E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.9E-06	2.8E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	6.1E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.4E-07	4.3E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	2.5E-07	mg/kg/day	7.3E-02	1/mg/kg-day	1.8E-08	1.7E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	6.4E-08	mg/kg/day	1.4E-02	1/mg/kg-day	8.9E-10	4.5E-06	mg/kg/day	1.0E-01	mg/kg/day	4.5E-05
				Carbazole	3.2E+01	mg/kg	4.5E-07	mg/kg/day	2.0E-02	1/mg/kg-day	9.1E-09	3.2E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	6.4E-07	mg/kg/day	7.3E-03	1/mg/kg-day	4.7E-09	4.5E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	6.8E-08	mg/kg/day	7.3E+00	1/mg/kg-day	4.9E-07	4.7E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	8.6E-08	mg/kg/day	N/A		N/A	6.0E-06	mg/kg/day	4.0E-03	mg/kg/day	1.5E-03
				Fluoranthene	1.1E+02	mg/kg	1.5E-06	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	1.0E-01	mg/kg/day	1.1E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	2.1E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-07	1.5E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	8.0E-08	mg/kg/day	N/A		N/A	5.6E-06	mg/kg/day	6.0E-01	mg/kg/day	9.4E-06
				Pyrene	8.5E+01	mg/kg	1.2E-06	mg/kg/day	N/A		N/A	8.3E-05	mg/kg/day	3.0E-01	mg/kg/day	2.8E-04
				Aldrin	4.6E-03	mg/kg	6.4E-11	mg/kg/day	1.7E+01	1/mg/kg-day	1.1E-09	4.5E-09	mg/kg/day	4.0E-05	mg/kg/day	1.1E-04
				Aroclor-1242	1.1E+00	mg/kg	1.5E-08	mg/kg/day	2.0E+00	1/mg/kg-day	3.0E-08	1.1E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	5.6E-09	mg/kg/day	2.0E+00	1/mg/kg-day	1.1E-08	3.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	2.6E-09	mg/kg/day	1.6E+01	1/mg/kg-day	4.1E-08	1.8E-07	mg/kg/day	1.0E-04	mg/kg/day	1.8E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	3.4E-09	mg/kg/day	1.1E+00	1/mg/kg-day	3.7E-09	2.4E-07	mg/kg/day	1.0E-05	mg/kg/day	2.4E-02
				Aluminum	1.3E+04	mg/kg	1.9E-04	mg/kg/day	N/A		N/A	1.3E-02	mg/kg/day	1.0E+00	mg/kg/day	1.3E-02
				Arsenic	4.0E+01	mg/kg	5.6E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.3E-07	3.9E-05	mg/kg/day	3.0E-04	mg/kg/day	1.3E-01
				Chromium (hexavalent)	4.3E-01	mg/kg	6.0E-09	mg/kg/day	5.0E-01	1/mg/kg-day	3.0E-09	4.2E-07	mg/kg/day	5.0E-03	mg/kg/day	8.4E-05
				Cobalt	3.6E+00	mg/kg	5.0E-08	mg/kg/day	N/A		N/A	3.5E-06	mg/kg/day	3.0E-03	mg/kg/day	1.2E-03
				Iron	2.1E+04	mg/kg	2.9E-04	mg/kg/day	N/A		N/A	2.0E-02	mg/kg/day	7.0E-01	mg/kg/day	2.9E-02
				Lead	3.7E+01	mg/kg	5.1E-07	mg/kg/day	N/A		N/A	3.6E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	2.0E-06	mg/kg/day	N/A		N/A	1.4E-04	mg/kg/day	2.4E-02	mg/kg/day	5.8E-03
				Thallium	3.8E-01	mg/kg	5.3E-09	mg/kg/day	N/A		N/A	3.7E-07	mg/kg/day	4.0E-05	mg/kg/day	9.3E-03
				Vanadium	3.5E+01	mg/kg	4.9E-07	mg/kg/day	N/A		N/A	3.5E-05	mg/kg/day	7.0E-03	mg/kg/day	4.9E-03
			Exp. Route Total								5.3E-06					2.2E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	1.2E-07	mg/kg/day	7.3E-01	1/mg/kg-day	8.6E-08	8.2E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	8.5E-08	mg/kg/day	7.3E+00	1/mg/kg-day	6.2E-07	6.0E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	1.3E-07	mg/kg/day	7.3E-01	1/mg/kg-day	9.5E-08	9.1E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	5.3E-08	mg/kg/day	7.3E-02	1/mg/kg-day	3.9E-09	3.7E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.1E-08	mg/kg/day	1.4E-02	1/mg/kg-day	1.5E-10	7.4E-07	mg/kg/day	1.0E-01	mg/kg/day	7.4E-06
				Carbazole	3.2E+01	mg/kg	7.5E-08	mg/kg/day	2.0E-02	1/mg/kg-day	1.5E-09	5.2E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	1.4E-07	mg/kg/day	7.3E-03	1/mg/kg-day	1.0E-09	9.6E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	1.5E-08	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-07	1.0E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	1.4E-08	mg/kg/day	N/A		N/A	9.9E-07	mg/kg/day	4.0E-03	mg/kg/day	2.5E-04
				Fluoranthene	1.1E+02	mg/kg	3.3E-07	mg/kg/day	N/A		N/A	2.3E-05	mg/kg/day	1.0E-01	mg/kg/day	2.3E-04
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	4.5E-08	mg/kg/day	7.3E-01	1/mg/kg-day	3.3E-08	3.2E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	1.7E-08	mg/kg/day	N/A		N/A	1.2E-06	mg/kg/day	6.0E-01	mg/kg/day	2.0E-06
				Pyrene	8.5E+01	mg/kg	2.5E-07	mg/kg/day	N/A		N/A	1.8E-05	mg/kg/day	3.0E-01	mg/kg/day	5.9E-05
				Aldrin	4.6E-03	mg/kg	1.1E-11	mg/kg/day	1.7E+01	1/mg/kg-day	1.8E-10	7.4E-10	mg/kg/day	4.0E-05	mg/kg/day	1.9E-05
				Aroclor-1242	1.1E+00	mg/kg	3.5E-09	mg/kg/day	2.0E+00	1/mg/kg-day	7.0E-09	2.5E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.3E-09	mg/kg/day	2.0E+00	1/mg/kg-day	2.6E-09	9.1E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	4.2E-10	mg/kg/day	1.6E+01	1/mg/kg-day	6.8E-09	3.0E-08	mg/kg/day	1.0E-04	mg/kg/day	3.0E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	2.2E-10	mg/kg/day	1.1E+00	1/mg/kg-day	2.5E-10	1.6E-08	mg/kg/day	1.0E-05	mg/kg/day	1.6E-03
				Aluminum	1.3E+04	mg/kg	3.1E-06	mg/kg/day	N/A		N/A	2.2E-04	mg/kg/day	1.0E+00	mg/kg/day	2.2E-04
				Arsenic	4.0E+01	mg/kg	2.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-08	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	6.4E-03
				Chromium (hexavalent)	4.3E-01	mg/kg	9.9E-11	mg/kg/day	2.0E+01	1/mg/kg-day	2.0E-09	6.9E-09	mg/kg/day	1.3E-04	mg/kg/day	5.6E-05
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	8.2E-10	mg/kg/day	N/A		N/A	5.7E-08	mg/kg/day	3.0E-03	mg/kg/day	1.9E-05
				Iron	2.1E+04	mg/kg	4.8E-06	mg/kg/day	N/A		N/A	3.4E-04	mg/kg/day	7.0E-01	mg/kg/day	4.8E-04
				Lead	3.7E+01	mg/kg	8.5E-09	mg/kg/day	N/A		N/A	5.9E-07	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	3.3E-08	mg/kg/day	N/A		N/A	2.3E-06	mg/kg/day	9.6E-04	mg/kg/day	2.4E-03
				Thallium	3.8E-01	mg/kg	8.8E-11	mg/kg/day	N/A		N/A	6.2E-09	mg/kg/day	4.0E-05	mg/kg/day	1.5E-04

TABLE 7.6.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Vanadium	3.5E+01	mg/kg	8.1E-09	mg/kg/day	N/A		N/A	5.7E-07	mg/kg/day	7.0E-03	mg/kg/day	8.1E-05
			Exp. Route Total								1.0E-06					1.2E-02
		Exposure Point Total									6.4E-06					2.3E-01
	Exposure Medium Total										6.4E-06					2.3E-01
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	1.6E-04	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	5.3E-09	1.1E-05	mg/m^3	3.0E-03	mg/m^3	3.6E-03
			Exp. Route Total								5.3E-09					3.6E-03
		Exposure Point Total									5.3E-09					3.6E-03
	Exposure Medium Total										5.3E-09					3.6E-03
Soil* from inside and outside the Fenced Area											6.4E-06					2.4E-01
Soil*	Soil*	Soil* within Fenced Area of Youth Pond/Site 4	Ingestion	Benzo(a)anthracene	1.8E+02	mg/kg	2.5E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-06	1.8E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	8.2E+02	mg/kg	1.2E-05	mg/kg/day	7.3E+00	1/mg/kg-day	8.4E-05	8.1E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	2.8E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.0E-06	2.0E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	1.1E-06	mg/kg/day	7.3E-02	1/mg/kg-day	8.3E-08	7.9E-05	mg/kg/day	N/A		N/A
				Carbazole	8.1E+01	mg/kg	1.1E-06	mg/kg/day	2.0E-02	1/mg/kg-day	2.3E-08	7.9E-05	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	2.9E-06	mg/kg/day	7.3E-03	1/mg/kg-day	2.1E-08	2.1E-04	mg/kg/day	1.0E-01	mg/kg/day	2.1E-03
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	3.1E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.2E-06	2.2E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	7.4E+00	mg/kg	1.0E-07	mg/kg/day	N/A		N/A	7.2E-06	mg/kg/day	4.0E-03	mg/kg/day	1.8E-03
				Fluoranthene	5.0E+02	mg/kg	7.0E-06	mg/kg/day	N/A		N/A	4.9E-04	mg/kg/day	1.0E-01	mg/kg/day	4.9E-03
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	9.6E-07	mg/kg/day	7.3E-01	1/mg/kg-day	7.0E-07	6.8E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	3.6E-07	mg/kg/day	N/A		N/A	2.5E-05	mg/kg/day	6.0E-01	mg/kg/day	4.2E-05
				Pyrene	3.9E+02	mg/kg	5.5E-06	mg/kg/day	N/A		N/A	3.8E-04	mg/kg/day	3.0E-01	mg/kg/day	1.3E-03
				Dieldrin	6.5E-01	mg/kg	9.1E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.5E-07	6.4E-07	mg/kg/day	1.0E-04	mg/kg/day	6.4E-03
				gamma-BHC (Lindane)	8.6E-01	mg/kg	1.2E-08	mg/kg/day	1.1E+00	1/mg/kg-day	1.3E-08	8.4E-07	mg/kg/day	1.0E-05	mg/kg/day	8.4E-02
				Aluminum	1.1E+04	mg/kg	1.6E-04	mg/kg/day	N/A		N/A	1.1E-02	mg/kg/day	1.0E+00	mg/kg/day	1.1E-02
				Arsenic	4.8E+00	mg/kg	6.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.0E-07	4.7E-06	mg/kg/day	3.0E-04	mg/kg/day	1.6E-02
				Chromium (hexavalent)	5.3E-01	mg/kg	7.4E-09	mg/kg/day	5.0E-01	1/mg/kg-day	3.7E-09	5.2E-07	mg/kg/day	5.0E-03	mg/kg/day	1.0E-04
				Cobalt	3.8E+00	mg/kg	5.3E-08	mg/kg/day	N/A		N/A	3.7E-06	mg/kg/day	3.0E-03	mg/kg/day	1.2E-03
				Iron	1.6E+04	mg/kg	2.3E-04	mg/kg/day	N/A		N/A	1.6E-02	mg/kg/day	7.0E-01	mg/kg/day	2.3E-02
				Lead	1.2E+02	mg/kg	1.6E-06	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	N/A		N/A
				Manganese	2.1E+02	mg/kg	2.9E-06	mg/kg/day	N/A		N/A	2.0E-04	mg/kg/day	2.4E-02	mg/kg/day	8.4E-03
			Exp. Route Total								9.1E-05					1.6E-01
Soil* (cont'd)	Soil*	Soil* within Fenced Area of Youth Pond/Site 4	Dermal Absorption	Benzo(a)anthracene	1.8E+02	mg/kg	5.4E-07	mg/kg/day	7.3E-01	1/mg/kg-day	3.9E-07	3.8E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	8.2E+02	mg/kg	2.5E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.8E-05	1.7E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	2.0E+02	mg/kg	6.0E-07	mg/kg/day	7.3E-01	1/mg/kg-day	4.4E-07	4.2E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	8.1E+01	mg/kg	2.4E-07	mg/kg/day	7.3E-02	1/mg/kg-day	1.8E-08	1.7E-05	mg/kg/day	N/A		N/A
				Carbazole	8.1E+01	mg/kg	1.9E-07	mg/kg/day	2.0E-02	1/mg/kg-day	3.7E-09	1.3E-05	mg/kg/day	N/A		N/A
				Chrysene	2.1E+02	mg/kg	6.3E-07	mg/kg/day	7.3E-03	1/mg/kg-day	4.6E-09	4.4E-05	mg/kg/day	1.0E-01	mg/kg/day	4.4E-04
				Dibenz(a,h)anthracene	2.2E+01	mg/kg	6.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	4.8E-07	4.6E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	7.4E+00	mg/kg	1.7E-08	mg/kg/day	N/A		N/A	1.2E-06	mg/kg/day	4.0E-03	mg/kg/day	3.0E-04
				Fluoranthene	5.0E+02	mg/kg	1.5E-06	mg/kg/day	N/A		N/A	1.0E-04	mg/kg/day	1.0E-01	mg/kg/day	1.0E-03
				Indeno(1,2,3-cd)pyrene	6.9E+01	mg/kg	2.1E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.5E-07	1.4E-05	mg/kg/day	N/A		N/A
				Naphthalene	2.6E+01	mg/kg	7.8E-08	mg/kg/day	N/A		N/A	5.5E-06	mg/kg/day	6.0E-01	mg/kg/day	9.1E-06
				Pyrene	3.9E+02	mg/kg	1.2E-06	mg/kg/day	N/A		N/A	8.2E-05	mg/kg/day	3.0E-01	mg/kg/day	2.7E-04
				Dieldrin	6.5E-01	mg/kg	1.5E-09	mg/kg/day	1.6E+01	1/mg/kg-day	2.4E-08	1.0E-07	mg/kg/day	1.0E-04	mg/kg/day	1.0E-03
				gamma-BHC (Lindane)	8.6E-01	mg/kg	7.9E-10	mg/kg/day	1.1E+00	1/mg/kg-day	8.7E-10	5.6E-08	mg/kg/day	1.0E-05	mg/kg/day	5.6E-03
				Aluminum	1.1E+04	mg/kg	2.6E-06	mg/kg/day	N/A	1/mg/kg-day	N/A	1.8E-04	mg/kg/day	1.0E+00	mg/kg/day	1.8E-04
				Arsenic	4.8E+00	mg/kg	3.3E-09	mg/kg/day	1.5E+00	1/mg/kg-day	5.0E-09	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	7.7E-04

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chromium (hexavalent)	5.3E-01	mg/kg	1.2E-10	mg/kg/day	2.0E+01	1/mg/kg-day	2.4E-09	8.6E-09	mg/kg/day	1.3E-04	mg/kg/day	6.8E-05
				Cobalt	3.8E+00	mg/kg	8.7E-10	mg/kg/day	N/A	1/mg/kg-day	N/A	6.1E-08	mg/kg/day	3.0E-03	mg/kg/day	2.0E-05
				Iron	1.6E+04	mg/kg	3.8E-06	mg/kg/day	N/A	1/mg/kg-day	N/A	2.6E-04	mg/kg/day	7.0E-01	mg/kg/day	3.8E-04
				Lead	1.2E+02	mg/kg	2.7E-08	mg/kg/day	N/A		N/A	1.9E-06	mg/kg/day	N/A		N/A
				Manganese	2.1E+02	mg/kg	4.7E-08	mg/kg/day	N/A	1/mg/kg-day	N/A	3.3E-06	mg/kg/day	9.6E-04	mg/kg/day	3.5E-03
			Exp. Route Total								2.0E-05					1.4E-02
		Exposure Point Total									1.1E-04					1.7E-01
	Exposure Medium Total										1.1E-04					1.7E-01
	Air	Emissions From Area of Youth Pond/Site 4	Inhalation	Naphthalene	4.3E-01	$\mu g/m^3$	7.1E-04	$\mu g/m^3$	3.4E-05	$(\mu g/m^3)^{-1}$	2.4E-08	4.9E-05	mg/m^3	3.0E-03	mg/m^3	1.6E-02
			Exp. Route Total								2.4E-08					1.6E-02
		Exposure Point Total									2.4E-08					1.6E-02
	Exposure Medium Total										2.4E-08					1.6E-02
Soil* from within Fenced Area of Youth Pond/Site 4											1.1E-04					1.9E-01
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	Dermal													
				1,4-Dichlorobenzene	2.0E+00	ug/L	1.7E-07	mg/kg/day	5.4E-03	1/mg/kg-day	9.1E-10	1.2E-05	mg/kg/day	7.0E-02	mg/kg/day	1.7E-04
				Benzene	1.4E+01	ug/L	3.7E-07	mg/kg/day	5.5E-02	1/mg/kg-day	2.0E-08	2.6E-05	mg/kg/day	1.0E-02	mg/kg/day	2.6E-03
				Ethylbenzene	1.0E+01	ug/L	8.5E-07	mg/kg/day	1.1E-02	1/mg/kg-day	9.4E-09	6.0E-05	mg/kg/day	5.0E-02	mg/kg/day	1.2E-03
				m- and p-Xylene	2.0E+01	ug/L	1.8E-06	mg/kg/day	N/A		N/A	1.3E-04	mg/kg/day	4.0E-01	mg/kg/day	3.2E-04
				Trichloroethene	4.0E-01	ug/L	9.3E-09	mg/kg/day	4.6E-02	1/mg/kg-day	4.3E-10	6.5E-07	mg/kg/day	4.8E-04	mg/kg/day	1.4E-03
				Xylene, total	1.8E+01	ug/L	1.6E-06	mg/kg/day	N/A		N/A	1.1E-04	mg/kg/day	4.0E-01	mg/kg/day	2.8E-04
				1,1-Biphenyl	8.0E+00	ug/L	1.4E-06	mg/kg/day	8.0E-03	1/mg/kg-day	1.2E-08	1.0E-04	mg/kg/day	1.0E-01	mg/kg/day	1.0E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	6.2E-07	mg/kg/day	N/A		N/A	4.3E-05	mg/kg/day	5.0E-02	mg/kg/day	8.6E-04
				2-Methylnaphthalene	8.3E+00	ug/L	1.4E-06	mg/kg/day	N/A		N/A	9.9E-05	mg/kg/day	4.0E-03	mg/kg/day	2.5E-02
				Benzo(a)anthracene	9.6E-01	ug/L	1.4E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.0E-06	9.9E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	1.8E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.3E-05	1.2E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	2.4E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-06	1.7E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	2.3E-06	mg/kg/day	7.3E-02	1/mg/kg-day	1.7E-07	1.6E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	8.8E-07	mg/kg/day	7.3E+00	1/mg/kg-day	6.4E-06	6.1E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	2.4E-06	mg/kg/day	N/A		N/A	1.7E-04	mg/kg/day	4.0E-03	mg/kg/day	4.2E-02
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	3.2E-06	mg/kg/day	7.3E-01	1/mg/kg-day	2.3E-06	2.2E-04	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	1.0E-05	mg/kg/day	N/A		N/A	7.3E-04	mg/kg/day	6.0E-01	mg/kg/day	1.2E-03
				Dieldrin	1.7E-02	ug/L	1.4E-09	mg/kg/day	1.6E+01	1/mg/kg-day	2.2E-08	9.8E-08	mg/kg/day	1.0E-04	mg/kg/day	9.8E-04
				Aluminum	1.1E+04	ug/L	1.8E-05	mg/kg/day	N/A		N/A	1.2E-03	mg/kg/day	1.0E+00	mg/kg/day	1.2E-03
				Antimony	5.5E-01	ug/L	8.8E-10	mg/kg/day	N/A		N/A	6.2E-08	mg/kg/day	6.0E-05	mg/kg/day	1.0E-03
				Arsenic	1.7E+01	ug/L	2.8E-08	mg/kg/day	1.5E+00	1/mg/kg-day	4.1E-08	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	6.4E-03
				Barium	1.6E+02	ug/L	2.5E-07	mg/kg/day	N/A		N/A	1.8E-05	mg/kg/day	1.4E-02	mg/kg/day	1.3E-03
				Chromium	1.5E+01	ug/L	4.9E-08	mg/kg/day	2.0E+01	1/mg/kg-day	9.8E-07	3.4E-06	mg/kg/day	1.3E-04	mg/kg/day	2.6E-02
				Cobalt	2.4E+00	ug/L	1.5E-09	mg/kg/day	N/A		N/A	1.1E-07	mg/kg/day	3.0E-03	mg/kg/day	3.6E-05
				Iron	2.6E+04	ug/L	4.2E-05	mg/kg/day	N/A		N/A	2.9E-03	mg/kg/day	7.0E-01	mg/kg/day	4.2E-03
				Lead	4.5E+00	ug/L	7.1E-09	mg/kg/day	N/A		N/A	5.0E-07	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	5.5E-07	mg/kg/day	N/A		N/A	3.9E-05	mg/kg/day	9.6E-04	mg/kg/day	4.0E-02
				Mercury	5.9E-01	ug/L	9.4E-10	mg/kg/day	N/A		N/A	6.6E-08	mg/kg/day	1.4E-04	mg/kg/day	4.7E-04
				Thallium	1.1E+00	ug/L	1.8E-09	mg/kg/day	N/A		N/A	1.2E-07	mg/kg/day	4.0E-05	mg/kg/day	3.1E-03
				Vanadium	2.9E+01	ug/L	4.6E-08	mg/kg/day	N/A		N/A	3.2E-06	mg/kg/day	5.0E-03	mg/kg/day	6.4E-04
			Exp. Route Total								2.6E-05					1.6E-01
	Exposure Medium Total										2.6E-05					1.6E-01

TABLE 7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
	Air	Water Vapors in Excavation Trench	Inhalation													
				1,4-Dichlorobenzene	1.3E+01	µg/m^3	1.1E-02	µg/m^3	1.1E-05	(ug/m^3)$^{-1}$	1.2E-07	7.7E-04	mg/m^3	1.2E+00	mg/m^3	6.4E-04
				Benzene	1.3E+02	µg/m^3	1.1E-01	µg/m^3	7.8E-06	(ug/m^3)$^{-1}$	8.3E-07	7.5E-03	mg/m^3	8.0E-02	mg/m^3	9.3E-02
				Ethylbenzene	8.0E+01	µg/m^3	6.6E-02	µg/m^3	2.5E-06	(ug/m^3)$^{-1}$	1.6E-07	4.6E-03	mg/m^3	9.0E+00	mg/m^3	5.1E-04
				m- and p-Xylene	1.6E+02	µg/m^3	1.3E-01	µg/m^3	N/A		N/A	9.1E-03	mg/m^3	4.0E-01	mg/m^3	2.3E-02
				Trichloroethene	2.9E+00	µg/m^3	2.4E-03	µg/m^3	4.1E-06	(ug/m^3)$^{-1}$	9.7E-09	1.7E-04	mg/m^3	2.0E-03	mg/m^3	8.3E-02
				Xylene, total	6.4E+01	µg/m^3	5.2E-02	µg/m^3	N/A		N/A	3.7E-03	mg/m^3	4.0E-01	mg/m^3	9.1E-03
				1,1-Biphenyl	1.0E+02	µg/m^3	8.2E-02	µg/m^3	N/A		N/A	5.7E-03	mg/m^3	4.0E-03	mg/m^3	1.4E+00
				2-Methylnaphthalene	5.3E+01	µg/m^3	4.3E-02	µg/m^3	N/A		N/A	3.0E-03	mg/m^3	N/A		N/A
				Dibenzofuran	9.8E+01	µg/m^3	8.0E-02	µg/m^3	N/A		N/A	5.6E-03	mg/m^3	N/A		N/A
				Naphthalene	7.9E+02	µg/m^3	6.4E-01	µg/m^3	3.4E-05	(ug/m^3)$^{-1}$	2.2E-05	4.5E-02	mg/m^3	3.0E-03	mg/m^3	1.5E+01
			Exp. Route Total								2.3E-05					1.7E+01
		Exposure Point Total									2.3E-05					1.7E+01
Groundwater Total											4.9E-05					1.7E+01
Total of Receptor Risk from soil inside and outside fenced area and groundwater											5.5E-05	Total of Receptor Hazard from soil inside and outside and groundwater				1.7E+01
Total of Receptor Risk from soil within fenced area and groundwater											1.6E-04	Total of Receptor Hazard from soil within fenced area and groundwater				1.7E+01

Notes-

N/A = Not applicable.

*Soil = surface and subsurface soil combined.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.6.CTE Supplement A.

Inhalation exposure for groundwater calculated on Table 7.7.RME Supplement C.

Table 7.6.CTE Supplement A
Calculation of DAevent for Groundwater
Adult Construction Worker
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm²-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	4	4.2E-07	3
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	4	9.2E-07	3
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	4	2.1E-06	3
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	4	4.6E-06	3
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	4	2.3E-08	3
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	4	4.0E-06	3
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	4	3.6E-06	3
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	4	1.6E-06	3
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	4	3.6E-06	3
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	4	3.6E-06	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	4	4.4E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	4	6.1E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	4	5.8E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	4	2.2E-06	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	4	6.0E-06	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	4	8.1E-06	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	4	2.6E-05	3
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	4	3.5E-09	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	4	4.4E-05	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	4	2.2E-09	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	4	6.9E-08	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	4	6.3E-07	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	4	1.2E-07	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	4	3.9E-09	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	4	1.0E-04	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	4	1.8E-08	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	4	1.4E-06	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	4	2.4E-09	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	4	4.4E-09	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	4	1.1E-07	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm³ (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm³ (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm³ (eq 3)

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	2.2E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.6E-06	1.7E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	1.6E-06	mg/kg/day	7.3E+00	1/mg/kg-day	1.1E-05	1.2E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	2.4E-06	mg/kg/day	7.3E-01	1/mg/kg-day	1.8E-06	1.9E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	9.8E-07	mg/kg/day	7.3E-02	1/mg/kg-day	7.2E-08	7.6E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.5E-07	mg/kg/day	1.4E-02	1/mg/kg-day	3.5E-09	2.0E-06	mg/kg/day	2.0E-02	mg/kg/day	9.8E-05
				Carbazole	3.2E+01	mg/kg	1.8E-06	mg/kg/day	2.0E-02	1/mg/kg-day	3.6E-08	1.4E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	2.5E-06	mg/kg/day	7.3E-03	1/mg/kg-day	1.8E-08	2.0E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	2.7E-07	mg/kg/day	7.3E+00	1/mg/kg-day	1.9E-06	2.1E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	3.4E-07	mg/kg/day	N/A		N/A	2.6E-06	mg/kg/day	1.0E-03	mg/kg/day	2.6E-03
				Fluoranthene	1.1E+02	mg/kg	6.0E-06	mg/kg/day	N/A		N/A	4.6E-05	mg/kg/day	4.0E-02	mg/kg/day	1.2E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	8.4E-07	mg/kg/day	7.3E-01	1/mg/kg-day	6.1E-07	6.5E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.2E-07	mg/kg/day	N/A		N/A	2.5E-06	mg/kg/day	2.0E-02	mg/kg/day	1.2E-04
				Pyrene	8.5E+01	mg/kg	4.7E-06	mg/kg/day	N/A		N/A	3.6E-05	mg/kg/day	3.0E-02	mg/kg/day	1.2E-03
				Aldrin	4.6E-03	mg/kg	2.5E-10	mg/kg/day	1.7E+01	1/mg/kg-day	4.3E-09	2.0E-09	mg/kg/day	3.0E-05	mg/kg/day	6.6E-05
				Aroclor-1242	1.1E+00	mg/kg	6.0E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.2E-07	4.7E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	4.4E-08	1.7E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.0E-08	mg/kg/day	1.6E+01	1/mg/kg-day	1.6E-07	7.9E-08	mg/kg/day	5.0E-05	mg/kg/day	1.6E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	1.3E-08	mg/kg/day	1.1E+00	1/mg/kg-day	1.5E-08	1.0E-07	mg/kg/day	3.0E-04	mg/kg/day	3.5E-04
				Aluminum	1.3E+04	mg/kg	7.4E-04	mg/kg/day	N/A		N/A	5.8E-03	mg/kg/day	1.0E+00	mg/kg/day	5.8E-03
				Arsenic	4.0E+01	mg/kg	2.2E-06	mg/kg/day	1.5E+00	1/mg/kg-day	3.3E-06	1.7E-05	mg/kg/day	3.0E-04	mg/kg/day	5.7E-02
				Chromium (hexavalent)	4.3E-01	mg/kg	2.4E-08	mg/kg/day	5.0E-01	1/mg/kg-day	1.2E-08	1.8E-07	mg/kg/day	3.0E-03	mg/kg/day	6.1E-05
				Cobalt	3.6E+00	mg/kg	2.0E-07	mg/kg/day	N/A		N/A	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	5.1E-03
				Iron	2.1E+04	mg/kg	1.1E-03	mg/kg/day	N/A		N/A	8.9E-03	mg/kg/day	7.0E-01	mg/kg/day	1.3E-02
				Lead	3.7E+01	mg/kg	2.0E-06	mg/kg/day	N/A		N/A	1.6E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	7.9E-06	mg/kg/day	N/A		N/A	6.1E-05	mg/kg/day	2.4E-02	mg/kg/day	2.6E-03
				Thallium	3.8E-01	mg/kg	2.1E-08	mg/kg/day	N/A		N/A	1.6E-07	mg/kg/day	1.0E-05	mg/kg/day	1.6E-02
				Vanadium	3.5E+01	mg/kg	1.9E-06	mg/kg/day	N/A		N/A	1.5E-05	mg/kg/day	5.0E-03	mg/kg/day	3.0E-03
			Exp. Route Total								2.1E-05					1.1E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	3.7E-07	mg/kg/day	7.3E-01	1/mg/kg-day	2.7E-07	2.9E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	2.7E-07	mg/kg/day	7.3E+00	1/mg/kg-day	2.0E-06	2.1E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	4.1E-07	mg/kg/day	7.3E-01	1/mg/kg-day	3.0E-07	3.2E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	1.7E-07	mg/kg/day	7.3E-02	1/mg/kg-day	1.2E-08	1.3E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	3.3E-08	mg/kg/day	1.4E-02	1/mg/kg-day	4.7E-10	2.6E-07	mg/kg/day	2.0E-02	mg/kg/day	1.3E-05
				Carbazole	3.2E+01	mg/kg	2.4E-07	mg/kg/day	2.0E-02	1/mg/kg-day	4.7E-09	1.8E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	4.3E-07	mg/kg/day	7.3E-03	1/mg/kg-day	3.2E-09	3.4E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	4.6E-08	mg/kg/day	7.3E+00	1/mg/kg-day	3.3E-07	3.6E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	4.5E-08	mg/kg/day	N/A		N/A	3.5E-07	mg/kg/day	1.0E-03	mg/kg/day	3.5E-04
				Fluoranthene	1.1E+02	mg/kg	1.0E-06	mg/kg/day	N/A		N/A	8.0E-06	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	1.4E-07	mg/kg/day	7.3E-01	1/mg/kg-day	1.0E-07	1.1E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	5.4E-08	mg/kg/day	N/A		N/A	4.2E-07	mg/kg/day	2.0E-02	mg/kg/day	2.1E-05
				Pyrene	8.5E+01	mg/kg	8.0E-07	mg/kg/day	N/A		N/A	6.2E-06	mg/kg/day	3.0E-02	mg/kg/day	2.1E-04
				Aldrin	4.6E-03	mg/kg	3.4E-11	mg/kg/day	1.7E+01	1/mg/kg-day	5.7E-10	2.6E-10	mg/kg/day	3.0E-05	mg/kg/day	8.7E-06
				Aroclor-1242	1.1E+00	mg/kg	1.1E-08	mg/kg/day	2.0E+00	1/mg/kg-day	2.2E-08	8.6E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	4.1E-09	mg/kg/day	2.0E+00	1/mg/kg-day	8.2E-09	3.2E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	1.3E-09	mg/kg/day	1.6E+01	1/mg/kg-day	2.1E-08	1.0E-08	mg/kg/day	5.0E-05	mg/kg/day	2.1E-04
				gamma-BHC (Lindane)	2.4E-01	mg/kg	7.1E-10	mg/kg/day	1.1E+00	1/mg/kg-day	7.8E-10	5.5E-09	mg/kg/day	3.0E-04	mg/kg/day	1.8E-05

TABLE 7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Aluminum	1.3E+04	mg/kg	9.8E-06	mg/kg/day	N/A		N/A	7.6E-05	mg/kg/day	1.0E+00	mg/kg/day	7.6E-05
				Arsenic	4.0E+01	mg/kg	8.7E-08	mg/kg/day	1.5E+00	1/mg/kg-day	1.3E-07	6.7E-07	mg/kg/day	3.0E-04	mg/kg/day	2.2E-03
				Chromium (hexavalent)	4.3E-01	mg/kg	3.1E-10	mg/kg/day	2.0E+01	1/mg/kg-day	6.3E-09	2.4E-09	mg/kg/day	7.5E-05	mg/kg/day	3.2E-05
				Cobalt	3.6E+00	mg/kg	2.6E-09	mg/kg/day	N/A		N/A	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	6.7E-05
				Iron	2.1E+04	mg/kg	1.5E-05	mg/kg/day	N/A		N/A	1.2E-04	mg/kg/day	7.0E-01	mg/kg/day	1.7E-04
				Lead	3.7E+01	mg/kg	2.7E-08	mg/kg/day	N/A		N/A	2.1E-07	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	1.0E-07	mg/kg/day	N/A		N/A	8.1E-07	mg/kg/day	9.6E-04	mg/kg/day	8.5E-04
				Thallium	3.8E-01	mg/kg	2.8E-10	mg/kg/day	N/A		N/A	2.2E-09	mg/kg/day	1.0E-05	mg/kg/day	2.2E-04
				Vanadium	3.5E+01	mg/kg	2.6E-08	mg/kg/day	N/A		N/A	2.0E-07	mg/kg/day	5.0E-03	mg/kg/day	4.0E-05
			Exp. Route Total								3.2E-06					4.5E-03
		Exposure Point Total									2.4E-05					1.1E-01
	Exposure Medium Total										2.4E-05					1.1E-01
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	2.5E-03	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	8.4E-08	1.9E-05	mg/m^3	3.0E-03	mg/m^3	6.4E-03
			Exp. Route Total								8.4E-08					6.4E-03
		Exposure Point Total									8.4E-08					6.4E-03
	Exposure Medium Total										8.4E-08					6.4E-03
Soil* from inside and outside the Fenced Area											2.4E-05					1.2E-01
										Total of Receptor Risk	2.4E-05				Total of Receptor Hazard	1.2E-01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	1.8E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	1.3E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	2.0E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	8.2E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	2.1E-06	mg/kg/day	N/A		N/A
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	3.2E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	2.1E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	2.2E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	2.8E-06	mg/kg/day	1.0E-03	mg/kg/day	2.8E-03
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	5.0E-05	mg/kg/day	4.0E-02	mg/kg/day	1.3E-03
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	7.0E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	2.7E-06	mg/kg/day	2.0E-02	mg/kg/day	1.3E-04
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	3.9E-05	mg/kg/day	3.0E-02	mg/kg/day	1.3E-03
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	2.1E-09	mg/kg/day	3.0E-05	mg/kg/day	7.1E-05
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	5.0E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	1.9E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	8.5E-08	mg/kg/day	5.0E-05	mg/kg/day	1.7E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	3.7E-04
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	6.2E-03	mg/kg/day	1.0E+00	mg/kg/day	6.2E-03
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	1.8E-05	mg/kg/day	3.0E-04	mg/kg/day	6.1E-02
				Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	2.0E-07	mg/kg/day	3.0E-03	mg/kg/day	6.6E-05
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	5.5E-03
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	9.6E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-02
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	1.7E-05	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	6.6E-05	mg/kg/day	2.4E-02	mg/kg/day	2.8E-03
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	1.8E-07	mg/kg/day	1.0E-05	mg/kg/day	1.8E-02
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	1.6E-05	mg/kg/day	5.0E-03	mg/kg/day	3.3E-03
			Exp. Route Total								N/A					1.2E-01
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	2.7E-06	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	1.9E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	3.0E-06	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	1.2E-06	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	2.4E-07	mg/kg/day	2.0E-02	mg/kg/day	1.2E-05
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	1.7E-06	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	3.1E-06	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	3.3E-07	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	3.2E-07	mg/kg/day	1.0E-03	mg/kg/day	3.2E-04
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	7.4E-06	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	1.0E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	3.9E-07	mg/kg/day	2.0E-02	mg/kg/day	2.0E-05
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	5.7E-06	mg/kg/day	3.0E-02	mg/kg/day	1.9E-04
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	2.4E-10	mg/kg/day	3.0E-05	mg/kg/day	8.0E-06
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	7.9E-08	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	2.9E-08	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	9.6E-09	mg/kg/day	5.0E-05	mg/kg/day	1.9E-04

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

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Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	5.1E-09	mg/kg/day	3.0E-04	mg/kg/day	1.7E-05
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	7.0E-05	mg/kg/day	1.0E+00	mg/kg/day	7.0E-05
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	6.2E-07	mg/kg/day	3.0E-04	mg/kg/day	2.1E-03
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	2.2E-09	mg/kg/day	7.5E-05	mg/kg/day	3.0E-05
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	1.9E-08	mg/kg/day	3.0E-04	mg/kg/day	6.2E-05
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	1.1E-04	mg/kg/day	7.0E-01	mg/kg/day	1.6E-04
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	1.9E-07	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	7.5E-07	mg/kg/day	9.6E-04	mg/kg/day	7.8E-04
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	2.0E-09	mg/kg/day	1.0E-05	mg/kg/day	2.0E-04
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	1.8E-07	mg/kg/day	5.0E-03	mg/kg/day	3.7E-05
			Exp. Route Total								N/A					4.2E-03
		Exposure Point Total									N/A					1.2E-01
	Exposure Medium Total										N/A					1.2E-01
	Air	Emissions from Soil* from inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	N/A		N/A		N/A	6.1E-05	mg/m^3	3.0E-03	mg/m^3	2.0E-02
			Exp. Route Total								N/A					2.0E-02
		Exposure Point Total									N/A					2.0E-02
	Exposure Medium Total										N/A					2.0E-02
Soil* from inside and outside the Fenced Area											N/A					1.4E-01
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	2.6E-05	mg/kg/day	7.0E-02	mg/kg/day	3.7E-04
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	1.8E-04	mg/kg/day	4.0E-03	mg/kg/day	4.5E-02
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	1.3E-04	mg/kg/day	1.0E-01	mg/kg/day	1.3E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	2.6E-04	mg/kg/day	2.0E-01	mg/kg/day	1.3E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	5.1E-06	mg/kg/day	5.0E-04	mg/kg/day	1.0E-02
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	2.3E-04	mg/kg/day	2.0E-01	mg/kg/day	1.1E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	1.0E-04	mg/kg/day	5.0E-02	mg/kg/day	2.1E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	3.7E-04	mg/kg/day	2.0E-02	mg/kg/day	1.9E-02
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	1.1E-04	mg/kg/day	4.0E-03	mg/kg/day	2.7E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	1.2E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	8.9E-06	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	1.2E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	1.2E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	2.9E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	2.4E-04	mg/kg/day	1.0E-03	mg/kg/day	2.4E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	1.5E-05	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	1.5E-03	mg/kg/day	2.0E-02	mg/kg/day	7.7E-02
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	2.2E-07	mg/kg/day	5.0E-05	mg/kg/day	4.4E-03
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	1.4E-01	mg/kg/day	1.0E+00	mg/kg/day	1.4E-01
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	7.1E-06	mg/kg/day	4.0E-04	mg/kg/day	1.8E-02
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	2.2E-04	mg/kg/day	3.0E-04	mg/kg/day	7.4E-01
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	2.0E-03	mg/kg/day	2.0E-01	mg/kg/day	1.0E-02

TABLE 7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	2.0E-04	mg/kg/day	3.0E-03	mg/kg/day	6.6E-02
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	3.1E-05	mg/kg/day	3.0E-04	mg/kg/day	1.0E-01
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	3.3E-01	mg/kg/day	7.0E-01	mg/kg/day	4.8E-01
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	5.8E-05	mg/kg/day	N/A		N/A
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	N/A		N/A		N/A	4.4E-03	mg/kg/day	2.4E-02	mg/kg/day	1.8E-01
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	7.6E-06	mg/kg/day	3.0E-04	mg/kg/day	2.5E-02
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	1.4E-05	mg/kg/day	1.0E-05	mg/kg/day	1.4E+00
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	3.7E-04	mg/kg/day	5.0E-03	mg/kg/day	7.4E-02
			Exp. Route Total								N/A					3.7E+00
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	1.6E-05	mg/kg/day	7.0E-02	mg/kg/day	2.3E-04
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	2.6E-05	mg/kg/day	4.0E-03	mg/kg/day	6.4E-03
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	7.3E-05	mg/kg/day	1.0E-01	mg/kg/day	7.3E-04
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	1.6E-04	mg/kg/day	2.0E-01	mg/kg/day	7.8E-04
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	8.1E-07	mg/kg/day	5.0E-04	mg/kg/day	1.6E-03
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	1.4E-04	mg/kg/day	2.0E-01	mg/kg/day	6.9E-04
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	1.5E-04	mg/kg/day	5.0E-02	mg/kg/day	2.9E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	5.2E-05	mg/kg/day	2.0E-02	mg/kg/day	2.6E-03
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	1.4E-04	mg/kg/day	4.0E-03	mg/kg/day	3.5E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	1.5E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	1.8E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	2.5E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	2.4E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	9.1E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	2.2E-04	mg/kg/day	1.0E-03	mg/kg/day	2.2E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	3.3E-04	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	9.5E-04	mg/kg/day	2.0E-02	mg/kg/day	4.8E-02
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	1.4E-07	mg/kg/day	5.0E-05	mg/kg/day	2.9E-03
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	4.6E-04	mg/kg/day	1.0E+00	mg/kg/day	4.6E-04
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	2.3E-08	mg/kg/day	6.0E-05	mg/kg/day	3.8E-04
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	7.1E-07	mg/kg/day	3.0E-04	mg/kg/day	2.4E-03
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	6.5E-06	mg/kg/day	1.4E-02	mg/kg/day	4.6E-04
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	1.3E-06	mg/kg/day	7.5E-05	mg/kg/day	1.7E-02
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	4.0E-08	mg/kg/day	3.0E-04	mg/kg/day	1.3E-04
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	1.1E-03	mg/kg/day	7.0E-01	mg/kg/day	1.5E-03
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	1.8E-07	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	N/A		N/A		N/A	1.4E-05	mg/kg/day	9.6E-04	mg/kg/day	1.5E-02
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	2.4E-08	mg/kg/day	2.1E-05	mg/kg/day	1.2E-03
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	4.5E-08	mg/kg/day	1.0E-05	mg/kg/day	4.5E-03
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	1.2E-06	mg/kg/day	5.0E-03	mg/kg/day	2.4E-04
			Exp. Route Total								N/A					3.6E-01
		Exposure Point Total									N/A					3.6E-01
	Exposure Medium Total										N/A					4.0E+00

TABLE 7.8.CTE

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CENTRAL TENDENCY EXPOSURE

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Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Air	Water Vapors at Showerhead	Inhalation													
				1,4-Dichlorobenzene	1.6E-03	mg/m^3	N/A		N/A		N/A	1.1E-05	mg/m^3	8.0E-01	mg/m^3	1.4E-05
				Benzene	1.6E-02	mg/m^3	N/A		N/A		N/A	1.1E-04	mg/m^3	3.0E-02	mg/m^3	3.6E-03
				Ethylbenzene	1.0E-02	mg/m^3	N/A		N/A		N/A	6.8E-05	mg/m^3	1.0E+00	mg/m^3	6.8E-05
				m- and p-Xylene	2.0E-02	mg/m^3	N/A		N/A		N/A	1.3E-04	mg/m^3	1.0E-01	mg/m^3	1.3E-03
				Trichloroethene	3.7E-04	mg/m^3	N/A		N/A		N/A	2.5E-06	mg/m^3	2.0E-03	mg/m^3	1.2E-03
				Xylene, total	1.8E-02	mg/m^3	N/A		N/A		N/A	1.2E-04	mg/m^3	1.0E-01	mg/m^3	1.2E-03
				1,1-Biphenyl	4.0E-03	mg/m^3	N/A		N/A		N/A	2.6E-05	mg/m^3	4.0E-04	mg/m^3	6.6E-02
				2-Methylnaphthalene	5.2E-03	mg/m^3	N/A		N/A		N/A	3.5E-05	mg/m^3	N/A		N/A
				Dibenzofuran	7.6E-03	mg/m^3	N/A		N/A		N/A	5.1E-05	mg/m^3	N/A		N/A
				Naphthalene	7.5E-02	mg/m^3	N/A		N/A		N/A	5.0E-04	mg/m^3	3.0E-03	mg/m^3	1.7E-01
			Exp. Route Total								N/A					2.4E-01
		Exposure Point Total									N/A					2.4E-01
	Exposure Medium Total										N/A					2.4E-01
Groundwater Total											N/A					4.3E+00
										Total of Receptor Risk	N/A				Total of Receptor Hazard	4.4E+00

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.8.CTE Supplement A.

Inhalation exposure for groundwater while showering calculated on Table 7.8.CTE Supplement B.

Table 7.8.CTE Supplement A
Calculation of DAevent for Groundwater
Resident Adult
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	0.25	9.8E-08	2
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.25	1.6E-07	2
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	0.25	4.4E-07	2
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.25	9.5E-07	2
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.25	4.9E-09	2
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.25	8.4E-07	2
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	0.25	8.9E-07	2
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	0.25	3.1E-07	2
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	0.25	8.6E-07	2
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	0.25	8.9E-07	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	0.25	1.1E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	0.25	1.5E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	0.25	1.5E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	0.25	5.5E-07	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	0.25	1.3E-06	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	0.25	2.0E-06	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	0.25	5.8E-06	2
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	0.25	8.8E-10	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	0.25	2.8E-06	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	0.25	1.4E-10	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	0.25	4.3E-09	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	0.25	3.9E-08	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	0.25	7.7E-09	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	0.25	2.4E-10	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	0.25	6.5E-06	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	0.25	1.1E-09	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	0.25	8.6E-08	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	0.25	1.5E-10	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	0.25	2.8E-10	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	0.25	7.2E-09	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

Table 7.8.CTE Supplement B
Inhalation Exposure Concentrations from Foster and Chrostowski Shower Model
Adult Resident
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Exposure Point Concentration Cwo (µg/L)	Molecular weight (MW) (g/mole)	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl (VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/L)	S (µg/m^3 -min)	Ca (mg/m^3)	Ca (ug/m^3)
1,4-Dichlorobenzene	2.0E+00	1.5E+02	2.4E-03	1.0E+03	1.1E+01	9.9E+00	1.3E+01	2.1E-01	1.8E-01	1.6E-03	1.6E-06
Benzene	1.4E+01	7.8E+01	5.6E-03	1.4E+03	1.5E+01	1.4E+01	1.9E+01	2.1E+00	1.7E+00	1.6E-02	1.6E-05
Ethylbenzene	1.0E+01	1.1E+02	7.9E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	1.3E+00	1.1E+00	1.0E-02	1.0E-05
m- and p-Xylene	2.0E+01	1.1E+02	5.2E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	2.6E+00	2.2E+00	2.0E-02	2.0E-05
Trichloroethene	4.0E-01	1.3E+02	9.9E-03	1.1E+03	1.2E+01	1.1E+01	1.5E+01	4.8E-02	4.0E-02	3.7E-04	3.7E-07
Xylene, total	1.8E+01	1.1E+02	5.2E-03	1.2E+03	1.3E+01	1.2E+01	1.7E+01	2.3E+00	1.9E+00	1.8E-02	1.8E-05
1,1-Biphenyl	8.0E+00	1.5E+02	3.1E-04	1.0E+03	1.1E+01	5.9E+00	8.0E+00	5.1E-01	4.3E-01	4.0E-03	4.0E-06
2-Methylnaphthalene	8.3E+00	1.4E+02	5.2E-04	1.1E+03	1.1E+01	7.5E+00	1.0E+01	6.8E-01	5.6E-01	5.2E-03	5.2E-06
Dibenzofuran	1.9E+01	1.7E+02	2.1E-04	9.8E+02	1.0E+01	4.7E+00	6.4E+00	9.8E-01	8.2E-01	7.6E-03	7.6E-06
Naphthalene	1.2E+02	1.3E+02	4.4E-04	1.1E+03	1.2E+01	7.5E+00	1.0E+01	9.7E+00	8.1E+00	7.5E-02	7.5E-05

Variables	Units	Exposure Assumptions
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4
Tl = Calibration temp. of water	K (20C +273)	293
Ts = Shower water temperature	k (45C)	318
Us = water viscosity at Ts	centipoise	0.596
Ul = water viscosity at Tl	cp	1.002
Cwd = conc. leaving droplets after time sdt	µg/l	Solved by Eq 5
sdt = shower droplet drop time	sec	0.5
d = shower droplet diameter	mm	1
FR = shower water flow rate	l/min	10
SV = shower room air volume	m^3	12
S = indoor VOC generation rate	µg/m^3-min	Solved by Eq 6
Ds = duration of shower	min	15
Dt = total duration in shower room	min	45
R = air exchange rate	min^{-1}	0.01667
Ca = indoor air concentration of VOCs	µg/m^3	Solved by Eq 7

Equation 1:	Kg(VOC) =	$3000 * (18 / MW)^{0.5}$
Equation 2:	Kl(VOC) =	$20 * (44 / MW)^{0.5}$
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))
Equation 6:	S =	(Cwd * FR / SV)
Equation 7:	Ca =	If t>Ds [(S / R) * (Ds + (EXP(-R * Dt) / R) -(EXP(R *(Ds - Dt)) / R)] / Dt * 1/1000

TABLE 7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	1.7E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	1.2E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	1.9E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	7.6E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	2.0E-05	mg/kg/day	2.0E-02	mg/kg/day	9.8E-04
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	1.4E-04	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	2.0E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	2.1E-05	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	2.6E-05	mg/kg/day	1.0E-03	mg/kg/day	2.6E-02
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	4.6E-04	mg/kg/day	4.0E-02	mg/kg/day	1.2E-02
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	6.5E-05	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	2.5E-05	mg/kg/day	2.0E-02	mg/kg/day	1.2E-03
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	3.6E-04	mg/kg/day	3.0E-02	mg/kg/day	1.2E-02
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	2.0E-08	mg/kg/day	3.0E-05	mg/kg/day	6.6E-04
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	4.6E-06	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	1.7E-06	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	7.8E-07	mg/kg/day	5.0E-05	mg/kg/day	1.6E-02
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	1.0E-06	mg/kg/day	3.0E-04	mg/kg/day	3.5E-03
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	5.7E-02	mg/kg/day	1.0E+00	mg/kg/day	5.7E-02
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	1.7E-04	mg/kg/day	3.0E-04	mg/kg/day	5.7E-01
				Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	1.8E-06	mg/kg/day	3.0E-03	mg/kg/day	6.1E-04
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	5.1E-02
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	8.9E-02	mg/kg/day	7.0E-01	mg/kg/day	1.3E-01
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	1.6E-04	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	6.1E-04	mg/kg/day	2.4E-02	mg/kg/day	2.6E-02
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	1.6E-06	mg/kg/day	1.0E-05	mg/kg/day	1.6E-01
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	1.5E-04	mg/kg/day	5.0E-03	mg/kg/day	3.0E-02
			Exp. Route Total								N/A					1.1E+00
			Dermal Absorption[1]	Benzo(a)anthracene	3.9E+01	mg/kg	N/A		N/A		N/A	2.4E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	2.8E+01	mg/kg	N/A		N/A		N/A	1.8E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	4.4E+01	mg/kg	N/A		N/A		N/A	2.7E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	1.8E+01	mg/kg	N/A		N/A		N/A	1.1E-05	mg/kg/day	N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	N/A		N/A		N/A	2.2E-06	mg/kg/day	2.0E-02	mg/kg/day	1.1E-04
				Carbazole	3.2E+01	mg/kg	N/A		N/A		N/A	1.6E-05	mg/kg/day	N/A		N/A
				Chrysene	4.6E+01	mg/kg	N/A		N/A		N/A	2.8E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	N/A		N/A		N/A	3.0E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	N/A		N/A		N/A	2.9E-06	mg/kg/day	1.0E-03	mg/kg/day	2.9E-03
				Fluoranthene	1.1E+02	mg/kg	N/A		N/A		N/A	6.8E-05	mg/kg/day	N/A		N/A
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	N/A		N/A		N/A	9.4E-06	mg/kg/day	N/A		N/A
				Naphthalene	5.8E+00	mg/kg	N/A		N/A		N/A	3.6E-06	mg/kg/day	2.0E-02	mg/kg/day	1.8E-04
				Pyrene	8.5E+01	mg/kg	N/A		N/A		N/A	5.3E-05	mg/kg/day	3.0E-02	mg/kg/day	1.8E-03
				Aldrin	4.6E-03	mg/kg	N/A		N/A		N/A	2.2E-09	mg/kg/day	3.0E-05	mg/kg/day	7.4E-05
				Aroclor-1242	1.1E+00	mg/kg	N/A		N/A		N/A	7.3E-07	mg/kg/day	N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	N/A		N/A		N/A	2.7E-07	mg/kg/day	N/A		N/A
				Dieldrin	1.8E-01	mg/kg	N/A		N/A		N/A	8.8E-08	mg/kg/day	5.0E-05	mg/kg/day	1.8E-03
				gamma-BHC (Lindane)	2.4E-01	mg/kg	N/A		N/A		N/A	4.6E-08	mg/kg/day	3.0E-04	mg/kg/day	1.5E-04
				Aluminum	1.3E+04	mg/kg	N/A		N/A		N/A	6.4E-04	mg/kg/day	1.0E+00	mg/kg/day	6.4E-04
				Arsenic	4.0E+01	mg/kg	N/A		N/A		N/A	5.7E-06	mg/kg/day	3.0E-04	mg/kg/day	1.9E-02

TABLE 7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Chromium (hexavalent)	4.3E-01	mg/kg	N/A		N/A		N/A	2.1E-08	mg/kg/day	7.5E-05	mg/kg/day	2.7E-04
				Cobalt	3.6E+00	mg/kg	N/A		N/A		N/A	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	5.7E-04
				Iron	2.1E+04	mg/kg	N/A		N/A		N/A	1.0E-03	mg/kg/day	7.0E-01	mg/kg/day	1.4E-03
				Lead	3.7E+01	mg/kg	N/A		N/A		N/A	1.8E-06	mg/kg/day	N/A		N/A
				Manganese	1.4E+02	mg/kg	N/A		N/A		N/A	6.9E-06	mg/kg/day	9.6E-04	mg/kg/day	7.2E-03
				Thallium	3.8E-01	mg/kg	N/A		N/A		N/A	1.8E-08	mg/kg/day	1.0E-05	mg/kg/day	1.8E-03
				Vanadium	3.5E+01	mg/kg	N/A		N/A		N/A	1.7E-06	mg/kg/day	5.0E-03	mg/kg/day	3.4E-04
			Exp. Route Total								N/A					3.8E-02
		Exposure Point Total									N/A					1.1E+00
	Exposure Medium Total										N/A					1.1E+00
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	N/A		N/A		N/A	6.1E-05	mg/m^3	3.0E-03	mg/m^3	2.0E-02
			Exp. Route Total								N/A					2.0E-02
		Exposure Point Total									N/A					2.0E-02
	Exposure Medium Total										N/A					2.0E-02
Soil* from inside and outside the Fenced Area											N/A					1.2E+00
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	8.5E-05	mg/kg/day	7.0E-02	mg/kg/day	1.2E-03
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	6.0E-04	mg/kg/day	4.0E-03	mg/kg/day	1.5E-01
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	4.3E-04	mg/kg/day	1.0E-01	mg/kg/day	4.3E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	8.5E-04	mg/kg/day	2.0E-01	mg/kg/day	4.3E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	1.7E-05	mg/kg/day	5.0E-04	mg/kg/day	3.4E-02
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	7.5E-04	mg/kg/day	2.0E-01	mg/kg/day	3.8E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	3.4E-04	mg/kg/day	5.0E-02	mg/kg/day	6.8E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	1.2E-03	mg/kg/day	2.0E-02	mg/kg/day	6.2E-02
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	3.6E-04	mg/kg/day	4.0E-03	mg/kg/day	8.9E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	4.1E-05	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	3.0E-05	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	4.1E-05	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	4.0E-05	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	9.5E-06	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	8.1E-04	mg/kg/day	1.0E-03	mg/kg/day	8.1E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	5.1E-05	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	5.1E-03	mg/kg/day	2.0E-02	mg/kg/day	2.6E-01
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	7.3E-07	mg/kg/day	5.0E-05	mg/kg/day	1.5E-02
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	4.7E-01	mg/kg/day	1.0E+00	mg/kg/day	4.7E-01
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	2.4E-05	mg/kg/day	4.0E-04	mg/kg/day	5.9E-02
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	7.4E-04	mg/kg/day	3.0E-04	mg/kg/day	2.5E+00
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	6.7E-03	mg/kg/day	2.0E-01	mg/kg/day	3.4E-02
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	6.6E-04	mg/kg/day	3.0E-03	mg/kg/day	2.2E-01
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	1.0E-04	mg/kg/day	3.0E-04	mg/kg/day	3.4E-01
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	1.1E+00	mg/kg/day	7.0E-01	mg/kg/day	1.6E+00
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	1.9E-04	mg/kg/day	N/A		N/A

TABLE 7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	N/A		N/A		N/A	1.5E-02	mg/kg/day	2.4E-02	mg/kg/day	6.2E-01
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	2.5E-05	mg/kg/day	3.0E-04	mg/kg/day	8.4E-02
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	4.7E-05	mg/kg/day	1.0E-05	mg/kg/day	4.7E+00
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	1.2E-03	mg/kg/day	5.0E-03	mg/kg/day	2.5E-01
			Exp. Route Total								N/A					1.2E+01
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	N/A		N/A		N/A	3.2E-05	mg/kg/day	7.0E-02	mg/kg/day	4.5E-04
				Benzene	1.4E+01	ug/L	N/A		N/A		N/A	5.0E-05	mg/kg/day	4.0E-03	mg/kg/day	1.3E-02
				Ethylbenzene	1.0E+01	ug/L	N/A		N/A		N/A	1.4E-04	mg/kg/day	1.0E-01	mg/kg/day	1.4E-03
				m- and p-Xylene	2.0E+01	ug/L	N/A		N/A		N/A	3.1E-04	mg/kg/day	2.0E-01	mg/kg/day	1.5E-03
				Trichloroethene	4.0E-01	ug/L	N/A		N/A		N/A	1.6E-06	mg/kg/day	5.0E-04	mg/kg/day	3.2E-03
				Xylene, total	1.8E+01	ug/L	N/A		N/A		N/A	2.7E-04	mg/kg/day	2.0E-01	mg/kg/day	1.4E-03
				1,1-Biphenyl	8.0E+00	ug/L	N/A		N/A		N/A	2.9E-04	mg/kg/day	5.0E-02	mg/kg/day	5.8E-03
				2,4-Dimethylphenol	2.9E+01	ug/L	N/A		N/A		N/A	1.0E-04	mg/kg/day	2.0E-02	mg/kg/day	5.1E-03
				2-Methylnaphthalene	8.3E+00	ug/L	N/A		N/A		N/A	2.8E-04	mg/kg/day	4.0E-03	mg/kg/day	6.9E-02
				Benzo(a)anthracene	9.6E-01	ug/L	N/A		N/A		N/A	2.9E-04	mg/kg/day	N/A		N/A
				Benzo(a)pyrene	6.9E-01	ug/L	N/A		N/A		N/A	3.6E-04	mg/kg/day	N/A		N/A
				Benzo(b)fluoranthene	9.5E-01	ug/L	N/A		N/A		N/A	5.0E-04	mg/kg/day	N/A		N/A
				Benzo(k)fluoranthene	9.3E-01	ug/L	N/A		N/A		N/A	4.7E-04	mg/kg/day	N/A		N/A
				Dibenz(a,h)anthracene	2.2E-01	ug/L	N/A		N/A		N/A	1.8E-04	mg/kg/day	N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	N/A		N/A		N/A	4.0E-04	mg/kg/day	1.0E-03	mg/kg/day	4.0E-01
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	N/A		N/A		N/A	6.5E-04	mg/kg/day	N/A		N/A
				Naphthalene	1.2E+02	ug/L	N/A		N/A		N/A	1.9E-03	mg/kg/day	2.0E-02	mg/kg/day	9.4E-02
				Dieldrin	1.7E-02	ug/L	N/A		N/A		N/A	2.8E-07	mg/kg/day	5.0E-05	mg/kg/day	5.7E-03
				Aluminum	1.1E+04	ug/L	N/A		N/A		N/A	1.0E-03	mg/kg/day	1.0E+00	mg/kg/day	1.0E-03
				Antimony	5.5E-01	ug/L	N/A		N/A		N/A	5.1E-08	mg/kg/day	6.0E-05	mg/kg/day	8.6E-04
				Arsenic	1.7E+01	ug/L	N/A		N/A		N/A	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	5.4E-03
				Barium	1.6E+02	ug/L	N/A		N/A		N/A	1.5E-05	mg/kg/day	1.4E-02	mg/kg/day	1.0E-03
				Chromium	1.5E+01	ug/L	N/A		N/A		N/A	2.9E-06	mg/kg/day	7.5E-05	mg/kg/day	3.8E-02
				Cobalt	2.4E+00	ug/L	N/A		N/A		N/A	9.0E-08	mg/kg/day	3.0E-04	mg/kg/day	3.0E-04
				Iron	2.6E+04	ug/L	N/A		N/A		N/A	2.4E-03	mg/kg/day	7.0E-01	mg/kg/day	3.5E-03
				Lead	4.5E+00	ug/L	N/A		N/A		N/A	4.2E-07	mg/kg/day	N/A		N/A
				Manganese	3.5E+02	ug/L	N/A		N/A		N/A	3.2E-05	mg/kg/day	9.6E-04	mg/kg/day	3.4E-02
				Mercury	5.9E-01	ug/L	N/A		N/A		N/A	5.5E-08	mg/kg/day	2.1E-05	mg/kg/day	2.6E-03
				Thallium	1.1E+00	ug/L	N/A		N/A		N/A	1.0E-07	mg/kg/day	1.0E-05	mg/kg/day	1.0E-02
				Vanadium	2.9E+01	ug/L	N/A		N/A		N/A	2.7E-06	mg/kg/day	5.0E-03	mg/kg/day	5.4E-04
			Exp. Route Total								N/A					7.0E-01
		Exposure Point Total									N/A					7.0E-01
	Exposure Medium Total										N/A					1.3E+01
Groundwater Total											N/A					1.3E+01
										Total of Receptor Risk	N/A				Total of Receptor Hazard	1.4E+01

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

DAevent for exposure to groundwater calculated on Table 7.8.CTE Supplement A.

Table 7.9.CTE Supplement A
Calculation of DAevent for Groundwater
Resident Child
Cheatham Annex Site 4/Youth Pond, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical of Potential Concern	Water Concentration (CW) (µg/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
1,4-Dichlorobenzene	2.0E+00	4.2E-02	2.0E-01	7.1E-01	1.7E+00	1.0E+00	0.33	1.1E-07	2
Benzene	1.4E+01	1.5E-02	5.1E-02	2.9E-01	7.0E-01	1.0E+00	0.33	1.8E-07	2
Ethylbenzene	1.0E+01	4.9E-02	2.0E-01	4.2E-01	1.0E+00	1.0E+00	0.33	5.1E-07	2
m- and p-Xylene	2.0E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.33	1.1E-06	2
Trichloroethene	4.0E-01	1.2E-02	5.1E-02	5.8E-01	1.4E+00	1.0E+00	0.33	5.6E-09	2
Xylene, total	1.8E+01	5.3E-02	2.1E-01	4.2E-01	1.0E+00	1.0E+00	0.33	9.6E-07	2
1,1-Biphenyl[1]	8.0E+00	9.2E-02	4.4E-01	7.7E-01	1.8E+00	1.0E+00	0.33	1.0E-06	2
2,4-Dimethylphenol	2.9E+01	1.1E-02	4.6E-02	5.2E-01	1.2E+00	1.0E+00	0.33	3.6E-07	2
2-Methylnaphthalene[1]	8.3E+00	9.2E-02	4.1E-01	6.6E-01	1.6E+00	1.0E+00	0.33	9.8E-07	2
Benzo(a)anthracene	9.6E-01	4.7E-01	2.8E+00	2.0E+00	8.5E+00	1.0E+00	0.33	1.0E-06	2
Benzo(a)pyrene	6.9E-01	7.0E-01	4.3E+00	2.7E+00	1.2E+01	1.0E+00	0.33	1.3E-06	2
Benzo(b)fluoranthene	9.5E-01	7.0E-01	4.3E+00	2.8E+00	1.2E+01	1.0E+00	0.33	1.8E-06	2
Benzo(k)fluoranthene[1]	9.3E-01	6.9E-01	4.0E+00	2.7E+00	1.2E+01	1.0E+00	0.33	1.7E-06	2
Dibenz(a,h)anthracene	2.2E-01	1.5E+00	9.7E+00	3.9E+00	1.8E+01	6.0E-01	0.33	6.3E-07	2
Dibenzofuran	1.9E+01	9.8E-02	4.9E-01	1.9E-01	9.8E-02	1.0E+00	0.33	1.4E-06	3
Indeno(1,2,3-cd)pyrene	1.2E+00	1.0E+00	6.7E+00	3.8E+00	1.7E+01	6.0E-01	0.33	2.3E-06	2
Naphthalene	1.2E+02	4.7E-02	2.0E-01	5.6E-01	1.3E+00	1.0E+00	0.33	6.7E-06	2
Dieldrin	1.7E-02	1.2E-02	9.2E-02	1.5E+01	3.5E+01	8.0E-01	0.33	1.0E-09	2
Aluminum	1.1E+04	1.0E-03	N/A	N/A	N/A	N/A	0.33	3.7E-06	1
Antimony	5.5E-01	1.0E-03	N/A	N/A	N/A	N/A	0.33	1.8E-10	1
Arsenic	1.7E+01	1.0E-03	N/A	N/A	N/A	N/A	0.33	5.7E-09	1
Barium	1.6E+02	1.0E-03	N/A	N/A	N/A	N/A	0.33	5.2E-08	1
Chromium	1.5E+01	2.0E-03	N/A	N/A	N/A	N/A	0.33	1.0E-08	1
Cobalt	2.4E+00	4.0E-04	N/A	N/A	N/A	N/A	0.33	3.2E-10	1
Iron	2.6E+04	1.0E-03	N/A	N/A	N/A	N/A	0.33	8.6E-06	1
Lead	4.5E+00	1.0E-03	N/A	N/A	N/A	N/A	0.33	1.5E-09	1
Manganese	3.5E+02	1.0E-03	N/A	N/A	N/A	N/A	0.33	1.1E-07	1
Mercury	5.9E-01	1.0E-03	N/A	N/A	N/A	N/A	0.33	1.9E-10	1
Thallium	1.1E+00	1.0E-03	N/A	N/A	N/A	N/A	0.33	3.6E-10	1
Vanadium	2.9E+01	1.0E-03	N/A	N/A	N/A	N/A	0.33	9.5E-09	1

Notes:
m-Xylene used for xylenes
NA - Not applicable
Permeability constants from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005. The default value of 0.001 was assigned to inorganics not listed in this document.
B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).
t* - Time to reach steady-state
[1]Lag time and B calculated on Table 7.7.RME Supplement B
* Permeability constants calculated using Equation 3.8 (log K_p = 2.80 + 0.66 log K_{ow} - 0.0056 MW, where r^2 = 0.66) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final)* . EPA/540/R/99/005.

B calculated using Equation A.1 (B = K_p * $MW^{1/2}$/2.6) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

τ_{event} calculated using Equation A.4 ($\tau_{event} = l_{sc}^{2/6D}{}_{sc}$ = 0.105 × 10^[0.0056 MW]) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Since B ≤ 0.6, then t* calculated using Equation A.4 (t* = 2.4 τ_{event}) from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final). EPA/540/R/99/005.*

Inorganics: DAevent (mg/cm2-event) =
Kp x CW x tevent x 0.001 mg/ug x 0.001 l/cm^3 (eq 1)

Organics: DAevent (mg/cm2-event) =
If tevent<t*, then DAevent =
2 x FA x Kp x CW x (sqrt((6 x τ_{event} x t_{event})/π)) x 0.001 mg/ug x 0.001 l/cm^3 (eq 2)

If tevent>t*, then DAevent =
FA x Kp x CW x (t_{event}/(1+B) + 2 x τ_{event} x ((1 + 3xB + 3xB^2)/(1+B)^2) x 0.001 mg/ug x 0.001 l/cm^3 (eq 3)

TABLE 7.10.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil*	Soil*	Soil* inside and outside Fenced Area	Ingestion	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	6.4E-05	N/A		N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	4.6E-04	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	7.1E-05	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	2.9E-06	N/A		N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	1.9E-06	mg/kg/day	1.4E-02	1/mg/kg-day	2.7E-08	N/A		N/A		N/A
				Carbazole	3.2E+01	mg/kg	1.4E-05	mg/kg/day	2.0E-02	1/mg/kg-day	2.8E-07	N/A		N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	7.5E-07	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	7.9E-05	N/A		N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.6E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Fluoranthene	1.1E+02	mg/kg	4.6E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	2.5E-05	N/A		N/A		N/A
				Naphthalene	5.8E+00	mg/kg	2.4E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Pyrene	8.5E+01	mg/kg	3.6E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Aldrin	4.6E-03	mg/kg	2.0E-09	mg/kg/day	1.7E+01	1/mg/kg-day	3.3E-08	N/A		N/A		N/A
				Aroclor-1242	1.1E+00	mg/kg	4.6E-07	mg/kg/day	2.0E+00	1/mg/kg-day	9.2E-07	N/A		N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	1.7E-07	mg/kg/day	2.0E+00	1/mg/kg-day	3.4E-07	N/A		N/A		N/A
				Dieldrin	1.8E-01	mg/kg	7.8E-08	mg/kg/day	1.6E+01	1/mg/kg-day	1.2E-06	N/A		N/A		N/A
				gamma-BHC (Lindane)	2.4E-01	mg/kg	1.0E-07	mg/kg/day	1.1E+00	1/mg/kg-day	1.1E-07	N/A		N/A		N/A
				Aluminum	1.3E+04	mg/kg	5.7E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	4.0E+01	mg/kg	1.7E-05	mg/kg/day	1.5E+00	1/mg/kg-day	2.5E-05	N/A		N/A		N/A
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			5.0E-01	1/mg/kg-day	4.8E-07	N/A		N/A		N/A
				Cobalt	3.6E+00	mg/kg	1.5E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.1E+04	mg/kg	8.9E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	3.7E+01	mg/kg	1.6E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	1.4E+02	mg/kg	6.1E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	3.8E-01	mg/kg	1.6E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.5E+01	mg/kg	1.5E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								7.4E-04					N/A
			Dermal Absorption[1]	Benzo(a)anthracene[2]	3.9E+01	mg/kg			7.3E-01	1/mg/kg-day	9.4E-06	N/A		N/A		N/A
				Benzo(a)pyrene[2]	2.8E+01	mg/kg			7.3E+00	1/mg/kg-day	6.8E-05	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	4.4E+01	mg/kg			7.3E-01	1/mg/kg-day	1.0E-05	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	1.8E+01	mg/kg			7.3E-02	1/mg/kg-day	4.3E-07	N/A		N/A		N/A
				bis(2-Ethylhexyl)phthalate	4.6E+00	mg/kg	2.2E-07	mg/kg/day	1.4E-02	1/mg/kg-day	3.0E-09	N/A		N/A		N/A
				Carbazole	3.2E+01	mg/kg	1.5E-06	mg/kg/day	2.0E-02	1/mg/kg-day	3.1E-08	N/A		N/A		N/A
				Chrysene[2]	4.6E+01	mg/kg			7.3E-03	1/mg/kg-day	1.1E-07	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	4.8E+00	mg/kg			7.3E+00	1/mg/kg-day	1.2E-05	N/A		N/A		N/A
				Dibenzofuran	6.1E+00	mg/kg	2.9E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Fluoranthene	1.1E+02	mg/kg	6.7E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.5E+01	mg/kg			7.3E-01	1/mg/kg-day	3.6E-06	N/A		N/A		N/A
				Naphthalene	5.8E+00	mg/kg	3.6E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Pyrene	8.5E+01	mg/kg	5.2E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Aldrin	4.6E-03	mg/kg	2.2E-10	mg/kg/day	1.7E+01	1/mg/kg-day	3.7E-09	N/A		N/A		N/A
				Aroclor-1242	1.1E+00	mg/kg	7.2E-08	mg/kg/day	2.0E+00	1/mg/kg-day	1.4E-07	N/A		N/A		N/A
				Aroclor-1260	4.0E-01	mg/kg	2.7E-08	mg/kg/day	2.0E+00	1/mg/kg-day	5.3E-08	N/A		N/A		N/A
				Dieldrin	1.8E-01	mg/kg	8.7E-09	mg/kg/day	1.6E+01	1/mg/kg-day	1.4E-07	N/A		N/A		N/A
				gamma-BHC (Lindane)	2.4E-01	mg/kg	4.6E-09	mg/kg/day	1.1E+00	1/mg/kg-day	5.1E-09	N/A		N/A		N/A
				Aluminum	1.3E+04	mg/kg	6.4E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A

TABLE 7.10.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Arsenic	4.0E+01	mg/kg	5.7E-07	mg/kg/day	1.5E+00	1/mg/kg-day	8.5E-07	N/A		N/A		N/A
				Chromium (hexavalent)[2]	4.3E-01	mg/kg			2.0E+01	1/mg/kg-day	2.2E-07	N/A		N/A		N/A
Soil* (cont'd)	Soil*	Soil* inside and outside Fenced Area	Dermal Absorption[1]	Cobalt	3.6E+00	mg/kg	1.7E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.1E+04	mg/kg	9.9E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	3.7E+01	mg/kg	1.8E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	1.4E+02	mg/kg	6.8E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	3.8E-01	mg/kg	1.8E-09	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	3.5E+01	mg/kg	1.7E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								1.0E-04					N/A
		Exposure Point Total									8.4E-04					N/A
	Exposure Medium Total										8.4E-04					N/A
	Air	Emissions from Soil* inside and outside Fenced Area	Inhalation	Naphthalene	9.6E-02	µg/m^3	1.3E-02	µg/m^3	3.4E-05	(µg/m^3)$^{-1}$	4.5E-07	N/A		N/A		N/A
			Exp. Route Total								4.5E-07					N/A
		Exposure Point Total									4.5E-07					N/A
	Exposure Medium Total										4.5E-07					N/A
Soil* from inside and outside the Fenced Area											8.4E-04					N/A
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	1,4-Dichlorobenzene	2.0E+00	ug/L	1.1E-05	mg/kg/day	5.4E-03		5.7E-08	N/A		N/A		N/A
				Benzene	1.4E+01	ug/L	7.4E-05	mg/kg/day	5.5E-02		4.1E-06	N/A		N/A		N/A
				Ethylbenzene	1.0E+01	ug/L	5.3E-05	mg/kg/day	1.1E-02		5.8E-07	N/A		N/A		N/A
				m- and p-Xylene	2.0E+01	ug/L	1.1E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene (†)	4.0E-01	ug/L			N/A		N/A	N/A		N/A		N/A
				Trichloroethene (Kidney)	4.0E-01	ug/L			9.3E-03	1/mg/kg-day	1.0E-07	N/A		N/A		N/A
				Trichloroethene (NHL + Liver)	4.0E-01	ug/L	2.1E-06	mg/kg/day	3.7E-02	1/mg/kg-day	7.9E-08	N/A		N/A		N/A
				Xylene, total	1.8E+01	ug/L	9.4E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	8.0E+00	ug/L	4.2E-05	mg/kg/day	8.0E-03		3.4E-07	N/A		N/A		N/A
				2,4-Dimethylphenol	2.9E+01	ug/L	1.5E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	8.3E+00	ug/L	4.4E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Benzo(a)anthracene[2]	9.6E-01	ug/L			7.3E-01	1/mg/kg-day	1.9E-05	N/A		N/A		N/A
				Benzo(a)pyrene[2]	6.9E-01	ug/L			7.3E+00	1/mg/kg-day	1.4E-04	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	9.5E-01	ug/L			7.3E-01	1/mg/kg-day	1.9E-05	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	9.3E-01	ug/L			7.3E-02	1/mg/kg-day	1.9E-06	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	ug/L			7.3E+00	1/mg/kg-day	4.5E-05	N/A		N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	1.0E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.2E+00	ug/L			7.3E-01	1/mg/kg-day	2.4E-05	N/A		N/A		N/A
				Naphthalene	1.2E+02	ug/L	6.4E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dieldrin	1.7E-02	ug/L	9.0E-08	mg/kg/day	1.6E+01	1/mg/kg-day	1.4E-06	N/A		N/A		N/A
				Aluminum	1.1E+04	ug/L	5.9E-02	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Antimony	5.5E-01	ug/L	2.9E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	1.7E+01	ug/L	9.2E-05	mg/kg/day	1.5E+00	1/mg/kg-day	1.4E-04	N/A		N/A		N/A
				Barium	1.6E+02	ug/L	8.4E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Chromium[2]	1.5E+01	ug/L			5.0E-01	1/mg/kg-day	2.1E-04	N/A		N/A		N/A
				Cobalt	2.4E+00	ug/L	1.3E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.6E+04	ug/L	1.4E-01	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	4.5E+00	ug/L	2.4E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A

TABLE 7.10.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Manganese	3.5E+02	ug/L	1.8E-03	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Mercury	5.9E-01	ug/L	3.1E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	1.1E+00	ug/L	5.8E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	2.9E+01	ug/L	1.5E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								6.1E-04					N/A
			Dermal	1,4-Dichlorobenzene	2.0E+00	ug/L	4.8E-06	mg/kg/day	5.4E-03	1/mg/kg-day	2.6E-08	N/A		N/A		N/A
				Benzene	1.4E+01	ug/L	7.6E-06	mg/kg/day	5.5E-02	1/mg/kg-day	4.2E-07	N/A		N/A		N/A
				Ethylbenzene	1.0E+01	ug/L	2.2E-05	mg/kg/day	1.1E-02	1/mg/kg-day	2.4E-07	N/A		N/A		N/A
				m- and p-Xylene	2.0E+01	ug/L	4.7E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene (†)	4.0E-01	ug/L			N/A		N/A	N/A		N/A		N/A
				Trichloroethene (Kidney)	4.0E-01	ug/L			9.3E-03	1/mg/kg-day	5.9E-08	N/A		N/A		N/A
				Trichloroethene (NHL + Liver)	4.0E-01	ug/L	2.4E-07	mg/kg/day	3.7E-02	1/mg/kg-day	8.9E-09	N/A		N/A		N/A
				Xylene, total	1.8E+01	ug/L	4.1E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	8.0E+00	ug/L	4.4E-05	mg/kg/day	8.0E-03	1/mg/kg-day	3.5E-07	N/A		N/A		N/A
				2,4-Dimethylphenol	2.9E+01	ug/L	1.5E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	8.3E+00	ug/L	4.2E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Benzo(a)anthracene[2]	9.6E-01	ug/L			7.3E-01	1/mg/kg-day	1.6E-04	N/A		N/A		N/A
				Benzo(a)pyrene[2]	6.9E-01	ug/L			7.3E+00	1/mg/kg-day	2.0E-03	N/A		N/A		N/A
				Benzo(b)fluoranthene[2]	9.5E-01	ug/L			7.3E-01	1/mg/kg-day	2.8E-04	N/A		N/A		N/A
				Benzo(k)fluoranthene[2]	9.3E-01	ug/L			7.3E-02	1/mg/kg-day	2.7E-05	N/A		N/A		N/A
				Dibenz(a,h)anthracene[2]	2.2E-01	ug/L			7.3E+00	1/mg/kg-day	1.0E-03	N/A		N/A		N/A
				Dibenzofuran	1.9E+01	ug/L	6.2E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Indeno(1,2,3-cd)pyrene[2]	1.2E+00	ug/L			7.3E-01	1/mg/kg-day	3.7E-04	N/A		N/A		N/A
				Naphthalene	1.2E+02	ug/L	2.8E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dieldrin	1.7E-02	ug/L	4.3E-08	mg/kg/day	1.6E+01	1/mg/kg-day	6.9E-07	N/A		N/A		N/A
				Aluminum	1.1E+04	ug/L	1.5E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Antimony	5.5E-01	ug/L	7.3E-09	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Arsenic	1.7E+01	ug/L	2.3E-07	mg/kg/day	1.5E+00	1/mg/kg-day	3.4E-07	N/A		N/A		N/A
				Barium	1.6E+02	ug/L	2.1E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Chromium[2]	1.5E+01	ug/L			2.0E+01	1/mg/kg-day	4.2E-05	N/A		N/A		N/A
				Cobalt	2.4E+00	ug/L	1.3E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Iron	2.6E+04	ug/L	3.5E-04	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Lead	4.5E+00	ug/L	6.0E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Manganese	3.5E+02	ug/L	4.6E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Mercury	5.9E-01	ug/L	7.8E-09	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Thallium	1.1E+00	ug/L	1.5E-08	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Vanadium	2.9E+01	ug/L	3.8E-07	mg/kg/day	N/A		N/A	N/A		N/A		N/A
			Exp. Route Total								3.9E-03					N/A
		Exposure Point Total									4.5E-03					N/A
	Exposure Medium Total										4.5E-03					N/A

TABLE 7.10.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater (cont'd)	Air	Water Vapors at Showerhead	Inhalation													
				1,4-Dichlorobenzene	1.6E-06	$\mu g/m^3$	1.4E-06	mg/kg/day	1.1E-05	$(\mu g/m^3)^{-1}$	1.5E-11	N/A		N/A		N/A
				Benzene	1.6E-05	$\mu g/m^3$	1.4E-05	mg/kg/day	7.8E-06	$(\mu g/m^3)^{-1}$	1.1E-10	N/A		N/A		N/A
				Ethylbenzene	1.0E-05	$\mu g/m^3$	8.7E-06	mg/kg/day	2.5E-06	$(\mu g/m^3)^{-1}$	2.2E-11	N/A		N/A		N/A
				m- and p-Xylene	2.0E-05	$\mu g/m^3$	1.7E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Trichloroethene	3.7E-07	$\mu g/m^3$	3.2E-07	mg/kg/day	4.1E-06	$(\mu g/m^3)^{-1}$	1.3E-12	N/A		N/A		N/A
				Xylene, total	1.8E-05	$\mu g/m^3$	1.5E-05	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				1,1-Biphenyl	4.0E-06	$\mu g/m^3$	3.4E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				2-Methylnaphthalene	5.2E-06	$\mu g/m^3$	4.5E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Dibenzofuran	7.6E-06	$\mu g/m^3$	6.5E-06	mg/kg/day	N/A		N/A	N/A		N/A		N/A
				Naphthalene	7.5E-05	$\mu g/m^3$	6.4E-05	mg/kg/day	3.4E-05	$(\mu g/m^3)^{-1}$	2.2E-09	N/A		N/A		N/A
			Exp. Route Total								2.3E-09					N/A
		Exposure Point Total									2.3E-09					N/A
	Exposure Medium Total										2.3E-09					N/A
Groundwater Total											4.5E-03					N/A
										Total of Receptor Risk	5.4E-03				Total of Receptor Hazard	N/A

N/A = Not applicable.

[1] Dermal absorption factors (DABS) used to calculate dermal absorption intake from soil and sediment are chemical specific.

DABs of 0.1 used for SVOCs, and pesticides, DABS of 0.13 for PAHs, DABS of 0.14 for aroclors, DABS of 0.04 for lindane, DABS of 0.03 used for arsenic, DABS of 0.01 for all other inorganics.

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

DAevent for exposure to groundwater calculated on Tables 7.8.CTE Supplement A and 7.9.CTE Supplement A.

Inhalation exposure for groundwater while showering calculated on Table 7.7.CTE Supplement B.

[2] See Table 7.10.CTE Supplement A for calculation of cancer intake and cancer risk following MMOA method.

TABLE 7.10.CTE Supplement A

CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations										
							Intake					CSF/Unit Risk					Cancer Risk
					Value	Units	Value				Units	Value				Units	
							0-2 yrs	2-6 yrs	6-16 years	16-30 yrs		0-2 yrs (ADAF=10)	2-6 yrs (ADAF=3)	6-16 yrs (ADAF=3)	16-30 yrs (ADAF=1)		
Soil*	Soil*	Soil* inside and outside the Fenced Area	Ingestion	Benzo(a)anthracene	3.9E+01	mg/kg	4.8E-06	9.6E-06	2.6E-06	3.6E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	6.4E-05
				Benzo(a)pyrene	2.8E+01	mg/kg	3.5E-06	6.9E-06	1.9E-06	2.6E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	4.6E-04
				Benzo(b)fluoranthene	4.4E+01	mg/kg	5.3E-06	1.1E-05	2.8E-06	4.0E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	7.1E-05
				Benzo(k)fluoranthene	1.8E+01	mg/kg	2.2E-06	4.4E-06	1.2E-06	1.6E-06	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	2.9E-06
				Chrysene	4.6E+01	mg/kg	5.6E-06	1.1E-05	3.0E-06	4.2E-06	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	1/(mg/kg-day)	7.5E-07
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	5.9E-07	1.2E-06	3.2E-07	4.4E-07	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	7.9E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	1.9E-06	3.7E-06	9.9E-07	1.4E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	2.5E-05
				Chromium (hexavalent)	4.3E-01	mg/kg	5.3E-08	1.1E-07	2.8E-08	3.9E-08	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	4.8E-07
			Dermal	Benzo(a)anthracene	3.9E+01	mg/kg	7.0E-07	1.4E-06	3.8E-07	5.3E-07	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	9.4E-06
				Benzo(a)pyrene	2.8E+01	mg/kg	5.1E-07	1.0E-06	2.8E-07	3.9E-07	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	6.8E-05
				Benzo(b)fluoranthene	4.4E+01	mg/kg	7.7E-07	1.5E-06	4.2E-07	5.9E-07	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	1.0E-05
				Benzo(k)fluoranthene	1.8E+01	mg/kg	3.2E-07	6.3E-07	1.7E-07	2.4E-07	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	4.3E-07
				Chrysene	4.6E+01	mg/kg	8.1E-07	1.6E-06	4.4E-07	6.2E-07	mg/kg/day	7.3E-02	2.2E-02	2.2E-02	7.3E-03	1/(mg/kg-day)	1.1E-07
				Dibenz(a,h)anthracene	4.8E+00	mg/kg	8.6E-08	1.7E-07	4.7E-08	6.6E-08	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	1.2E-05
				Indeno(1,2,3-cd)pyrene	1.5E+01	mg/kg	2.7E-07	5.4E-07	1.5E-07	2.1E-07	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	3.6E-06
				Chromium (hexavalent)	4.3E-01	mg/kg	5.9E-10	1.2E-09	3.2E-10	4.5E-10	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	2.2E-07
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Ingestion	Trichloroethene (Kidney)	4.0E-01	ug/L	4.9E-07	9.8E-07	7.3E-07	1.0E-06	mg/kg/day	9.3E-02	2.8E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	1.0E-07
				Benzo(a)anthracene	9.6E-01	ug/L	1.2E-06	2.3E-06	1.7E-06	2.4E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	1.9E-05
				Benzo(a)pyrene	6.9E-01	ug/L	8.5E-07	1.7E-06	1.3E-06	1.8E-06	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	1.4E-04
				Benzo(b)fluoranthene	9.5E-01	ug/L	1.2E-06	2.3E-06	1.7E-06	2.4E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	1.9E-05
				Benzo(k)fluoranthene	9.3E-01	ug/L	1.1E-06	2.3E-06	1.7E-06	2.4E-06	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	1.9E-06
				Dibenz(a,h)anthracene	2.2E-01	ug/L	2.7E-07	5.4E-07	4.1E-07	5.7E-07	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	4.5E-05
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	1.5E-06	2.9E-06	2.2E-06	3.1E-06	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	2.4E-05
				Chromium	1.5E+01	ug/L	1.9E-05	3.8E-05	2.8E-05	4.0E-05	mg/kg/day	5.0E+00	1.5E+00	1.5E+00	5.0E-01	1/(mg/kg-day)	2.1E-04
			Dermal	Trichloroethene (Kidney)	4.0E-01	ug/L	4.5E-08	1.8E-06	1.2E-07	1.6E-07	mg/kg/day	9.3E-02	2.8E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	5.9E-08
				Benzo(a)anthracene	9.6E-01	ug/L	8.3E-06	1.7E-05	2.1E-05	2.9E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	1.6E-04
				Benzo(a)pyrene	6.9E-01	ug/L	1.0E-05	2.0E-05	2.6E-05	3.6E-05	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	2.0E-03
				Benzo(b)fluoranthene	9.5E-01	ug/L	1.4E-05	2.8E-05	3.6E-05	5.0E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	2.8E-04
				Benzo(k)fluoranthene	9.3E-01	ug/L	1.3E-05	2.7E-05	3.4E-05	4.8E-05	mg/kg/day	7.3E-01	2.2E-01	2.2E-01	7.3E-02	1/(mg/kg-day)	2.7E-05
				Dibenz(a,h)anthracene	2.2E-01	ug/L	5.1E-06	1.0E-05	1.3E-05	1.8E-05	mg/kg/day	7.3E+01	2.2E+01	2.2E+01	7.3E+00	1/(mg/kg-day)	1.0E-03
				Indeno(1,2,3-cd)pyrene	1.2E+00	ug/L	1.9E-05	3.7E-05	4.7E-05	6.6E-05	mg/kg/day	7.3E+00	2.2E+00	2.2E+00	7.3E-01	1/(mg/kg-day)	3.7E-04
				Chromium	1.5E+01	ug/L	8.2E-08	1.6E-07	1.8E-07	2.5E-07	mg/kg/day	2.0E+02	6.0E+01	6.0E+01	2.0E+01	1/(mg/kg-day)	4.2E-05

Cancer risk = $(Intake_{0\text{-}2} \times CSF_{0\text{-}2}) + (Intake_{2\text{-}6} \times CSF_{2\text{-}6}) + (Intake_{6\text{-}16} \times CSF_{6\text{-}16}) + (Intake_{16\text{-}30} \times CSF_{16\text{-}30})$

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	5E-05	N/A	4E-05	9E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	3E-04	N/A	3E-04	6E-04	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	5E-05	N/A	4E-05	9E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	2E-06	N/A	2E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Carbazole	8E-07	N/A	6E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Chrysene	5E-07	N/A	5E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	6E-05	N/A	5E-05	1E-04	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	2E-02	N/A	1E-02	3E-02
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-02	N/A	1E-02	2E-02
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	2E-05	3E-05	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-03	N/A	1E-03	2E-03
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	1E-02	2E-02
			Dieldrin	4E-06	N/A	2E-06	6E-06	Liver	1E-02	N/A	8E-03	2E-02
			gamma-BHC (Lindane)	3E-07	N/A	9E-08	4E-07	Kidney, Liver	3E-03	N/A	7E-04	4E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	1E-02	N/A	8E-04	1E-02
			Arsenic	4E-06	N/A	8E-07	5E-06	Skin, Vascular	2E-02	N/A	5E-03	3E-02
			Chromium (hexavalent)	9E-08	N/A	2E-07	3E-07	NOE	2E-04	N/A	5E-04	6E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-02	N/A	1E-03	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	2E-03	3E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-02	N/A	2E-02	3E-02
			Chemical Total	5E-04	N/A	4E-04	1E-03		2E-01	N/A	7E-02	2E-01
		Exposure Point Total					1E-03					2E-01
	Exposure Medium Total						1E-03					2E-01
	Air	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Naphthalene	N/A	1E-06	N/A	1E-06	Respiratory System	N/A	3E-02	N/A	3E-02
			Chemical Total	N/A	1E-06	N/A	1E-06		N/A	3E-02	N/A	3E-02
		Exposure Point Total					1E-06					3E-02
	Exposure Medium Total						1E-06					3E-02
Surface Soil within Fenced Area of Site 4							1E-03					3E-01
						Receptor Risk Total	1E-03				Receptor HI Total	3E-01

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Total Whole Body HI Across All Media =	3E-02
Total Kidney HI Across All Media =	5E-02
Total Liver HI Across All Media =	5E-02
Total Blood HI Across All Media =	2E-02
Total Body Weight HI Across All Media =	2E-03
Total Neurological/CNS HI Across All Media =	5E-02
Total Skin HI Across All Media =	3E-02
Total Vascular HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	2E-02
Total Gastrointestinal HI Across All Media =	3E-02
Total Respiratory System HI Across All Media =	3E-02

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	2E-07	N/A	1E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-07	N/A	9E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-09	N/A	4E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	N/A	6E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	9E-08	N/A	5E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Aldrin	4E-08	N/A	2E-08	5E-08	Liver	2E-04	N/A	9E-05	3E-04
			Aroclor-1242	1E-07	N/A	8E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	1E-07	N/A	7E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-03	N/A	9E-05	2E-03
			Arsenic	8E-06	N/A	1E-06	9E-06	Skin, Vascular	5E-02	N/A	6E-03	6E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	3E-03	N/A	1E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	5E-04	1E-02
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-03	N/A	1E-03	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-02	N/A	5E-04	1E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	4E-05	1E-03
			Chemical Total	1E-05	N/A	2E-06	1E-05		8E-02	N/A	9E-03	9E-02
		Exposure Point Total					1E-05					9E-02
	Exposure Medium Total						1E-05					9E-02
Surface Soil outside Fenced Area of Site 4							1E-05					9E-02
Surface Water	Surface Water	Youth Pond	Arsenic	1E-07	N/A	3E-08	1E-07	Skin, Vascular	7E-04	N/A	2E-04	9E-04
			Chemical Total	1E-07	N/A	3E-08	1E-07		7E-04	N/A	2E-04	9E-04
		Exposure Point Total					1E-07					9E-04
	Exposure Medium Total						1E-07					9E-04
Surface Water - Youth Pond Total							1E-07					9E-04
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	7E-07	N/A	2E-07	9E-07	Skin, Vascular	5E-03	N/A	1E-03	6E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-03	N/A	6E-04	3E-03
			Chemical Total	7E-07	N/A	2E-05	2E-05		7E-03	N/A	2E-03	9E-03
		Exposure Point Total					2E-05					9E-03
	Exposure Medium Total						2E-05					9E-03
Surface Water - Upstream Pond Total							2E-05					9E-03

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	4E-06	N/A	9E-07	5E-06	Skin, Vascular	3E-02	N/A	6E-03	3E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	1E-03	7E-03
			Chemical Total	4E-06	N/A	9E-07	5E-06		3E-02	N/A	7E-03	4E-02
		Exposure Point Total					5E-06					4E-02
	Exposure Medium Total						5E-06					4E-02
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					4E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	2E-03	N/A	3E-03	5E-03
			Chromium	7E-07	N/A	1E-05	1E-05	NOE	1E-03	N/A	2E-02	2E-02
			Chemical Total	1E-06	N/A	1E-05	1E-05		4E-03	N/A	2E-02	2E-02
		Exposure Point Total					1E-05					2E-02
	Exposure Medium Total						1E-05					2E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							1E-05					2E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-07	N/A	1E-06	1E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-08	N/A	2E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	7E-09	N/A	3E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-06	N/A	4E-06	8E-06	Skin, Vascular	3E-02	N/A	3E-02	5E-02
			Chromium	4E-07	N/A	6E-06	6E-06	NOE	8E-04	N/A	1E-02	1E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-02	N/A	5E-03	2E-02
			Chemical Total	5E-06	N/A	1E-05	2E-05		4E-02	N/A	4E-02	8E-02
		Exposure Point Total					2E-05					8E-02
	Exposure Medium Total						2E-05					8E-02
Surface and Subsurface Sediment - Youth Pond Total							2E-05					8E-02

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	9E-09	N/A	4E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-07	N/A	7E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	4E-07	N/A	2E-06	2E-06	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	7E-08	N/A	3E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-07	N/A	4E-07	5E-07	Liver	4E-04	N/A	1E-03	2E-03
			Heptachlor epoxide	3E-08	N/A	9E-08	1E-07	Liver	6E-04	N/A	2E-03	3E-03
			Arsenic	1E-06	N/A	1E-06	2E-06	Skin, Vascular	7E-03	N/A	7E-03	1E-02
			Chromium	5E-10	N/A	7E-09	7E-09	NOE	9E-07	N/A	1E-05	1E-05
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-06	N/A	5E-06	7E-06		8E-03	N/A	1E-02	2E-02
		Exposure Point Total					7E-06					2E-02
	Exposure Medium Total						7E-06					2E-02
Surface and Subsurface Sediment - Upstream Pond Total							7E-06					2E-02
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-07	N/A	5E-07	6E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	N/A	6E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-09	N/A	2E-08	3E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	3E-03	N/A	3E-03	5E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	9E-04	N/A	2E-05	9E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-03	N/A	4E-07	2E-03
			Manganese	N/A	N/A	N/A	N/A	CNS	9E-04	N/A	1E-04	1E-03
			Chemical Total	6E-07	N/A	1E-06	2E-06		6E-03	N/A	3E-03	9E-03
		Exposure Point Total					2E-06					9E-03
	Exposure Medium Total						2E-06					9E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							2E-06					9E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-05	N/A	N/A	1E-05	Ocular, Finger and Toe Nails	7E-01	N/A	N/A	7E-01
			Aroclor-1260	5E-05	N/A	N/A	5E-05	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	6E-05	N/A	N/A	6E-05	Sperm	2E+00	N/A	N/A	2E+00
			Chromium	8E-06	N/A	N/A	8E-06	NOE	2E-02	N/A	N/A	2E-02
			Mercury	N/A	N/A	N/A	N/A	Neurological	3E-01	N/A	N/A	3E-01
			Chemical Total	1E-04	N/A	N/A	1E-04		3E+00	N/A	N/A	3E+00
		Exposure Point Total					1E-04					3E+00
	Exposure Medium Total						1E-04					3E+00
Fish - Youth and Upstream Pond Fish Tissue Total							1E-04					3E+00
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				3E+00
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				3E+00

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	6E-02
Total Vascular HI Across All Media =	6E-02
Total Hair HI Across All Media =	2E-02
Total Ocular HI Across All Media =	7E-01
Total Finger and Toe Nails HI Across All Media =	7E-01
Total Sperm HI Across All Media =	2E+00
Total Neurological HI Across All Media =	3E-01
Total Thyroid HI Across All Media =	9E-04
Total Gastrointestinal HI Across All Media =	2E-03

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	5E-03
Total Neurological/CNS HI Across All Media =	3E-01
Total Skin HI Across All Media =	1E-01
Total Vascular HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	3E-03
Total Gastrointestinal HI Across All Media =	2E-02
Total Hair HI Across All Media =	1E-02
Total Kidney HI Across All Media =	1E-03
Total Ocular HI Across All Media =	7E-01
Total Finger and Toe Nails HI Across All Media =	7E-01
Total Sperm HI Across All Media =	2E+00

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	3E-06	N/A	1E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-05	N/A	8E-06	3E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-06	N/A	8E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	1E-07	N/A	4E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-06	N/A	5E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-06	N/A	4E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Aldrin	9E-08	N/A	3E-08	1E-07	Liver	2E-03	N/A	6E-04	3E-03
			Aroclor-1242	3E-07	N/A	1E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-02	N/A	6E-04	2E-02
			Arsenic	2E-05	N/A	2E-06	2E-05	Skin, Vascular	5E-01	N/A	4E-02	5E-01
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-02	N/A	7E-04	3E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-01	N/A	3E-03	1E-01
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-02	N/A	9E-03	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-01	N/A	3E-03	1E-01
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	3E-04	1E-02
			Chemical Total	5E-05	N/A	1E-05	6E-05		8E-01	N/A	6E-02	8E-01
		Exposure Point Total					6E-05					8E-01
	Exposure Medium Total						6E-05					8E-01
Surface Soil outside Fenced Area of Site 4							6E-05					8E-01
Surface Water	Surface Water	Youth Pond	Arsenic	1E-07	N/A	1E-08	1E-07	Skin, Vascular	3E-03	N/A	3E-04	4E-03
			Chemical Total	1E-07	N/A	1E-08	1E-07		3E-03	N/A	3E-04	4E-03
		Exposure Point Total					1E-07					4E-03
	Exposure Medium Total						1E-07					4E-03
Surface Water - Youth Pond Total							1E-07					4E-03
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	3E-07	N/A	5E-05	5E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	8E-07	N/A	6E-08	9E-07	Skin, Vascular	2E-02	N/A	2E-03	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	9E-04	1E-02
			Chemical Total	1E-06	N/A	5E-05	5E-05		3E-02	N/A	3E-03	4E-02
		Exposure Point Total					5E-05					4E-02
	Exposure Medium Total						5E-05					4E-02
Surface Water - Upstream Pond Total							5E-05					4E-02

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	5E-06	N/A	4E-07	5E-06	Skin, Vascular	1E-01	N/A	9E-03	1E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	2E-03	3E-02
			Chemical Total	5E-06	N/A	4E-07	5E-06		1E-01	N/A	1E-02	2E-01
		Exposure Point Total					5E-06					2E-01
	Exposure Medium Total						5E-06					2E-01
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					2E-01
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	6E-07	N/A	3E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	9E-07	N/A	1E-07	1E-06	Skin, Vascular	2E-02	N/A	3E-03	3E-02
			Chromium	9E-06	N/A	1E-05	2E-05	NOE	1E-02	N/A	2E-02	3E-02
			Chemical Total	1E-05	N/A	1E-05	2E-05		4E-02	N/A	2E-02	6E-02
		Exposure Point Total					2E-05					6E-02
	Exposure Medium Total						2E-05					6E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-05					6E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	3E-06	N/A	2E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	4E-07	N/A	2E-07	6E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	6E-07	N/A	3E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-08	N/A	4E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	9E-06	N/A	1E-06	1E-05	Skin, Vascular	2E-01	N/A	3E-02	3E-01
			Chromium	5E-06	N/A	9E-06	1E-05	NOE	8E-03	N/A	1E-02	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-01	N/A	5E-03	1E-01
			Chemical Total	2E-05	N/A	1E-05	3E-05		4E-01	N/A	5E-02	4E-01
		Exposure Point Total					3E-05					4E-01
	Exposure Medium Total						3E-05					4E-01
Surface and Subsurface Sediment - Youth Pond Total							3E-05					4E-01

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	1E-07	N/A	6E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-07	N/A	2E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-07	N/A	2E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	9E-07	N/A	5E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	2E-07	N/A	9E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	3E-07	N/A	1E-07	4E-07	Liver	4E-03	N/A	2E-03	5E-03
			Heptachlor epoxide	6E-08	N/A	2E-08	8E-08	Liver	6E-03	N/A	2E-03	8E-03
			Arsenic	2E-06	N/A	3E-07	3E-06	Skin, Vascular	6E-02	N/A	7E-03	7E-02
			Chromium	6E-09	N/A	1E-08	2E-08	NOE	9E-06	N/A	1E-05	2E-05
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	7E-06	N/A	2E-06	9E-06		7E-02	N/A	1E-02	8E-02
		Exposure Point Total					9E-06					8E-02
	Exposure Medium Total						9E-06					8E-02
Surface and Subsurface Sediment - Upstream Pond Total							9E-06					8E-02
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-07	N/A	7E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-06	N/A	7E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	N/A	9E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-08	N/A	3E-08	9E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	1E-07	3E-07	Skin, Vascular	2E-02	N/A	3E-03	3E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	9E-03	N/A	2E-05	9E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-02	N/A	4E-07	2E-02
			Manganese	N/A	N/A	N/A	N/A	CNS	9E-03	N/A	1E-04	9E-03
			Chemical Total	2E-06	N/A	1E-06	3E-06		6E-02	N/A	3E-03	6E-02
		Exposure Point Total					3E-06					6E-02
	Exposure Medium Total						3E-06					6E-02
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							3E-06					6E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	5E-06	N/A	N/A	5E-06	Ocular, Finger and Toe Nails	2E+00	N/A	N/A	2E+00
			Aroclor-1260	3E-05	N/A	N/A	3E-05	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	3E-05	N/A	N/A	3E-05	Sperm	4E+00	N/A	N/A	4E+00
			Chromium	2E-05	N/A	N/A	2E-05	NOE	4E-02	N/A	N/A	4E-02
			Mercury	N/A	N/A	N/A	N/A	Neurological	7E-01	N/A	N/A	7E-01
			Chemical Total	9E-05	N/A	N/A	9E-05		7E+00	N/A	N/A	7E+00
		Exposure Point Total					9E-05					7E+00
	Exposure Medium Total						9E-05					7E+00
Fish - Youth and Upstream Pond Fish Tissue Total							9E-05					7E+00
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				7E+00
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				8E+00

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	3E-01
Total Vascular HI Across All Media =	3E-01
Total Hair HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	9E-03
Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00
Total Neurological/CNS HI Across All Media =	7E-01
Total Gastrointestinal HI Across All Media =	2E-02

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	2E-02
Total Neurological/CNS HI Across All Media =	7E-01
Total Skin HI Across All Media =	8E-01
Total Vascular HI Across All Media =	8E-01
Total Thyroid HI Across All Media =	3E-02
Total Gastrointestinal HI Across All Media =	2E-01
Total Hair HI Across All Media =	1E-01
Total Kidney HI Across All Media =	1E-02
Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	5E-07	N/A	4E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-06	N/A	2E-06	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-07	N/A	2E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-09	N/A	8E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	N/A	8E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Aldrin	4E-08	N/A	3E-08	7E-08	Liver	2E-04	N/A	1E-04	4E-04
			Aroclor-1242	1E-07	N/A	1E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	1E-07	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-03	N/A	2E-04	3E-03
			Arsenic	8E-06	N/A	2E-06	1E-05	Skin, Vascular	5E-02	N/A	1E-02	6E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	3E-03	N/A	2E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	8E-04	1E-02
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-03	N/A	2E-03	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-02	N/A	7E-04	1E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	7E-05	1E-03
			Chemical Total	1E-05	N/A	4E-06	2E-05		8E-02	N/A	1E-02	1E-01
		Exposure Point Total					2E-05					1E-01
	Exposure Medium Total						2E-05					1E-01
Surface Soil outside Fenced Area of Site 4							2E-05					1E-01
Surface Water	Surface Water	Youth Pond	Arsenic	3E-07	N/A	3E-08	3E-07	Skin, Vascular	2E-03	N/A	2E-04	2E-03
			Chemical Total	3E-07	N/A	3E-08	3E-07		2E-03	N/A	2E-04	2E-03
		Exposure Point Total					3E-07					2E-03
	Exposure Medium Total						3E-07					2E-03
Surface Water - Youth Pond Total							3E-07					2E-03
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	1E-07	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	2E-07	2E-06	Skin, Vascular	1E-02	N/A	1E-03	1E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	7E-04	7E-03
			Chemical Total	2E-06	N/A	2E-05	2E-05		2E-02	N/A	2E-03	2E-02
		Exposure Point Total					2E-05					2E-02
	Exposure Medium Total						2E-05					2E-02
Surface Water - Upstream Pond Total							2E-05					2E-02

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	1E-05	N/A	1E-06	1E-05	Skin, Vascular	6E-02	N/A	7E-03	7E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-03	2E-02
			Chemical Total	1E-05	N/A	1E-06	1E-05		7E-02	N/A	8E-03	8E-02
		Exposure Point Total					1E-05					8E-02
	Exposure Medium Total						1E-05					8E-02
Surface Water - Drainage Channel to Upstream Pond Total							1E-05					8E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	2E-08	N/A	8E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	1E-07	N/A	2E-07	3E-07	Skin, Vascular	1E-03	N/A	1E-03	2E-03
			Chromium	3E-07	N/A	4E-06	4E-06	NOE	5E-04	N/A	7E-03	8E-03
			Chemical Total	4E-07	N/A	4E-06	4E-06		1E-03	N/A	8E-03	1E-02
		Exposure Point Total					4E-06					1E-02
	Exposure Medium Total						4E-06					1E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							4E-06					1E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	9E-08	N/A	4E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-08	N/A	5E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-09	N/A	1E-08	1E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	2E-06	3E-06	Skin, Vascular	1E-02	N/A	1E-02	2E-02
			Chromium	2E-07	N/A	2E-06	2E-06	NOE	3E-04	N/A	4E-03	5E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	5E-03	N/A	2E-03	7E-03
			Chemical Total	2E-06	N/A	4E-06	6E-06		2E-02	N/A	2E-02	3E-02
		Exposure Point Total					6E-06					3E-02
	Exposure Medium Total						6E-06					3E-02
Surface and Subsurface Sediment - Youth Pond Total							6E-06					3E-02

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	3E-09	N/A	1E-08	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	6E-08	N/A	3E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	1E-07	N/A	7E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	4E-08	N/A	1E-07	2E-07	Liver	2E-04	N/A	5E-04	7E-04
			Heptachlor epoxide	1E-08	N/A	3E-08	4E-08	Liver	2E-04	N/A	8E-04	1E-03
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	3E-03	N/A	3E-03	5E-03
			Chromium	2E-10	N/A	3E-09	3E-09	NOE	4E-07	N/A	5E-06	5E-06
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	7E-07	N/A	2E-06	3E-06		3E-03	N/A	4E-03	7E-03
		Exposure Point Total					3E-06					7E-03
	Exposure Medium Total						3E-06					7E-03
Surface and Subsurface Sediment - Upstream Pond Total							3E-06					7E-03
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	4E-09	N/A	2E-08	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	4E-08	N/A	2E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-09	N/A	2E-08	3E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	N/A	8E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	2E-07	3E-07	Skin, Vascular	1E-03	N/A	1E-03	2E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	4E-04	N/A	8E-06	4E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-04	N/A	1E-07	6E-04
			Manganese	N/A	N/A	N/A	N/A	CNS	4E-04	N/A	4E-05	4E-04
			Chemical Total	2E-07	N/A	4E-07	7E-07		2E-03	N/A	1E-03	3E-03
		Exposure Point Total					7E-07					3E-03
	Exposure Medium Total						7E-07					3E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							7E-07					3E-03
Receptor Risk Total from Youth Pond							7E-06	Receptor HI Total from Youth Pond				4E-02
Receptor Risk Total from Upstream Pond							5E-05	Receptor HI Total from Upstream Pond				2E-01

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond surface water, Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissu.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, and surface and subsurface sediment to Upstream Pond.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	2E-02
Total Vascular HI Across All Media =	2E-02
Total Hair HI Across All Media =	7E-03
Total Thyroid HI Across All Media =	4E-04
Total Gastrointestinal HI Across All Media =	6E-04
Total Neurological/CNS HI Across All Media =	4E-04

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	2E-03
Total Neurological/CNS HI Across All Media =	6E-03
Total Skin HI Across All Media =	1E-01
Total Vascular HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	3E-03
Total Gastrointestinal HI Across All Media =	3E-02
Total Hair HI Across All Media =	1E-02
Total Kidney HI Across All Media =	1E-03

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Youth Pond	Arsenic	1E-07	N/A	3E-08	1E-07	Skin, Vascular	7E-04	N/A	2E-04	9E-04
			Chemical Total	1E-07	N/A	3E-08	1E-07		7E-04	N/A	2E-04	9E-04
		Exposure Point Total					1E-07					9E-04
	Exposure Medium Total						1E-07					9E-04
Surface Water - Youth Pond Total							1E-07					9E-04
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	7E-07	N/A	2E-07	9E-07	Skin, Vascular	5E-03	N/A	1E-03	6E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-03	N/A	6E-04	3E-03
			Chemical Total	7E-07	N/A	2E-05	2E-05		7E-03	N/A	2E-03	9E-03
		Exposure Point Total					2E-05					9E-03
	Exposure Medium Total						2E-05					9E-03
Surface Water - Upstream Pond Total							2E-05					9E-03
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	4E-06	N/A	9E-07	5E-06	Skin, Vascular	3E-02	N/A	6E-03	3E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	1E-03	7E-03
			Chemical Total	4E-06	N/A	9E-07	5E-06		3E-02	N/A	7E-03	4E-02
		Exposure Point Total					5E-06					4E-02
	Exposure Medium Total						5E-06					4E-02
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					4E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	2E-03	N/A	3E-03	5E-03
			Chromium	7E-07	N/A	1E-05	1E-05	NOE	1E-03	N/A	2E-02	2E-02
			Chemical Total	1E-06	N/A	1E-05	1E-05		4E-03	N/A	2E-02	2E-02
		Exposure Point Total					1E-05					2E-02
	Exposure Medium Total						1E-05					2E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							1E-05					2E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-07	N/A	1E-06	1E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-08	N/A	2E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	7E-09	N/A	3E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-06	N/A	4E-06	8E-06	Skin, Vascular	3E-02	N/A	3E-02	5E-02
			Chromium	4E-07	N/A	6E-06	6E-06	NOE	8E-04	N/A	1E-02	1E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-02	N/A	5E-03	2E-02
			Chemical Total	5E-06	N/A	1E-05	2E-05		4E-02	N/A	4E-02	8E-02
		Exposure Point Total					2E-05					8E-02
	Exposure Medium Total						2E-05					8E-02
Surface and Subsurface Sediment - Youth Pond Total							2E-05					8E-02

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	9E-09	N/A	4E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-07	N/A	7E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	4E-07	N/A	2E-06	2E-06	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	7E-08	N/A	3E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-07	N/A	4E-07	5E-07	Liver	4E-04	N/A	1E-03	2E-03
			Heptachlor epoxide	3E-08	N/A	9E-08	1E-07	Liver	6E-04	N/A	2E-03	3E-03
			Arsenic	1E-06	N/A	1E-06	2E-06	Skin, Vascular	7E-03	N/A	7E-03	1E-02
			Chromium	5E-10	N/A	7E-09	7E-09	NOE	9E-07	N/A	1E-05	1E-05
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-06	N/A	5E-06	7E-06		8E-03	N/A	1E-02	2E-02
		Exposure Point Total					7E-06					2E-02
	Exposure Medium Total						7E-06					2E-02
Surface and Subsurface Sediment - Upstream Pond Total							7E-06					2E-02
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-07	N/A	5E-07	6E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	N/A	6E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-09	N/A	2E-08	3E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	3E-03	N/A	3E-03	5E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	9E-04	N/A	2E-05	9E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-03	N/A	4E-07	2E-03
			Manganese	N/A	N/A	N/A	N/A	CNS	9E-04	N/A	1E-04	1E-03
			Chemical Total	6E-07	N/A	1E-06	2E-06		6E-03	N/A	3E-03	9E-03
		Exposure Point Total					2E-06					9E-03
	Exposure Medium Total						2E-06					9E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							2E-06					9E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-05	N/A	N/A	1E-05	Ocular, Finger and Toe Nails	7E-01	N/A	N/A	7E-01
			Aroclor-1260	5E-05	N/A	N/A	5E-05	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	6E-05	N/A	N/A	6E-05	Sperm	2E+00	N/A	N/A	2E+00
			Chromium	8E-06	N/A	N/A	8E-06	NOE	2E-02	N/A	N/A	2E-02
			Mercury	N/A	N/A	N/A	N/A	Neurological	1E-01	N/A	N/A	1E-01
			Chemical Total	1E-04	N/A	N/A	1E-04		3E+00	N/A	N/A	3E+00
		Exposure Point Total					1E-04					3E+00
	Exposure Medium Total						1E-04					3E+00
Fish - Youth and Upstream Pond Fish Tissue Total							1E-04					3E+00

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside the Fenced Area	Benzo(a)anthracene	2E-06	N/A	1E-06	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-05	N/A	8E-06	2E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-06	N/A	1E-06	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-08	N/A	5E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	4E-09	N/A	2E-09	6E-09	Liver	5E-05	N/A	2E-05	7E-05
			Carbazole	5E-08	N/A	2E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	2E-08	N/A	1E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-06	N/A	1E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	1E-03	N/A	5E-04	2E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	6E-04	N/A	3E-04	8E-04
			Indeno(1,2,3-cd)pyrene	8E-07	N/A	4E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	6E-05	N/A	3E-05	9E-05
			Pyrene	N/A	N/A	N/A	N/A	Kidney	6E-04	N/A	3E-04	9E-04
			Aldrin	5E-09	N/A	2E-09	8E-09	Liver	3E-05	N/A	1E-05	4E-05
			Aroclor-1242	2E-07	N/A	8E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	6E-08	N/A	3E-08	9E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	2E-07	N/A	8E-08	3E-07	Liver	7E-04	N/A	3E-04	1E-03
			gamma-BHC (Lindane)	2E-08	N/A	3E-09	2E-08	Kidney, Liver	2E-04	N/A	3E-05	2E-04
			Aluminum	N/A	N/A	N/A	N/A	Neurological	3E-03	N/A	1E-04	3E-03
			Arsenic	4E-06	N/A	5E-07	5E-06	Skin, Vascular	3E-02	N/A	3E-03	3E-02
			Chromium (hexavalent)	2E-08	N/A	2E-08	4E-08	NOE	3E-05	N/A	5E-05	8E-05
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	1E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	2E-04	6E-03
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-03	N/A	1E-03	2E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	8E-03	N/A	3E-04	8E-03
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	6E-05	1E-03
			Chemical Total	3E-05	N/A	1E-05	4E-05		5E-02	N/A	7E-03	6E-02
		Exposure Point Total					4E-05					6E-02
	Exposure Medium Total						4E-05					6E-02
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	3E-08	N/A	3E-08	Respiratory System	N/A	8E-04	N/A	8E-04
			Chemical Total	N/A	3E-08	N/A	3E-08		N/A	8E-04	N/A	8E-04
		Exposure Point Total					3E-08					8E-04
	Exposure Medium Total						3E-08					8E-04
Surface Soil outside Fenced Area of Site 4							4E-05					6E-02
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				3E+00
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				3E+00

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area, and fish tissue from Youth and Upstream Pond.
Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.
Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	6E-02
Total Vascular HI Across All Media =	6E-02
Total Hair HI Across All Media =	2E-02
Total Ocular HI Across All Media =	7E-01
Total Finger and Toe Nails HI Across All Media =	7E-01
Total Sperm HI Across All Media =	2E+00
Total Gastrointestinal HI Across All Media =	2E-03
Total Neurological/CNS HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	9E-04

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	7E-03
Total Neurological/CNS HI Across All Media =	1E-01
Total Skin HI Across All Media =	9E-02
Total Vascular HI Across All Media =	9E-02
Total Thyroid HI Across All Media =	3E-03
Total Gastrointestinal HI Across All Media =	2E-02
Total Hair HI Across All Media =	8E-03
Total Respiratory System HI Across All Media =	8E-04
Total Ocular HI Across All Media =	7E-01
Total Finger and Toe Nails HI Across All Media =	7E-01
Total Sperm HI Across All Media =	2E+00
Total Whole Body/Body Weight Across All Media =	2E-03
Total Kidney Across All Media =	3E-03
Total Blood Across All Media =	8E-04

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Youth Pond	Arsenic	1E-07	N/A	1E-08	1E-07	Skin, Vascular	3E-03	N/A	3E-04	4E-03
			Chemical Total	1E-07	N/A	1E-08	1E-07		3E-03	N/A	3E-04	4E-03
		Exposure Point Total					1E-07					4E-03
	Exposure Medium Total						1E-07					4E-03
Surface Water - Youth Pond Total							1E-07					4E-03
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	3E-07	N/A	5E-05	5E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	8E-07	N/A	6E-08	9E-07	Skin, Vascular	2E-02	N/A	2E-03	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	1E-03	1E-02
			Chemical Total	1E-06	N/A	5E-05	5E-05		3E-02	N/A	3E-03	4E-02
		Exposure Point Total					5E-05					4E-02
	Exposure Medium Total						5E-05					4E-02
Surface Water - Upstream Pond Total							5E-05					4E-02
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	5E-06	N/A	4E-07	5E-06	Skin, Vascular	1E-01	N/A	1E-02	1E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	2E-03	3E-02
			Chemical Total	5E-06	N/A	4E-07	5E-06		1E-01	N/A	1E-02	2E-01
		Exposure Point Total					5E-06					2E-01
	Exposure Medium Total						5E-06					2E-01
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					2E-01
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	6E-07	N/A	3E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	9E-07	N/A	1E-07	1E-06	Skin, Vascular	2E-02	N/A	3E-03	3E-02
			Chromium	9E-06	N/A	1E-05	2E-05	NOE	1E-02	N/A	2E-02	3E-02
			Chemical Total	1E-05	N/A	1E-05	2E-05		4E-02	N/A	3E-02	6E-02
		Exposure Point Total					2E-05					6E-02
	Exposure Medium Total						2E-05					6E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-05					6E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	3E-06	N/A	2E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	4E-07	N/A	2E-07	6E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	6E-07	N/A	3E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-08	N/A	4E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	9E-06	N/A	1E-06	1E-05	Skin, Vascular	2E-01	N/A	3E-02	3E-01
			Chromium	5E-06	N/A	9E-06	1E-05	NOE	8E-03	N/A	1E-02	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E-01	N/A	5E-03	1E-01
			Chemical Total	2E-05	N/A	1E-05	3E-05		4E-01	N/A	5E-02	4E-01
		Exposure Point Total					3E-05					4E-01
	Exposure Medium Total						3E-05					4E-01
Surface and Subsurface Sediment - Youth Pond Total							3E-05					4E-01

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	1E-07	N/A	6E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-07	N/A	2E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-07	N/A	2E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	9E-07	N/A	5E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	2E-07	N/A	9E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	3E-07	N/A	1E-07	4E-07	Liver	4E-03	N/A	2E-03	5E-03
			Heptachlor epoxide	6E-08	N/A	2E-08	8E-08	Liver	6E-03	N/A	2E-03	8E-03
			Arsenic	2E-06	N/A	3E-07	3E-06	Skin, Vascular	6E-02	N/A	7E-03	7E-02
			Chromium	6E-09	N/A	1E-08	2E-08	NOE	9E-06	N/A	1E-05	2E-05
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	7E-06	N/A	2E-06	9E-06		7E-02	N/A	1E-02	8E-02
		Exposure Point Total					9E-06					8E-02
	Exposure Medium Total						9E-06					8E-02
Surface and Subsurface Sediment - Upstream Pond Total							9E-06					8E-02
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-07	N/A	7E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-06	N/A	7E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	N/A	9E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-08	N/A	3E-08	9E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	9E-07	N/A	1E-07	1E-06	Skin, Vascular	2E-02	N/A	3E-03	3E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	9E-03	N/A	2E-05	9E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-02	N/A	4E-07	2E-02
			Manganese	N/A	N/A	N/A	N/A	CNS	9E-03	N/A	1E-04	9E-03
			Chemical Total	3E-06	N/A	1E-06	4E-06		6E-02	N/A	3E-03	6E-02
		Exposure Point Total					4E-06					6E-02
	Exposure Medium Total						4E-06					6E-02
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							4E-06					6E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	5E-06	N/A	N/A	5E-06	Ocular, Finger and Toe Nails	2E+00	N/A	N/A	2E+00
			Aroclor-1260	3E-05	N/A	N/A	3E-05	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	3E-05	N/A	N/A	3E-05	Sperm	4E+00	N/A	N/A	4E+00
			Chromium	2E-05	N/A	N/A	2E-05	NOE	4E-02	N/A	N/A	4E-02
			Mercury	N/A	N/A	N/A	N/A	Neurological	2E-01	N/A	N/A	2E-01
			Chemical Total	9E-05	N/A	N/A	9E-05		6E+00	N/A	N/A	6E+00
		Exposure Point Total					9E-05					6E+00
	Exposure Medium Total						9E-05					6E+00
Fish - Youth and Upstream Pond Fish Tissue Total							9E-05					6E+00

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside the Fenced Area	Benzo(a)anthracene	2E-05	N/A	9E-06	3E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-04	N/A	7E-05	2E-04	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-05	N/A	1E-05	4E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	1E-06	N/A	4E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	1E-08	N/A	3E-09	1E-08	Liver	4E-04	N/A	1E-04	6E-04
			Chrysene	1E-07	N/A	3E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Carbazole	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-05	N/A	1E-05	4E-05	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	1E-02	N/A	3E-03	1E-02
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	5E-03	N/A	2E-03	7E-03
			Indeno(1,2,3-cd)pyrene	1E-05	N/A	3E-06	1E-05	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	5E-04	N/A	2E-04	7E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	5E-03	N/A	2E-03	7E-03
			Aldrin	1E-08	N/A	4E-09	2E-08	Liver	3E-04	N/A	8E-05	4E-04
			Aroclor-1242	4E-07	N/A	1E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	1E-07	N/A	5E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	5E-07	N/A	1E-07	6E-07	Liver	7E-03	N/A	2E-03	9E-03
			gamma-BHC (Lindane)	4E-08	N/A	5E-09	5E-08	Kidney, Liver	2E-03	N/A	2E-04	2E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	3E-02	N/A	7E-04	3E-02
			Arsenic	1E-05	N/A	8E-07	1E-05	Skin, Vascular	3E-01	N/A	2E-02	3E-01
			Chromium (hexavalent)	2E-07	N/A	2E-07	4E-07	NOE	3E-04	N/A	3E-04	6E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-02	N/A	6E-04	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-02	N/A	2E-03	6E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-02	N/A	8E-03	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	7E-02	N/A	2E-03	7E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	4E-04	1E-02
			Chemical Total	3E-04	N/A	1E-04	4E-04		5E-01	N/A	4E-02	5E-01
		Exposure Point Total					4E-04					5E-01
	Exposure Medium Total						4E-04					5E-01
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	7E-09	N/A	7E-09	Respiratory System	N/A	8E-04	N/A	8E-04
			Chemical Total	N/A	7E-09	N/A	7E-09		N/A	8E-04	N/A	8E-04
		Exposure Point Total					7E-09					8E-04
	Exposure Medium Total						7E-09					8E-04
Surface Soil outside Fenced Area of Site 4							4E-04					5E-01
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				7E+00
Receptor Risk Total from Upstream Pond							6E-04	Receptor HI Total from Upstream Pond				7E+00

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area, and fish tissue from Youth and Upstream Pond.
Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.
Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	3E-01
Total Vascular HI Across All Media =	3E-01
Total Thyroid HI Across All Media =	9E-03
Total Gastrointestinal HI Across All Media =	2E-02
Total Hair HI Across All Media =	1E-01
Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00
Total Neurological/CNS HI Across All Media =	2E-01

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	3E-02
Total Neurological/CNS HI Across All Media =	3E-01
Total Skin HI Across All Media =	5E-01
Total Vascular HI Across All Media =	5E-01
Total Thyroid HI Across All Media =	2E-02
Total Gastrointestinal HI Across All Media =	1E-01
Total Hair HI Across All Media =	7E-02
Total Respiratory System HI Across All Media =	8E-04
Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00
Total Whole Body/Body Weight Across All Media =	2E-02
Total Kidney Across All Media =	3E-02
Total Blood Across All Media =	7E-03

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	7E-07	N/A	3E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-06	N/A	2E-06	7E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	7E-07	N/A	3E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-08	N/A	1E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	1E-09	N/A	4E-10	2E-09	Reproductive System	7E-05	N/A	2E-05	1E-04
			Carbazole	1E-08	N/A	4E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	8E-09	N/A	3E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-07	N/A	3E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	2E-03	N/A	7E-04	3E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney	2E-03	N/A	7E-04	2E-03
			Indeno(1,2,3-cd)pyrene	3E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	2E-05	N/A	6E-06	2E-05
			Pyrene	N/A	N/A	N/A	N/A	Kidney	5E-04	N/A	2E-04	6E-04
			Aldrin	2E-09	N/A	5E-10	2E-09	Kidney	2E-04	N/A	6E-05	2E-04
			Aroclor-1242	5E-08	N/A	2E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	2E-08	N/A	8E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	7E-08	N/A	2E-08	9E-08	Neurological	3E-03	N/A	9E-04	4E-03
			gamma-BHC (Lindane)	6E-09	N/A	7E-10	7E-09	Immunological	4E-02	N/A	5E-03	4E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-02	N/A	7E-04	2E-02
			Arsenic	1E-06	N/A	1E-07	1E-06	Skin, Vascular	2E-01	N/A	2E-02	2E-01
			Chromium (hexavalent)	5E-09	N/A	6E-09	1E-08	Blood	1E-04	N/A	2E-04	3E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	6E-05	2E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	5E-02	N/A	1E-03	5E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-02	N/A	7E-03	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-02	N/A	5E-04	2E-02
			Vanadium	N/A	N/A	N/A	N/A	Whole Body	8E-03	N/A	2E-04	8E-03
			Chemical Total	9E-06	N/A	3E-06	1E-05		4E-01	N/A	4E-02	4E-01
		Exposure Point Total					1E-05					4E-01
	Exposure Medium Total						1E-05					4E-01
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	5E-09	N/A	5E-09	Respiratory System	N/A	4E-03	N/A	4E-03
			Chemical Total	N/A	5E-09	N/A	5E-09		N/A	4E-03	N/A	4E-03
		Exposure Point Total					5E-09					4E-03
	Exposure Medium Total						5E-09					4E-03
Soil* from inside and outside Fenced Area							1E-05					4E-01

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* within the Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	3E-06	N/A	1E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-04	N/A	5E-05	2E-04	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-06	N/A	1E-06	5E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	1E-07	N/A	5E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Carbazole	6E-08	N/A	2E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	4E-08	N/A	1E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-06	N/A	1E-06	5E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-03	N/A	9E-04	4E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney	8E-03	N/A	3E-03	1E-02
			Indeno(1,2,3-cd)pyrene	1E-06	N/A	5E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	7E-05	N/A	3E-05	1E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	2E-03	N/A	8E-04	3E-03
			Dieldrin	2E-07	N/A	7E-08	3E-07	Neurological	1E-02	N/A	3E-03	1E-02
			gamma-BHC (Lindane)	2E-08	N/A	3E-09	2E-08	Immunological	1E-01	N/A	2E-02	2E-01
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-02	N/A	5E-04	2E-02
			Arsenic	2E-07	N/A	1E-08	2E-07	Skin, Vascular	3E-02	N/A	2E-03	3E-02
			Chromium (hexavalent)	6E-09	N/A	7E-09	1E-08	Blood	2E-04	N/A	2E-04	4E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	6E-05	2E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-02	N/A	1E-03	4E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-02	N/A	1E-02	2E-02
			Chemical Total	2E-04	N/A	6E-05	2E-04		3E-01	N/A	4E-02	3E-01
		Exposure Point Total					2E-04					3E-01
	Exposure Medium Total						2E-04					3E-01
	Air	Emissions From Soil* within Fenced Area of Youth Pond/Site 4	Naphthalene	N/A	2E-08	N/A	2E-08	Respiratory System	N/A	2E-02	N/A	2E-02
			Chemical Total	N/A	2E-08	N/A	2E-08		N/A	2E-02	N/A	2E-02
		Exposure Point Total					2E-08					2E-02
	Exposure Medium Total						2E-08					2E-02
Soil* within Fenced Area of Youth Pond/Site 4							2E-04					3E-01

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	1,4-Dichlorobenzene	N/A	N/A	2E-09	2E-09	Liver	N/A	N/A	3E-04	3E-04
			Benzene	N/A	N/A	4E-08	4E-08	Blood	N/A	N/A	5E-03	5E-03
			Ethylbenzene	N/A	N/A	2E-08	2E-08	Liver	N/A	N/A	2E-03	2E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight	N/A	N/A	6E-04	6E-04
			Trichloroethene	N/A	N/A	8E-10	8E-10	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	N/A	N/A	2E-03	2E-03
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight	N/A	N/A	5E-04	5E-04
			1,1-Biphenyl	N/A	N/A	2E-08	2E-08	Developmental/Fetus	N/A	N/A	2E-03	2E-03
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	2E-03	2E-03
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	N/A	N/A	4E-02	4E-02
			Benzo(a)anthracene	N/A	N/A	1E-06	1E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	3E-06	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	2E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	9E-06	9E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	8E-02	8E-02
			Indeno(1,2,3-cd)pyrene	N/A	N/A	3E-06	3E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	N/A	N/A	2E-03	2E-03
			Dieldrin	N/A	N/A	3E-08	3E-08	Neurological	N/A	N/A	1E-03	1E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	N/A	N/A	2E-03	2E-03
			Antimony	N/A	N/A	N/A	N/A	Blood, Whole Body	N/A	N/A	2E-03	2E-03
			Arsenic	N/A	N/A	8E-08	8E-08	Skin, Vascular	N/A	N/A	1E-02	1E-02
			Barium	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	3E-03	3E-03
			Chromium	N/A	N/A	2E-06	2E-06	Blood	N/A	N/A	5E-02	5E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	N/A	N/A	7E-05	7E-05
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	N/A	N/A	8E-03	8E-03
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	N/A	N/A	8E-02	8E-02
			Mercury	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	9E-04	9E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	N/A	N/A	6E-03	6E-03
			Vanadium	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	1E-03	1E-03
			Chemical Total	N/A	N/A	4E-05	4E-05		N/A	N/A	3E-01	3E-01
		Exposure Point Total					4E-05					3E-01
	Exposure Medium Total						4E-05					3E-01

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Water Vapors in Excavation Trench	1,4-Dichlorobenzene	N/A	2E-07	N/A	2E-07	Liver	N/A	1E-03	N/A	1E-03
			Benzene	N/A	2E-06	N/A	2E-06	Blood	N/A	2E-01	N/A	2E-01
			Ethylbenzene	N/A	3E-07	N/A	3E-07	Ear	N/A	1E-03	N/A	1E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Whole Body	N/A	5E-02	N/A	5E-02
			Trichloroethene	N/A	2E-08	N/A	2E-08	Immunotoxicity, Heart Malformations	N/A	2E-01	N/A	2E-01
			Xylene, total	N/A	N/A	N/A	N/A	Whole Body	N/A	2E-02	N/A	2E-02
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Respiratory System	N/A	3E+00	N/A	3E+00
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	4E-05	N/A	4E-05	Respiratory System	N/A	3E+01	N/A	3E+01
			Chemical Total	N/A	5E-05	N/A	5E-05		N/A	3E+01	N/A	3E+01
		Exposure Point Total					5E-05					3E+01
	Exposure Medium Total						5E-05					3E+01
Groundwater Total							8E-05					3E+01
Receptor Risk Total from soil inside and outside fenced area and groundwater							9E-05	Receptor HI Total from soil inside and outside fenced area and groundwater				3E+01
Receptor Risk Total from soil within fenced area and groundwater							3E-04	Receptor HI Total from soil within fenced area and groundwater				3E+01

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Soil* Inside and Outside fenced Area and Groundwater Target Organ Totals

Total Reproductive System HI Across All Media =	1E-04
Total Whole Body/Body Weight Across All Media =	2E-01
Total Kidney Across All Media =	7E-03
Total Neurological/CNS HI Across All Media =	1E-01
Total Hair Across All Media =	2E-02
Total Blood HI Across All Media =	2E-01
Total Thyroid HI Across All Media =	2E-03
Total Gastrointestinal HI Across All Media =	6E-02
Total Immunological HI Across All Media =	2E-01
Total Skin HI Across All Media =	2E-01
Total Vascular HI Across All Media =	2E-01
Total Respiratory System HI Across All Media =	3E+01
Total Liver HI Across All Media =	4E-03
Total Ear HI Across All Media =	1E-03
Total Heart Malformations HI Across All Media =	2E-01
Total Developmental/Fetus HI Across All Media =	2E-03
Total Lung HI Across All Media =	4E-02

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Soil* Within Fenced Area and Groundwater

Total Liver HI Across All Media =	2E-03
Total Neurological/CNS HI Across All Media =	4E-02
Total Skin HI Across All Media =	4E-02
Total Vascular HI Across All Media =	4E-02
Total Thyroid HI Across All Media =	2E-03
Total Gastrointestinal HI Across All Media =	5E-02
Total Hair HI Across All Media =	6E-03
Total Respiratory System HI Across All Media =	3E+01
Total Immunological HI Across All Media =	3E-01
Total Whole Body/Body Weight Across All Media =	2E-01
Total Kidney Across All Media =	2E-02
Total Blood Across All Media =	2E-01
Total Heart Malformations HI Across All Media =	2E-01
Total Ear HI Across All Media =	1E-03
Total Developmental/Fetus HI Across All Media =	2E-03

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	1E-05	N/A	9E-06	2E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	7E-05	N/A	6E-05	1E-04	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-05	N/A	1E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	5E-07	N/A	4E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	2E-08	N/A	1E-08	4E-08	Liver	2E-04	N/A	1E-04	4E-04
			Carbazole	2E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Chrysene	1E-07	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-05	N/A	1E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	6E-03	N/A	4E-03	1E-02
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	3E-03	N/A	2E-03	5E-03
			Indeno(1,2,3-cd)pyrene	4E-06	N/A	3E-06	7E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	3E-04	N/A	2E-04	5E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	2E-03	5E-03
			Aldrin	3E-08	N/A	2E-08	5E-08	Liver	2E-04	N/A	1E-04	2E-04
			Aroclor-1242	8E-07	N/A	7E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	3E-07	N/A	3E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-06	N/A	7E-07	2E-06	Liver	4E-03	N/A	2E-03	6E-03
			gamma-BHC (Lindane)	9E-08	N/A	2E-08	1E-07	Kidney, Liver	8E-04	N/A	2E-04	1E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	1E-02	N/A	9E-04	1E-02
			Arsenic	2E-05	N/A	4E-06	2E-05	Skin, Vascular	1E-01	N/A	3E-02	2E-01
			Chromium (hexavalent)	8E-08	N/A	2E-07	3E-07	NOE	1E-04	N/A	4E-04	5E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	1E-02	N/A	8E-04	1E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	2E-03	3E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	6E-03	N/A	1E-02	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	4E-02	N/A	2E-03	4E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	7E-03	N/A	5E-04	7E-03
			Chemical Total	1E-04	N/A	1E-04	2E-04		3E-01	N/A	5E-02	3E-01
		Exposure Point Total					2E-04					3E-01
	Exposure Medium Total						2E-04					3E-01
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	3E-07	N/A	3E-07	Respiratory System	N/A	7E-03	N/A	7E-03
			Chemical Total	N/A	3E-07	N/A	3E-07		N/A	7E-03	N/A	7E-03
		Exposure Point Total					3E-07					7E-03
	Exposure Medium Total						3E-07					7E-03
Soil* from inside and outside Fenced Area							2E-04					3E-01
						Receptor Risk Total	2E-04				Receptor HI Total	3E-01

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Liver HI Across All Media =	1E-02
Total Whole Body/Body Weight Across All Media =	1E-02
Total Kidney Across All Media =	2E-02
Total Neurological/CNS HI Across All Media =	3E-02
Total Hair Across All Media =	4E-02
Total Blood HI Across All Media =	5E-03
Total Thyroid HI Across All Media =	1E-02
Total Gastrointestinal HI Across All Media =	3E-02
Total Skin HI Across All Media =	2E-01
Total Vascular HI Across All Media =	2E-01
Total Respiratory System HI Across All Media =	7E-03

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	2E-06	N/A	2E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-05	N/A	1E-05	3E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-06	N/A	2E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-08	N/A	8E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	5E-09	N/A	3E-09	8E-09	Liver	5E-05	N/A	3E-05	8E-05
			Carbazole	5E-08	N/A	3E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	2E-08	N/A	2E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-06	N/A	2E-06	5E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	1E-03	N/A	8E-04	2E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	6E-04	N/A	5E-04	1E-03
			Indeno(1,2,3-cd)pyrene	8E-07	N/A	7E-07	1E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	6E-05	N/A	5E-05	1E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	6E-04	N/A	5E-04	1E-03
			Aldrin	6E-09	N/A	4E-09	9E-09	Liver	3E-05	N/A	2E-05	5E-05
			Aroclor-1242	2E-07	N/A	1E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	6E-08	N/A	5E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	2E-07	N/A	1E-07	4E-07	Liver	7E-04	N/A	5E-04	1E-03
			gamma-BHC (Lindane)	2E-08	N/A	5E-09	2E-08	Kidney, Liver	2E-04	N/A	4E-05	2E-04
			Aluminum	N/A	N/A	N/A	N/A	Neurological	3E-03	N/A	2E-04	3E-03
			Arsenic	4E-06	N/A	9E-07	5E-06	Skin, Vascular	3E-02	N/A	5E-03	3E-02
			Chromium (hexavalent)	2E-08	N/A	4E-08	6E-08	NOE	3E-05	N/A	8E-05	1E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	2E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	4E-04	6E-03
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	1E-03	N/A	2E-03	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	8E-03	N/A	5E-04	8E-03
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	9E-05	2E-03
			Chemical Total	3E-05	N/A	2E-05	5E-05		5E-02	N/A	1E-02	6E-02
		Exposure Point Total					5E-05					6E-02
	Exposure Medium Total						5E-05					6E-02
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	6E-08	N/A	6E-08	Respiratory System	N/A	2E-03	N/A	2E-03
			Chemical Total	N/A	6E-08	N/A	6E-08		N/A	2E-03	N/A	2E-03
		Exposure Point Total					6E-08					2E-03
	Exposure Medium Total						6E-08					2E-03
Soil* from inside and outside Fenced Area							5E-05					6E-02
Surface Water	Surface Water	Youth Pond	Arsenic	3E-07	N/A	3E-08	3E-07	Skin, Vascular	2E-03	N/A	2E-04	2E-03
			Chemical Total	3E-07	N/A	3E-08	3E-07		2E-03	N/A	2E-04	2E-03
		Exposure Point Total					3E-07					2E-03
	Exposure Medium Total						3E-07					2E-03
Surface Water - Youth Pond Total							3E-07					2E-03

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	1E-07	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	2E-07	2E-06	Skin, Vascular	1E-02	N/A	1E-03	1E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	7E-04	7E-03
			Chemical Total	2E-06	N/A	2E-05	2E-05		2E-02	N/A	2E-03	2E-02
		Exposure Point Total					2E-05					2E-02
	Exposure Medium Total						2E-05					2E-02
Surface Water - Upstream Pond Total							2E-05					2E-02
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	1E-05	N/A	1E-06	1E-05	Skin, Vascular	6E-02	N/A	7E-03	7E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-03	2E-02
			Chemical Total	1E-05	N/A	1E-06	1E-05		7E-02	N/A	8E-03	8E-02
		Exposure Point Total					1E-05					8E-02
	Exposure Medium Total						1E-05					8E-02
Surface Water - Drainage Channel to Upstream Pond Total							1E-05					8E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	2E-08	N/A	8E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	1E-07	N/A	2E-07	3E-07	Skin, Vascular	1E-03	N/A	1E-03	2E-03
			Chromium	3E-07	N/A	4E-06	4E-06	NOE	5E-04	N/A	7E-03	8E-03
			Chemical Total	4E-07	N/A	4E-06	4E-06		1E-03	N/A	8E-03	1E-02
		Exposure Point Total					4E-06					1E-02
	Exposure Medium Total						4E-06					1E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							4E-06					1E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	9E-08	N/A	4E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-08	N/A	5E-08	7E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-08	N/A	9E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-09	N/A	1E-08	1E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	2E-06	3E-06	Skin, Vascular	1E-02	N/A	1E-02	2E-02
			Chromium	2E-07	N/A	2E-06	2E-06	NOE	3E-04	N/A	4E-03	5E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	5E-03	N/A	2E-03	7E-03
			Chemical Total	2E-06	N/A	4E-06	6E-06		2E-02	N/A	2E-02	3E-02
		Exposure Point Total					6E-06					3E-02
	Exposure Medium Total						6E-06					3E-02
Surface and Subsurface Sediment - Youth Pond Total							6E-06					3E-02

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	3E-09	N/A	1E-08	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	6E-08	N/A	3E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	N/A	5E-08	6E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	1E-07	N/A	7E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	3E-08	N/A	1E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dieldrin	4E-08	N/A	1E-07	2E-07	Liver	2E-04	N/A	5E-04	7E-04
			Heptachlor epoxide	1E-08	N/A	3E-08	4E-08	Liver	2E-04	N/A	8E-04	1E-03
			Arsenic	4E-07	N/A	4E-07	8E-07	Skin, Vascular	3E-03	N/A	3E-03	5E-03
			Chromium	2E-10	N/A	3E-09	3E-09	NOE	4E-07	N/A	5E-06	5E-06
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	7E-07	N/A	2E-06	3E-06		3E-03	N/A	4E-03	7E-03
		Exposure Point Total					3E-06					7E-03
	Exposure Medium Total						3E-06					7E-03
Surface and Subsurface Sediment - Upstream Pond Total							3E-06					7E-03
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	4E-09	N/A	2E-08	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	4E-08	N/A	2E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	8E-09	N/A	4E-08	4E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-09	N/A	2E-08	3E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	N/A	8E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	2E-07	3E-07	Skin, Vascular	1E-03	N/A	1E-03	2E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	4E-04	N/A	8E-06	4E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-04	N/A	1E-07	6E-04
			Manganese	N/A	N/A	N/A	N/A	CNS	4E-04	N/A	4E-05	4E-04
			Chemical Total	2E-07	N/A	4E-07	7E-07		2E-03	N/A	1E-03	3E-03
		Exposure Point Total					7E-07					3E-03
	Exposure Medium Total						7E-07					3E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							7E-07					3E-03
Receptor Risk Total from Youth Pond							7E-06	Receptor HI Total from Youth Pond				4E-02
Receptor Risk Total from Upstream Pond							8E-05	Receptor HI Total from Upstream Pond				2E-01

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area.

Upstream Pond total includes soil inside and outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, and surface and subsurface sediment to Upstream Pond.

Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	2E-02
Total Vascular HI Across All Media =	2E-02
Total Hair HI Across All Media =	7E-03
Total Thyroid HI Across All Media =	4E-04
Total Gastrointestinal HI Across All Media =	6E-04
Total Neurological/CNS Across All Media =	4E-04

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	4E-03
Total Neurological/CNS HI Across All Media =	6E-03
Total Skin HI Across All Media =	1E-01
Total Vascular HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	3E-03
Total Gastrointestinal HI Across All Media =	3E-02
Total Hair HI Across All Media =	8E-03
Total Respiratory System HI Across All Media =	2E-03
Total Whole Body/Body Weight Across All Media =	2E-03
Total Kidney Across All Media =	4E-03
Total Blood Across All Media =	1E-03

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	Liver	3E-04	N/A	1E-04	4E-04
			Carbazole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chrysene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	8E-03	N/A	3E-03	1E-02
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	4E-03	N/A	2E-03	6E-03
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	4E-04	N/A	2E-04	6E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	4E-03	N/A	2E-03	6E-03
			Aldrin	N/A	N/A	N/A	N/A	Liver	2E-04	N/A	9E-05	3E-04
			Aroclor-1242	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	N/A	N/A	N/A	N/A	Liver	5E-03	N/A	2E-03	7E-03
			gamma-BHC (Lindane)	N/A	N/A	N/A	N/A	Kidney, Liver	1E-03	N/A	2E-04	1E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-02	N/A	8E-04	2E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	2E-01	N/A	2E-02	2E-01
			Chromium (hexavalent)	N/A	N/A	N/A	N/A	NOE	2E-04	N/A	3E-04	5E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-02	N/A	7E-04	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-02	N/A	2E-03	4E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	8E-03	N/A	9E-03	2E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	5E-02	N/A	2E-03	5E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	4E-04	1E-02
			Chemical Total	N/A	N/A	N/A	N/A		4E-01	N/A	5E-02	4E-01
		Exposure Point Total					N/A					4E-01
	Exposure Medium Total						N/A					4E-01
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	3E-02	N/A	3E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	3E-02	N/A	3E-02
		Exposure Point Total					N/A					3E-02
	Exposure Medium Total						N/A					3E-02
Soil* from inside and outside Fenced Area							N/A					4E-01

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	8E-04	N/A	5E-04	1E-03
			Benzene	N/A	N/A	N/A	N/A	Blood	1E-01	N/A	1E-02	1E-01
			Ethylbenzene	N/A	N/A	N/A	N/A	Liver, Kidney	3E-03	N/A	2E-03	4E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight, Mortality	3E-03	N/A	2E-03	5E-03
			Trichloroethene	N/A	N/A	N/A	N/A	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	2E-02	N/A	4E-03	3E-02
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight, Mortality	2E-03	N/A	2E-03	4E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Kidney	4E-03	N/A	7E-03	1E-02
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body, Blood	4E-02	N/A	6E-03	5E-02
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	6E-02	N/A	8E-02	1E-01
			Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	5E-01	N/A	4E-01	9E-01
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	2E-01	N/A	1E-01	3E-01
			Dieldrin	N/A	N/A	N/A	N/A	Liver	9E-03	N/A	7E-03	2E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	3E-01	N/A	2E-03	3E-01
			Antimony	N/A	N/A	N/A	N/A	Blood, Longevity	4E-02	N/A	1E-03	4E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	2E+00	N/A	8E-03	2E+00
			Barium	N/A	N/A	N/A	N/A	Kidney	2E-02	N/A	2E-03	2E-02
			Chromium	N/A	N/A	N/A	N/A	NOE	1E-01	N/A	6E-02	2E-01
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-01	N/A	5E-04	2E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E+00	N/A	5E-03	1E+00
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	4E-01	N/A	5E-02	4E-01
			Mercury	N/A	N/A	N/A	N/A	Immune System	5E-02	N/A	4E-03	6E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	3E+00	N/A	2E-02	3E+00
			Vanadium	N/A	N/A	N/A	N/A	Kidney	2E-01	N/A	8E-04	2E-01
			Chemical Total	N/A	N/A	N/A	N/A		8E+00	N/A	8E-01	9E+00
		Exposure Point Total					N/A					9E+00
	Exposure Medium Total						N/A					9E+00

TABLE 9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Water Vapors at Showerhead	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	N/A	9E-05	N/A	9E-05
			Benzene	N/A	N/A	N/A	N/A	Blood	N/A	2E-02	N/A	2E-02
			Ethylbenzene	N/A	N/A	N/A	N/A	Developmental/Fetus	N/A	4E-04	N/A	4E-04
			m- and p-Xylene	N/A	N/A	N/A	N/A	Whole Body	N/A	9E-03	N/A	9E-03
			Trichloroethene	N/A	N/A	N/A	N/A	Immunotoxicity, Heart Malformations	N/A	8E-03	N/A	8E-03
			Xylene, total	N/A	N/A	N/A	N/A	Whole Body	N/A	8E-03	N/A	8E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Respiratory System	N/A	4E-01	N/A	4E-01
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	1E+00	N/A	1E+00
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E+00	N/A	2E+00
		Exposure Point Total					N/A					2E+00
	Exposure Medium Total						N/A					2E+00
Groundwater Total							N/A					1E+01
						Receptor Risk Total	N/A				Receptor HI Total	1E+01

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Skin HI Across All Media =	2E+00
Total Vascular HI Across All Media =	2E+00
Total Hair HI Across All Media =	3E+00
Total Thyroid HI Across All Media =	2E-01
Total Gastrointestinal HI Across All Media =	1E+00
Total Neurological/CNS Across All Media =	8E-01
Total Liver HI Across All Media =	4E-02
Total Respiratory System HI Across All Media =	2E+00
Total Whole Body/Body Weight Across All Media =	1E+00
Total Kidney HI Across All Media =	2E-01
Total Blood HI Across All Media =	2E-01
Total Mortality HI Across All Media =	9E-03
Total Immune System HI Across All Media =	9E-02
Total Heart Malformations HI Across All Media =	3E-02
Total Longevity HI Across All Media =	4E-02
Total Developmental/Fetus HI Across All Media =	4E-04
Total Lung HI Across All Media =	1E-01

TABLE 9.11.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	Liver	3E-03	N/A	8E-04	4E-03
			Carbazole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chrysene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	8E-02	N/A	2E-02	1E-01
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	3E-02	N/A	1E-02	5E-02
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	4E-03	N/A	1E-03	5E-03
			Pyrene	N/A	N/A	N/A	N/A	Kidney	4E-02	N/A	1E-02	5E-02
			Aldrin	N/A	N/A	N/A	N/A	Liver	2E-03	N/A	6E-04	3E-03
			Aroclor-1242	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	N/A	N/A	N/A	N/A	Liver	5E-02	N/A	1E-02	6E-02
			gamma-BHC (Lindane)	N/A	N/A	N/A	N/A	Kidney, Liver	1E-02	N/A	1E-03	1E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	2E-01	N/A	5E-03	2E-01
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	2E+00	N/A	1E-01	2E+00
			Chromium (hexavalent)	N/A	N/A	N/A	N/A	NOE	2E-03	N/A	2E-03	4E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-01	N/A	4E-03	2E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-01	N/A	1E-02	4E-01
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	8E-02	N/A	5E-02	1E-01
			Thallium	N/A	N/A	N/A	N/A	Hair	5E-01	N/A	1E-02	5E-01
			Vanadium	N/A	N/A	N/A	N/A	Kidney	9E-02	N/A	3E-03	9E-02
			Chemical Total	N/A	N/A	N/A	N/A		3E+00	N/A	3E-01	4E+00
		Exposure Point Total					N/A					4E+00
	Exposure Medium Total						N/A					4E+00
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	3E-02	N/A	3E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	3E-02	N/A	3E-02
		Exposure Point Total					N/A					3E-02
	Exposure Medium Total						N/A					3E-02
Soil* from inside and outside Fenced Area							N/A					4E+00

TABLE 9.11.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	2E-03	N/A	1E-03	3E-03
			Benzene	N/A	N/A	N/A	N/A	Blood	2E-01	N/A	3E-02	3E-01
			Ethylbenzene	N/A	N/A	N/A	N/A	Liver, Kidney	6E-03	N/A	4E-03	1E-02
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight, Mortality	6E-03	N/A	4E-03	1E-02
			Trichloroethene	N/A	N/A	N/A	N/A	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	5E-02	N/A	8E-03	6E-02
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight, Mortality	6E-03	N/A	4E-03	9E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	2E-02	3E-02
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body, Blood	9E-02	N/A	1E-02	1E-01
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	1E-01	N/A	2E-01	3E-01
			Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	1E+00	N/A	9E-01	2E+00
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	4E-01	N/A	2E-01	6E-01
			Dieldrin	N/A	N/A	N/A	N/A	Liver	2E-02	N/A	1E-02	4E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	7E-01	N/A	5E-03	7E-01
			Antimony	N/A	N/A	N/A	N/A	Blood, Longevity	9E-02	N/A	4E-03	9E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	4E+00	N/A	2E-02	4E+00
			Barium	N/A	N/A	N/A	N/A	Kidney	5E-02	N/A	5E-03	6E-02
			Chromium	N/A	N/A	N/A	N/A	NOE	3E-01	N/A	2E-01	5E-01
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	5E-01	N/A	1E-03	5E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E+00	N/A	2E-02	2E+00
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	9E-01	N/A	2E-01	1E+00
			Mercury	N/A	N/A	N/A	N/A	Immune System	1E-01	N/A	1E-02	1E-01
			Thallium	N/A	N/A	N/A	N/A	Hair	7E+00	N/A	5E-02	7E+00
			Vanadium	N/A	N/A	N/A	N/A	Kidney	4E-01	N/A	2E-03	4E-01
			Chemical Total	N/A	N/A	N/A	N/A		2E+01	N/A	2E+00	2E+01
		Exposure Point Total					N/A					2E+01
	Exposure Medium Total						N/A					2E+01
Groundwater Total							N/A					2E+01
						Receptor Risk Total	N/A				Receptor HI Total	2E+01

TABLE 9.11.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Soil* = combined surface and subsurface soil.

Target Organ Totals	
Total Skin HI Across All Media =	6E+00
Total Vascular HI Across All Media =	6E+00
Total Hair HI Across All Media =	8E+00
Total Thyroid HI Across All Media =	7E-01
Total Gastrointestinal HI Across All Media =	3E+00
Total Neurological/CNS Across All Media =	2E+00
Total Liver HI Across All Media =	2E-01
Total Respiratory System HI Across All Media =	3E-02
Total Whole Body/Body Weight Across All Media =	3E+00
Total Kidney Across All Media =	7E-01
Total Blood Across All Media =	5E-01
Total Mortality Across All Media =	2E-02
Total Immune System Across All Media =	2E-01
Total Heart Malformations Across All Media =	6E-02
Total Longevity HI Across All Media =	9E-02
Total Lung Across All Media =	3E-01

TABLE 9.12.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	2E-04	N/A	7E-05	3E-04		N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-03	N/A	5E-04	2E-03		N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-04	N/A	8E-05	3E-04		N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-06	N/A	3E-06	1E-05		N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	1E-07	N/A	3E-08	1E-07		N/A	N/A	N/A	N/A
			Carbazole	1E-06	N/A	3E-07	1E-06		N/A	N/A	N/A	N/A
			Chrysene	2E-06	N/A	9E-07	3E-06		N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-04	N/A	9E-05	3E-04		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Fluoranthene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	7E-05	N/A	3E-05	1E-04		N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Pyrene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Aldrin	1E-07	N/A	4E-08	2E-07		N/A	N/A	N/A	N/A
			Aroclor-1242	3E-06	N/A	2E-06	5E-06		N/A	N/A	N/A	N/A
			Aroclor-1260	1E-06	N/A	6E-07	2E-06		N/A	N/A	N/A	N/A
			Dieldrin	5E-06	N/A	1E-06	6E-06		N/A	N/A	N/A	N/A
			gamma-BHC (Lindane)	4E-07	N/A	5E-08	5E-07		N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Arsenic	9E-05	N/A	9E-06	1E-04		N/A	N/A	N/A	N/A
			Chromium (hexavalent)	1E-06	N/A	2E-06	3E-06		N/A	N/A	N/A	N/A
			Cobalt	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Lead	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Thallium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chemical Total	2E-03	N/A	8E-04	3E-03		N/A	N/A	N/A	N/A
		Exposure Point Total					3E-03					N/A
	Exposure Medium Total						3E-03					N/A
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
			Chemical Total	N/A	1E-06	N/A	1E-06		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-06					N/A
	Exposure Medium Total						1E-06					N/A
Soil* from inside and outside Fenced Area							3E-03					N/A

TABLE 9.12.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	2E-07	N/A	1E-07	3E-07		N/A	N/A	N/A	N/A
			Benzene	1E-05	N/A	2E-06	1E-05		N/A	N/A	N/A	N/A
			Ethylbenzene	2E-06	N/A	1E-06	3E-06		N/A	N/A	N/A	N/A
			m- and p-Xylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene (†)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene (Kidney)	2E-07	N/A	3E-08	2E-07		N/A	N/A	N/A	N/A
			Trichloroethene (NHL + Liver	2E-07	N/A	4E-08	3E-07		N/A	N/A	N/A	N/A
			Xylene, total	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			1,1-Biphenyl	1E-06	N/A	1E-06	2E-06		N/A	N/A	N/A	N/A
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Benzo(a)anthracene	3E-05	N/A	4E-04	4E-04		N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-04	N/A	5E-03	5E-03		N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-05	N/A	7E-04	7E-04		N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-06	N/A	7E-05	7E-05		N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-05	N/A	2E-03	3E-03		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-05	N/A	9E-04	1E-03		N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Dieldrin	4E-06	N/A	3E-06	7E-06		N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Antimony	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Arsenic	4E-04	N/A	2E-06	4E-04		N/A	N/A	N/A	N/A
			Barium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chromium	4E-04	N/A	2E-04	5E-04		N/A	N/A	N/A	N/A
			Cobalt	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Lead	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Mercury	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Thallium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chemical Total	1E-03	N/A	1E-02	1E-02		N/A	N/A	N/A	N/A
		Exposure Point Total					1E-02					N/A
	Exposure Medium Total						1E-02					N/A

TABLE 9.12.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Water Vapors at Showerhead	1,4-Dichlorobenzene	N/A	3E-10	N/A	3E-10		N/A	N/A	N/A	N/A
			Benzene	N/A	2E-09	N/A	2E-09		N/A	N/A	N/A	N/A
			Ethylbenzene	N/A	4E-10	N/A	4E-10		N/A	N/A	N/A	N/A
			m- and p-Xylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene	N/A	2E-11	N/A	2E-11		N/A	N/A	N/A	N/A
			Xylene, total	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			1,1-Biphenyl	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Naphthalene	N/A	4E-08	N/A	4E-08		N/A	N/A	N/A	N/A
			Chemical Total	N/A	4E-08	N/A	4E-08		N/A	N/A	N/A	N/A
		Exposure Point Total					4E-08					N/A
	Exposure Medium Total						4E-08					N/A
Groundwater Total							1E-02					N/A
						Receptor Risk Total	1E-02				Receptor HI Total	N/A

Notes:

N/A = Not applicable

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	7E-06	N/A	1E-06	8E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-05	N/A	9E-06	6E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	8E-06	N/A	1E-06	9E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-07	N/A	6E-08	4E-07	N/A	N/A	N/A	N/A	N/A
			Carbazole	1E-07	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Chrysene	8E-08	N/A	1E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	9E-06	N/A	2E-06	1E-05	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	8E-03	N/A	1E-03	9E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	5E-03	N/A	N/A	5E-03
			Indeno(1,2,3-cd)pyrene	3E-06	N/A	5E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	6E-04	N/A	1E-04	7E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	6E-03	N/A	1E-03	7E-03
			Dieldrin	6E-07	N/A	8E-08	6E-07	Liver	6E-03	N/A	7E-04	6E-03
			gamma-BHC (Lindane)	5E-08	N/A	3E-09	5E-08	Kidney, Liver	1E-03	N/A	6E-05	1E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	5E-03	N/A	7E-05	5E-03
			Arsenic	6E-07	N/A	2E-08	6E-07	Skin, Vascular	1E-02	N/A	4E-04	1E-02
			Chromium (hexavalent)	1E-08	N/A	8E-09	2E-08	NOE	8E-05	N/A	4E-05	1E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	7E-03	N/A	9E-05	7E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-04	1E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	6E-03	N/A	2E-03	7E-03
			Chemical Total	8E-05	N/A	1E-05	9E-05		7E-02	N/A	6E-03	7E-02
		Exposure Point Total					9E-05					7E-02
	Exposure Medium Total						9E-05					7E-02
	Air	Emissions from Surface Soil within Fenced Area of Youth Pond/Site 4	Naphthalene	N/A	4E-07	N/A	4E-07	Respiratory System	N/A	3E-02	N/A	3E-02
			Chemical Total	N/A	4E-07	N/A	4E-07		N/A	3E-02	N/A	3E-02
		Exposure Point Total					4E-07					3E-02
	Exposure Medium Total						4E-07					3E-02
Surface Soil within Fenced Area of Site 4							1E-04					1E-01
						Receptor Risk Total	1E-04				Receptor HI Total	1E-01

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Total Whole Body HI Across All Media =	9E-03
Total Kidney HI Across All Media =	1E-02
Total Liver HI Across All Media =	1E-02
Total Blood HI Across All Media =	5E-03
Total Body Weight HI Across All Media =	7E-04
Total Neurological/CNS HI Across All Media =	1E-02
Total Skin HI Across All Media =	1E-02
Total Vascular HI Across All Media =	1E-02
Total Thyroid HI Across All Media =	7E-03
Total Gastrointestinal HI Across All Media =	1E-02
Total Respiratory System HI Across All Media =	3E-02

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	2E-08	N/A	3E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-07	N/A	2E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-08	N/A	2E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	8E-10	N/A	1E-10	9E-10	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	N/A	2E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	9E-09	N/A	1E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Aldrin	4E-09	N/A	4E-10	4E-09	Liver	6E-05	N/A	6E-06	6E-05
			Aroclor-1242	1E-08	N/A	2E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	1E-08	N/A	2E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-04	N/A	7E-06	6E-04
			Arsenic	8E-07	N/A	3E-08	8E-07	Skin, Vascular	1E-02	N/A	4E-04	1E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	7E-04	N/A	8E-06	7E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-03	N/A	3E-05	3E-03
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-04	N/A	9E-05	4E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-03	N/A	3E-05	3E-03
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-04	N/A	3E-06	3E-04
			Chemical Total	1E-06	N/A	6E-08	1E-06		2E-02	N/A	6E-04	2E-02
		Exposure Point Total					1E-06					2E-02
	Exposure Medium Total						1E-06					2E-02
Surface Soil outside Fenced Area of Site 4							1E-06					2E-02
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	9E-09	N/A	4E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Arsenic	1E-07	N/A	3E-08	2E-07	Skin, Vascular	2E-03	N/A	5E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-03	N/A	3E-04	2E-03
			Chemical Total	1E-07	N/A	4E-06	4E-06		4E-03	N/A	8E-04	4E-03
		Exposure Point Total					4E-06					4E-03
	Exposure Medium Total						4E-06					4E-03
Surface Water - Upstream Pond Total							4E-06					4E-03

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	7E-07	N/A	2E-07	9E-07	Skin, Vascular	1E-02	N/A	3E-03	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-03	N/A	7E-04	4E-03
			Chemical Total	7E-07	N/A	2E-07	9E-07		2E-02	N/A	4E-03	2E-02
		Exposure Point Total					9E-07					2E-02
	Exposure Medium Total						9E-07					2E-02
Surface Water - Drainage Channel to Upstream Pond Total							9E-07					2E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	5E-09	N/A	1E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-08	N/A	2E-09	4E-08	Skin, Vascular	6E-04	N/A	4E-05	7E-04
			Chromium	7E-08	N/A	6E-08	1E-07	NOE	3E-04	N/A	3E-04	6E-04
			Chemical Total	1E-07	N/A	6E-08	2E-07		1E-03	N/A	4E-04	1E-03
		Exposure Point Total					2E-07					1E-03
	Exposure Medium Total						2E-07					1E-03
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-07					1E-03
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-08	N/A	7E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-09	N/A	9E-10	4E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-09	N/A	1E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-10	N/A	2E-10	8E-10	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	3E-08	4E-07	Skin, Vascular	6E-03	N/A	4E-04	7E-03
			Chromium	4E-08	N/A	4E-08	8E-08	NOE	2E-04	N/A	2E-04	4E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-03	N/A	8E-05	4E-03
			Chemical Total	4E-07	N/A	7E-08	5E-07		1E-02	N/A	7E-04	1E-02
		Exposure Point Total					5E-07					1E-02
	Exposure Medium Total						5E-07					1E-02
Surface and Subsurface Sediment - Youth Pond Total							5E-07					1E-02

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	8E-10	N/A	2E-10	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-08	N/A	4E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-09	N/A	8E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-09	N/A	8E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	3E-08	N/A	1E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	7E-09	N/A	2E-09	9E-09	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-08	N/A	2E-09	1E-08	Liver	1E-04	N/A	2E-05	1E-04
			Heptachlor epoxide	2E-09	N/A	6E-10	3E-09	Liver	2E-04	N/A	4E-05	2E-04
			Arsenic	1E-07	N/A	7E-09	1E-07	Skin, Vascular	2E-03	N/A	1E-04	2E-03
			Chromium	5E-11	N/A	4E-11	9E-11	NOE	2E-07	N/A	2E-07	5E-07
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-07	N/A	3E-08	2E-07		2E-03	N/A	2E-04	2E-03
		Exposure Point Total					2E-07					2E-03
	Exposure Medium Total						2E-07					2E-03
Surface and Subsurface Sediment - Upstream Pond Total							2E-07					2E-03
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-09	N/A	3E-10	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-08	N/A	3E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-09	N/A	4E-10	2E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-10	N/A	1E-10	6E-10	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-08	N/A	3E-09	4E-08	Skin, Vascular	7E-04	N/A	4E-05	7E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-04	N/A	4E-07	2E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-04	N/A	6E-09	4E-04
			Manganese	N/A	N/A	N/A	N/A	CNS	2E-04	N/A	2E-06	2E-04
			Chemical Total	5E-08	N/A	7E-09	6E-08		2E-03	N/A	5E-05	2E-03
		Exposure Point Total					6E-08					2E-03
	Exposure Medium Total						6E-08					2E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							6E-08					2E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-06	N/A	N/A	1E-06	Ocular, Finger and Toe Nails	2E-01	N/A	N/A	2E-01
			Aroclor-1260	6E-06	N/A	N/A	6E-06	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	7E-06	N/A	N/A	7E-06	Sperm	6E-01	N/A	N/A	6E-01
			Chromium	1E-06	N/A	N/A	1E-06	NOE	5E-03	N/A	N/A	5E-03
			Mercury	N/A	N/A	N/A	N/A	Neurological	1E-01	N/A	N/A	1E-01
			Chemical Total	2E-05	N/A	N/A	2E-05		1E+00	N/A	N/A	1E+00
		Exposure Point Total					2E-05					1E+00
	Exposure Medium Total						2E-05					1E+00
Fish - Youth and Upstream Pond Fish Tissue Total							2E-05					1E+00
Receptor Risk Total from Youth Pond							2E-05	Receptor HI Total from Youth Pond				1E+00
Receptor Risk Total from Upstream Pond							2E-05	Receptor HI Total from Upstream Pond				1E+00

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond total includes Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	7E-03
Total Vascular HI Across All Media =	7E-03
Total Hair HI Across All Media =	4E-03
Total Ocular HI Across All Media =	2E-01
Total Finger and Toe Nails HI Across All Media =	2E-01
Total Sperm HI Across All Media =	6E-01
Total Neurological HI Across All Media =	1E-01
Total Thyroid HI Across All Media =	2E-04
Total Gastrointestinal HI Across All Media =	4E-04

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	4E-04
Total Neurological/CNS HI Across All Media =	1E-01
Total Skin HI Across All Media =	3E-02
Total Vascular HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	7E-04
Total Gastrointestinal HI Across All Media =	8E-03
Total Hair HI Across All Media =	3E-03
Total Ocular HI Across All Media =	2E-01
Total Finger and Toe Nails HI Across All Media =	2E-01
Total Sperm HI Across All Media =	6E-01
Total Kidney HI Across All Media =	3E-04

TABLE 9.3.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	7E-07	N/A	1E-07	8E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	6E-06	N/A	8E-07	6E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	6E-07	N/A	8E-08	6E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-08	N/A	4E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-07	N/A	5E-08	4E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	N/A	4E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Aldrin	2E-08	N/A	3E-09	3E-08	Liver	5E-04	N/A	6E-05	6E-04
			Aroclor-1242	8E-08	N/A	1E-08	9E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	7E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-03	N/A	6E-05	6E-03
			Arsenic	5E-06	N/A	2E-07	5E-06	Skin, Vascular	1E-01	N/A	4E-03	1E-01
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	6E-03	N/A	7E-05	6E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	3E-04	3E-02
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-03	N/A	9E-04	4E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-02	N/A	3E-04	3E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	3E-05	3E-03
			Chemical Total	1E-05	N/A	1E-06	1E-05		2E-01	N/A	6E-03	2E-01
		Exposure Point Total					1E-05					2E-01
	Exposure Medium Total						1E-05					2E-01
Surface Soil outside Fenced Area of Site 4							1E-05					2E-01
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	2E-07	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	3E-08	4E-07	Skin, Vascular	1E-02	N/A	8E-04	1E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	5E-04	6E-03
			Chemical Total	6E-07	N/A	2E-05	2E-05		2E-02	N/A	1E-03	2E-02
		Exposure Point Total					2E-05					2E-02
	Exposure Medium Total						2E-05					2E-02
Surface Water - Upstream Pond Total							2E-05					2E-02
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	2E-06	N/A	2E-07	2E-06	Skin, Vascular	6E-02	N/A	5E-03	6E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	1E-03	1E-02
			Chemical Total	2E-06	N/A	2E-07	2E-06		7E-02	N/A	6E-03	8E-02
		Exposure Point Total					2E-06					8E-02
	Exposure Medium Total						2E-06					8E-02
Surface Water - Drainage Channel to Upstream Pond Total							2E-06					8E-02

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	2E-07	N/A	3E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	1E-08	2E-07	Skin, Vascular	6E-03	N/A	3E-04	6E-03
			Chromium	3E-06	N/A	1E-06	4E-06	NOE	3E-03	N/A	2E-03	5E-03
			Chemical Total	3E-06	N/A	1E-06	5E-06		9E-03	N/A	2E-03	1E-02
		Exposure Point Total					5E-06					1E-02
	Exposure Medium Total						5E-06					1E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							5E-06					1E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	7E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	7E-07	N/A	2E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-07	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	N/A	3E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	4E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	1E-07	2E-06	Skin, Vascular	6E-02	N/A	3E-03	6E-02
			Chromium	1E-06	N/A	9E-07	2E-06	NOE	2E-03	N/A	1E-03	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-02	N/A	5E-04	3E-02
			Chemical Total	5E-06	N/A	1E-06	6E-06		9E-02	N/A	5E-03	1E-01
		Exposure Point Total					6E-06					1E-01
	Exposure Medium Total						6E-06					1E-01
Surface and Subsurface Sediment - Youth Pond Total							6E-06					1E-01
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	3E-08	N/A	6E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-07	N/A	9E-08	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	9E-08	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	9E-08	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	2E-07	N/A	5E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	4E-08	N/A	9E-09	5E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	7E-08	N/A	1E-08	8E-08	Liver	1E-03	N/A	2E-04	1E-03
			Heptachlor epoxide	2E-08	N/A	2E-09	2E-08	Liver	1E-03	N/A	2E-04	2E-03
			Arsenic	6E-07	N/A	3E-08	6E-07	Skin, Vascular	2E-02	N/A	7E-04	2E-02
			Chromium	2E-09	N/A	1E-09	2E-09	NOE	2E-06	N/A	1E-06	4E-06
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-06	N/A	2E-07	2E-06		2E-02	N/A	1E-03	2E-02
		Exposure Point Total					2E-06					2E-02
	Exposure Medium Total						2E-06					2E-02
Surface and Subsurface Sediment - Upstream Pond Total							2E-06					2E-02

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	4E-08	N/A	7E-09	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	4E-07	N/A	7E-08	4E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	6E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-08	N/A	9E-09	5E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	3E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	1E-08	2E-07	Skin, Vascular	6E-03	N/A	3E-04	6E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	2E-06	2E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-03	N/A	4E-08	4E-03
			Manganese	N/A	N/A	N/A	N/A	CNS	2E-03	N/A	1E-05	2E-03
			Chemical Total	7E-07	N/A	1E-07	9E-07		1E-02	N/A	3E-04	1E-02
		Exposure Point Total					9E-07					1E-02
	Exposure Medium Total						9E-07					1E-02
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							9E-07					1E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-06	N/A	N/A	1E-06	Ocular, Finger and Toe Nails	3E-01	N/A	N/A	3E-01
			Aroclor-1260	5E-06	N/A	N/A	5E-06	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	6E-06	N/A	N/A	6E-06	Sperm	8E-01	N/A	N/A	8E-01
			Chromium	5E-06	N/A	N/A	5E-06	NOE	7E-03	N/A	N/A	7E-03
			Mercury	N/A	N/A	N/A	N/A	Neurological	1E-01	N/A	N/A	1E-01
			Chemical Total	2E-05	N/A	N/A	2E-05		1E+00	N/A	N/A	1E+00
		Exposure Point Total					2E-05					1E+00
	Exposure Medium Total						2E-05					1E+00
Fish - Youth and Upstream Pond Fish Tissue Total							2E-05					1E+00
Receptor Risk Total from Youth Pond							2E-05	Receptor HI Total from Youth Pond				1E+00
Receptor Risk Total from Upstream Pond							6E-05	Receptor HI Total from Upstream Pond				2E+00

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects

Youth Pond total includes Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	7E-02
Total Vascular HI Across All Media =	7E-02
Total Hair HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	2E-03
Total Ocular HI Across All Media =	3E-01
Total Finger and Toe Nails HI Across All Media =	3E-01
Total Sperm HI Across All Media =	8E-01
Total Neurological/CNS HI Across All Media =	1E-01
Total Kidney HI Across All Media =	3E-03
Total Thyroid HI Across All Media =	2E-03
Total Gastrointestinal HI Across All Media =	4E-03

TABLE 9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	3E-03
Total Neurological/CNS HI Across All Media =	1E-01
Total Skin HI Across All Media =	2E-01
Total Vascular HI Across All Media =	2E-01
Total Thyroid HI Across All Media =	6E-03
Total Gastrointestinal HI Across All Media =	5E-02
Total Hair HI Across All Media =	3E-02
Total Ocular HI Across All Media =	3E-01
Total Finger and Toe Nails HI Across All Media =	3E-01
Total Sperm HI Across All Media =	8E-01

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	9E-09	N/A	4E-06	4E-06	N/A	N/A	N/A	N/A	N/A
			Arsenic	1E-07	N/A	3E-08	2E-07	Skin, Vascular	2E-03	N/A	5E-04	3E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-03	N/A	3E-04	2E-03
			Chemical Total	1E-07	N/A	4E-06	4E-06		4E-03	N/A	8E-04	4E-03
		Exposure Point Total					4E-06					4E-03
	Exposure Medium Total						4E-06					4E-03
Surface Water - Upstream Pond Total							4E-06					4E-03
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	7E-07	N/A	2E-07	9E-07	Skin, Vascular	1E-02	N/A	3E-03	2E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-03	N/A	7E-04	4E-03
			Chemical Total	7E-07	N/A	2E-07	9E-07		2E-02	N/A	4E-03	2E-02
		Exposure Point Total					9E-07					2E-02
	Exposure Medium Total						9E-07					2E-02
Surface Water - Drainage Channel to Upstream Pond Total							9E-07					2E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	5E-09	N/A	1E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-08	N/A	2E-09	4E-08	Skin, Vascular	6E-04	N/A	4E-05	7E-04
			Chromium	7E-08	N/A	6E-08	1E-07	NOE	3E-04	N/A	3E-04	6E-04
			Chemical Total	1E-07	N/A	6E-08	2E-07		1E-03	N/A	4E-04	1E-03
		Exposure Point Total					2E-07					1E-03
	Exposure Medium Total						2E-07					1E-03
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-07					1E-03
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-08	N/A	7E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-09	N/A	9E-10	4E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-09	N/A	1E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-10	N/A	2E-10	8E-10	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	3E-08	4E-07	Skin, Vascular	6E-03	N/A	4E-04	7E-03
			Chromium	4E-08	N/A	4E-08	8E-08	NOE	2E-04	N/A	2E-04	4E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-03	N/A	8E-05	4E-03
			Chemical Total	4E-07	N/A	7E-08	5E-07		1E-02	N/A	7E-04	1E-02
		Exposure Point Total					5E-07					1E-02
	Exposure Medium Total						5E-07					1E-02
Surface and Subsurface Sediment - Youth Pond Total							5E-07					1E-02

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	8E-10	N/A	2E-10	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-08	N/A	4E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-09	N/A	8E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-09	N/A	8E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	3E-08	N/A	1E-08	5E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	7E-09	N/A	2E-09	9E-09	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-08	N/A	2E-09	1E-08	Liver	1E-04	N/A	2E-05	1E-04
			Heptachlor epoxide	2E-09	N/A	6E-10	3E-09	Liver	2E-04	N/A	4E-05	2E-04
			Arsenic	1E-07	N/A	7E-09	1E-07	Skin, Vascular	2E-03	N/A	1E-04	2E-03
			Chromium	5E-11	N/A	4E-11	9E-11	NOE	2E-07	N/A	2E-07	5E-07
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-07	N/A	3E-08	2E-07		2E-03	N/A	2E-04	2E-03
		Exposure Point Total					2E-07					2E-03
	Exposure Medium Total						2E-07					2E-03
Surface and Subsurface Sediment - Upstream Pond Total							2E-07					2E-03
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	1E-09	N/A	3E-10	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-08	N/A	3E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-09	N/A	6E-10	3E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-09	N/A	4E-10	2E-09	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-10	N/A	1E-10	6E-10	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-08	N/A	3E-09	4E-08	Skin, Vascular	7E-04	N/A	4E-05	7E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-04	N/A	4E-07	2E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-04	N/A	6E-09	4E-04
			Manganese	N/A	N/A	N/A	N/A	CNS	2E-04	N/A	2E-06	2E-04
			Chemical Total	5E-08	N/A	7E-09	6E-08		2E-03	N/A	5E-05	2E-03
		Exposure Point Total					6E-08					2E-03
	Exposure Medium Total						6E-08					2E-03
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							6E-08					2E-03
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-06	N/A	N/A	1E-06	Ocular, Finger and Toe Nails	2E-01	N/A	N/A	2E-01
			Aroclor-1260	6E-06	N/A	N/A	6E-06	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	7E-06	N/A	N/A	7E-06	Sperm	6E-01	N/A	N/A	6E-01
			Chromium	1E-06	N/A	N/A	1E-06	NOE	5E-03	N/A	N/A	5E-03
			Mercury	N/A	N/A	N/A	N/A	Neurological	3E-02	N/A	N/A	3E-02
			Chemical Total	2E-05	N/A	N/A	2E-05		9E-01	N/A	N/A	9E-01
		Exposure Point Total					2E-05					9E-01
	Exposure Medium Total						2E-05					9E-01
Fish - Youth and Upstream Pond Fish Tissue Total							2E-05					9E-01

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Benzo(a)anthracene	2E-07	N/A	1E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-06	N/A	8E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-07	N/A	1E-07	3E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	9E-09	N/A	5E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	4E-10	N/A	2E-10	6E-10	Liver	1E-05	N/A	5E-06	2E-05
			Carbazole	4E-09	N/A	2E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Chrysene	2E-09	N/A	1E-09	3E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	N/A	1E-07	4E-07	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-04	N/A	1E-04	5E-04
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-04	N/A	8E-05	2E-04
			Indeno(1,2,3-cd)pyrene	7E-08	N/A	4E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-05	N/A	9E-06	2E-05
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-04	N/A	9E-05	2E-04
			Aldrin	5E-10	N/A	2E-10	7E-10	Liver	8E-06	N/A	4E-06	1E-05
			Aroclor-1242	1E-08	N/A	9E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	5E-09	N/A	3E-09	9E-09	N/A	N/A	N/A	N/A	N/A
			Dieldrin	2E-08	N/A	9E-09	3E-08	Liver	2E-04	N/A	9E-05	3E-04
			gamma-BHC (Lindane)	2E-09	N/A	3E-10	2E-09	Kidney, Liver	4E-05	N/A	8E-06	5E-05
			Aluminum	N/A	N/A	N/A	N/A	Neurological	7E-04	N/A	3E-05	7E-04
			Arsenic	4E-07	N/A	5E-08	4E-07	Skin, Vascular	7E-03	N/A	9E-04	8E-03
			Chromium (hexavalent)	1E-09	N/A	3E-09	4E-09	NOE	7E-06	N/A	1E-05	2E-05
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	6E-04	N/A	3E-05	6E-04
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-03	N/A	7E-05	2E-03
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-04	N/A	3E-04	7E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-03	N/A	9E-05	2E-03
			Vanadium	N/A	N/A	N/A	N/A	Kidney	4E-04	N/A	2E-05	4E-04
			Chemical Total	3E-06	N/A	1E-06	4E-06		1E-02	N/A	2E-03	1E-02
		Exposure Point Total					4E-06					1E-02
	Exposure Medium Total						4E-06					1E-02
Soil* (cont'd)	Air	Emissions from Soil* outside Fenced Area of Site 4	Naphthalene	N/A	5E-09	N/A	5E-09	Respiratory System	N/A	1E-04	N/A	1E-04
			Chemical Total	N/A	5E-09	N/A	5E-09		N/A	1E-04	N/A	1E-04
		Exposure Point Total					5E-09					1E-04
	Exposure Medium Total						5E-09					1E-04
Soil* outside Fenced Area of Site 4							4E-06					2E-02
Receptor Risk Total from Youth Pond							2E-05	Receptor HI Total from Youth Pond				9E-01
Receptor Risk Total from Upstream Pond							2E-05	Receptor HI Total from Upstream Pond				9E-01

TABLE 9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, , Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.
Soil* = combined surface and subsurface soil

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	7E-03
Total Vascular HI Across All Media =	7E-03
Total Hair HI Across All Media =	4E-03
Total Ocular HI Across All Media =	2E-01
Total Finger and Toe Nails HI Across All Media =	2E-01
Total Sperm HI Across All Media =	6E-01
Total Neurological/CNS HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	2E-04
Total Gastrointestinal HI Across All Media =	4E-04

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	9E-04
Total Neurological/CNS HI Across All Media =	3E-02
Total Skin HI Across All Media =	3E-02
Total Vascular HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	6E-04
Total Gastrointestinal HI Across All Media =	7E-03
Total Hair HI Across All Media =	2E-03
Total Respiratory System HI Across All Media =	1E-04
Total Ocular HI Across All Media =	2E-01
Total Finger and Toe Nails HI Across All Media =	2E-01
Total Sperm HI Across All Media =	6E-01
Total Whole Body/Body Weight Across All Media =	5E-04
Total Kidney Across All Media =	9E-04
Total Blood Across All Media =	2E-04

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	2E-07	N/A	2E-05	2E-05	N/A	N/A	N/A	N/A	N/A
			Arsenic	4E-07	N/A	3E-08	4E-07	Skin, Vascular	1E-02	N/A	8E-04	1E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	6E-03	N/A	5E-04	6E-03
			Chemical Total	6E-07	N/A	2E-05	2E-05		2E-02	N/A	1E-03	2E-02
		Exposure Point Total					2E-05					2E-02
	Exposure Medium Total						2E-05					2E-02
Surface Water - Upstream Pond Total							2E-05					2E-02
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	2E-06	N/A	2E-07	2E-06	Skin, Vascular	6E-02	N/A	5E-03	6E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	1E-03	1E-02
			Chemical Total	2E-06	N/A	2E-07	2E-06		7E-02	N/A	6E-03	8E-02
		Exposure Point Total					2E-06					8E-02
	Exposure Medium Total						2E-06					8E-02
Surface Water - Drainage Channel to Upstream Pond Total							2E-06					8E-02
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Benzo(a)pyrene	2E-07	N/A	3E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	1E-08	2E-07	Skin, Vascular	6E-03	N/A	3E-04	6E-03
			Chromium	2E-06	N/A	1E-06	4E-06	NOE	3E-03	N/A	2E-03	5E-03
			Chemical Total	3E-06	N/A	1E-06	4E-06		9E-03	N/A	2E-03	1E-02
		Exposure Point Total					4E-06					1E-02
	Exposure Medium Total						4E-06					1E-02
Surface Sediment - Drainage Channel to Upstream Pond Total							4E-06					1E-02
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)anthracene	7E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	7E-07	N/A	2E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	1E-07	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	N/A	3E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	4E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-06	N/A	1E-07	2E-06	Skin, Vascular	6E-02	N/A	3E-03	6E-02
			Chromium	1E-06	N/A	9E-07	2E-06	NOE	2E-03	N/A	1E-03	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	3E-02	N/A	5E-04	3E-02
			Chemical Total	5E-06	N/A	1E-06	6E-06		9E-02	N/A	5E-03	1E-01
		Exposure Point Total					6E-06					1E-01
	Exposure Medium Total						6E-06					1E-01
Surface and Subsurface Sediment - Youth Pond Total							6E-06					1E-01

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)anthracene	3E-08	N/A	6E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-07	N/A	9E-08	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	9E-08	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	9E-08	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1242	2E-07	N/A	5E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	4E-08	N/A	9E-09	5E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	7E-08	N/A	1E-08	8E-08	Liver	1E-03	N/A	2E-04	1E-03
			Heptachlor epoxide	2E-08	N/A	2E-09	2E-08	Liver	1E-03	N/A	2E-04	2E-03
			Arsenic	6E-07	N/A	3E-08	6E-07	Skin, Vascular	2E-02	N/A	7E-04	2E-02
			Chromium	2E-09	N/A	1E-09	2E-09	NOE	2E-06	N/A	1E-06	4E-06
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chemical Total	2E-06	N/A	2E-07	2E-06		2E-02	N/A	1E-03	2E-02
		Exposure Point Total					2E-06					2E-02
	Exposure Medium Total						2E-06					2E-02
Surface and Subsurface Sediment - Upstream Pond Total							2E-06					2E-02
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)anthracene	4E-08	N/A	7E-09	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	4E-07	N/A	7E-08	4E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	6E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-08	N/A	9E-09	5E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	N/A	3E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Arsenic	2E-07	N/A	1E-08	2E-07	Skin, Vascular	6E-03	N/A	3E-04	6E-03
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	2E-03	N/A	2E-06	2E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	4E-03	N/A	4E-08	4E-03
			Manganese	N/A	N/A	N/A	N/A	CNS	2E-03	N/A	1E-05	2E-03
			Chemical Total	7E-07	N/A	1E-07	9E-07		1E-02	N/A	3E-04	1E-02
		Exposure Point Total					9E-07					1E-02
	Exposure Medium Total						9E-07					1E-02
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							9E-07					1E-02
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-06	N/A	N/A	1E-06	Ocular, Finger and Toe Nails	3E-01	N/A	N/A	3E-01
			Aroclor-1260	5E-06	N/A	N/A	5E-06	N/A	N/A	N/A	N/A	N/A
			Dioxin-Like PCB TEQ	6E-06	N/A	N/A	6E-06	Sperm	8E-01	N/A	N/A	8E-01
			Chromium	5E-06	N/A	N/A	5E-06	NOE	7E-03	N/A	N/A	7E-03
			Mercury	N/A	N/A	N/A	N/A	Neurological	4E-02	N/A	N/A	4E-02
			Chemical Total	2E-05	N/A	N/A	2E-05		1E+00	N/A	N/A	1E+00
		Exposure Point Total					2E-05					1E+00
	Exposure Medium Total						2E-05					1E+00
Fish - Youth and Upstream Pond Fish Tissue Total							2E-05					1E+00

TABLE 9.5.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* from inside and outside the Fenced Area	Benzo(a)anthracene	6E-06	N/A	9E-07	7E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-05	N/A	7E-06	5E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	7E-06	N/A	1E-06	8E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-07	N/A	4E-08	3E-07	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	3E-09	N/A	3E-10	3E-09	Liver	1E-04	N/A	1E-05	1E-04
			Carbazole	3E-08	N/A	3E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	7E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-06	N/A	1E-06	9E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-03	N/A	3E-04	3E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-03	N/A	2E-04	1E-03
			Indeno(1,2,3-cd)pyrene	2E-06	N/A	3E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-04	N/A	2E-05	2E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	2E-04	2E-03
			Aldrin	3E-09	N/A	4E-10	4E-09	Liver	7E-05	N/A	8E-06	8E-05
			Aroclor-1242	9E-08	N/A	1E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	3E-08	N/A	5E-09	4E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	1E-07	N/A	1E-08	1E-07	Liver	2E-03	N/A	2E-04	2E-03
			gamma-BHC (Lindane)	1E-08	N/A	5E-10	1E-08	Kidney, Liver	4E-04	N/A	2E-05	4E-04
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-03	N/A	7E-05	6E-03
			Arsenic	2E-06	N/A	8E-08	3E-06	Skin, Vascular	6E-02	N/A	2E-03	7E-02
			Chromium (hexavalent)	5E-08	N/A	2E-08	7E-08	NOE	7E-05	N/A	3E-05	1E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	6E-03	N/A	6E-05	6E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-04	1E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-03	N/A	8E-04	4E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-02	N/A	2E-04	2E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	4E-05	3E-03
			Chemical Total	7E-05	N/A	1E-05	8E-05		1E-01	N/A	4E-03	1E-01
		Exposure Point Total					8E-05					1E-01
	Exposure Medium Total						8E-05					1E-01
Soil*	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	6E-13	N/A	6E-13	Respiratory System	N/A	7E-08	N/A	7E-08
			Chemical Total	N/A	6E-13	N/A	6E-13		N/A	7E-08	N/A	7E-08
		Exposure Point Total					6E-13					7E-08
	Exposure Medium Total						6E-13					7E-08
Soil* inside and outside Fenced Area							8E-05					1E-01
Receptor Risk Total from Youth Pond							2E-05	Receptor HI Total from Youth Pond				1E+00
Receptor Risk Total from Upstream Pond							1E-04	Receptor HI Total from Upstream Pond				1E+00

TABLE 9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Skin HI Across All Media =	7E-02
Total Vascular HI Across All Media =	7E-02
Total Hair HI Across All Media =	3E-02
Total Ocular HI Across All Media =	3E-01
Total Finger and Toe Nails HI Across All Media =	3E-01
Total Sperm HI Across All Media =	8E-01
Total Neurological/CNS HI Across All Media =	4E-02
Total Thyroid HI Across All Media =	2E-03
Total Gastrointestinal HI Across All Media =	4E-03

Upstream Pond Target Organ Totals

Total Liver HI Across All Media =	7E-03
Total Neurological/CNS HI Across All Media =	5E-02
Total Skin HI Across All Media =	2E-01
Total Vascular HI Across All Media =	2E-01
Total Thyroid HI Across All Media =	6E-03
Total Gastrointestinal HI Across All Media =	4E-02
Total Hair HI Across All Media =	2E-02
Total Respiratory System HI Across All Media =	7E-08
Total Ocular HI Across All Media =	3E-01
Total Finger and Toe Nails HI Across All Media =	3E-01
Total Sperm HI Across All Media =	8E-01
Total Whole Body/Body Weight Across All Media =	3E-03
Total Kidney Across All Media =	6E-03
Total Blood Across All Media =	1E-03

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	4E-07	N/A	9E-08	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	3E-06	N/A	6E-07	4E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	4E-07	N/A	1E-07	5E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	2E-08	N/A	4E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	9E-10	N/A	1E-10	1E-09	Reproductive System	4E-05	N/A	7E-06	5E-05
			Carbazole	9E-09	N/A	1E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	5E-09	N/A	1E-09	6E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-07	N/A	1E-07	6E-07	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	2E-03	N/A	2E-04	2E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	2E-04	1E-03
			Indeno(1,2,3-cd)pyrene	2E-07	N/A	3E-08	2E-07	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	9E-06	N/A	2E-06	1E-05
			Pyrene	N/A	N/A	N/A	N/A	Kidney	3E-04	N/A	6E-05	3E-04
			Aldrin	1E-09	N/A	2E-10	1E-09	Kidney	1E-04	N/A	2E-05	1E-04
			Aroclor-1242	3E-08	N/A	7E-09	4E-08	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	1E-08	N/A	3E-09	1E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	4E-08	N/A	7E-09	5E-08	Neurological	2E-03	N/A	3E-04	2E-03
			gamma-BHC (Lindane)	4E-09	N/A	2E-10	4E-09	Immunological	2E-02	N/A	2E-03	3E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	1E-02	N/A	2E-04	1E-02
			Arsenic	8E-07	N/A	4E-08	9E-07	Skin, Vascular	1E-01	N/A	6E-03	1E-01
			Chromium (hexavalent)	3E-09	N/A	2E-09	5E-09	Blood	8E-05	N/A	6E-05	1E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	1E-03	N/A	2E-05	1E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	3E-02	N/A	5E-04	3E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	6E-03	N/A	2E-03	8E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	9E-03	N/A	2E-04	9E-03
			Vanadium	N/A	N/A	N/A	N/A	Whole Body	5E-03	N/A	8E-05	5E-03
			Chemical Total	5E-06	N/A	1E-06	6E-06		2E-01	N/A	1E-02	2E-01
		Exposure Point Total					6E-06					2E-01
	Exposure Medium Total						6E-06					2E-01
Soil* (cont'd)	Air	Emissions from Soil inside and outside Fenced Area	Naphthalene	N/A	5E-09	N/A	5E-09	Respiratory System	N/A	4E-03	N/A	4E-03
			Chemical Total	N/A	5E-09	N/A	5E-09		N/A	4E-03	N/A	4E-03
		Exposure Point Total					5E-09					4E-03
	Exposure Medium Total						5E-09					4E-03
Soil* from inside and outside Fenced Area							6E-06					2E-01

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* within the Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	2E-06	N/A	4E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	8E-05	N/A	2E-05	1E-04	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-06	N/A	4E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	8E-08	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Carbazole	2E-08	N/A	4E-09	3E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	2E-08	N/A	5E-09	3E-08	N/A	2E-03	N/A	4E-04	2E-03
			Dibenz(a,h)anthracene	2E-06	N/A	5E-07	3E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	2E-03	N/A	3E-04	2E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney	5E-03	N/A	1E-03	6E-03
			Indeno(1,2,3-cd)pyrene	7E-07	N/A	2E-07	9E-07	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	4E-05	N/A	9E-06	5E-05
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	3E-04	2E-03
			Dieldrin	1E-07	N/A	2E-08	2E-07	Neurological	6E-03	N/A	1E-03	7E-03
			gamma-BHC (Lindane)	1E-08	N/A	9E-10	1E-08	Immunological	8E-02	N/A	6E-03	9E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	1E-02	N/A	2E-04	1E-02
			Arsenic	1E-07	N/A	5E-09	1E-07	Skin, Vascular	2E-02	N/A	8E-04	2E-02
			Chromium (hexavalent)	4E-09	N/A	2E-09	6E-09	Blood	1E-04	N/A	7E-05	2E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	1E-03	N/A	2E-05	1E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E-02	N/A	4E-04	2E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	8E-03	N/A	3E-03	1E-02
			Chemical Total	9E-05	N/A	2E-05	1E-04		2E-01	N/A	1E-02	2E-01
		Exposure Point Total					1E-04					2E-01
	Exposure Medium Total						1E-04					2E-01
	Air	Emissions From Soil* within Fenced Area of Youth Pond/Site 4	Naphthalene	N/A	2E-08	N/A	2E-08	Respiratory System	N/A	2E-02	N/A	2E-02
			Chemical Total	N/A	2E-08	N/A	2E-08		N/A	2E-02	N/A	2E-02
		Exposure Point Total					2E-08					2E-02
	Exposure Medium Total						2E-08					2E-02
Soi* within Fenced Area of Youth Pond/Site 4							1E-04					2E-01

TABLE 9.6.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	1,4-Dichlorobenzene	N/A	N/A	9E-10	9E-10	Liver	N/A	N/A	2E-04	2E-04
			Benzene	N/A	N/A	2E-08	2E-08	Blood	N/A	N/A	3E-03	3E-03
			Ethylbenzene	N/A	N/A	9E-09	9E-09	Liver	N/A	N/A	1E-03	1E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight	N/A	N/A	3E-04	3E-04
			Trichloroethene	N/A	N/A	4E-10	4E-10	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	N/A	N/A	1E-03	1E-03
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight	N/A	N/A	3E-04	3E-04
			1,1-Biphenyl	N/A	N/A	1E-08	1E-08	Developmental/Fetus	N/A	N/A	1E-03	1E-03
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	9E-04	9E-04
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	N/A	N/A	2E-02	2E-02
			Benzo(a)anthracene	N/A	N/A	1E-06	1E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	1E-05	1E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	2E-06	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	2E-07	2E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	6E-06	6E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	4E-02	4E-02
			Indeno(1,2,3-cd)pyrene	N/A	N/A	2E-06	2E-06	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Neurological	N/A	N/A	1E-03	1E-03
			Dieldrin	N/A	N/A	2E-08	2E-08	Neurological	N/A	N/A	1E-03	1E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	N/A	N/A	1E-03	1E-03
			Antimony	N/A	N/A	N/A	N/A	Blood, Whole Body	N/A	N/A	1E-03	1E-03
			Arsenic	N/A	N/A	4E-08	4E-08	Skin, Vascular	N/A	N/A	6E-03	6E-03
			Barium	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	1E-03	1E-03
			Chromium	N/A	N/A	1E-06	1E-06	Blood	N/A	N/A	3E-02	3E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	N/A	N/A	4E-05	4E-05
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	N/A	N/A	4E-03	4E-03
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	N/A	N/A	4E-02	4E-02
			Mercury	N/A	N/A	N/A	N/A	Kidney	N/A	N/A	5E-04	5E-04
			Thallium	N/A	N/A	N/A	N/A	Hair	N/A	N/A	3E-03	3E-03
			Vanadium	N/A	N/A	N/A	N/A	Whole Body	N/A	N/A	6E-04	6E-04
			Chemical Total	N/A	N/A	3E-05	3E-05		N/A	N/A	2E-01	2E-01
		Exposure Point Total					3E-05					2E-01
	Exposure Medium Total						3E-05					2E-01

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors in Excavation Trench	1,4-Dichlorobenzene	N/A	1E-07	N/A	1E-07	Liver	N/A	6E-04	N/A	6E-04
			Benzene	N/A	8E-07	N/A	8E-07	Blood	N/A	9E-02	N/A	9E-02
			Ethylbenzene	N/A	2E-07	N/A	2E-07	Ear	N/A	5E-04	N/A	5E-04
			m- and p-Xylene	N/A	N/A	N/A	N/A	Whole Body	N/A	2E-02	N/A	2E-02
			Trichloroethene	N/A	1E-08	N/A	1E-08	Immunotoxicity, Heart Malformations	N/A	8E-02	N/A	8E-02
			Xylene, total	N/A	N/A	N/A	N/A	Whole Body	N/A	9E-03	N/A	9E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Respiratory System	N/A	1E+00	N/A	1E+00
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	2E-05	N/A	2E-05	Respiratory System	N/A	1E+01	N/A	1E+01
			Chemical Total	N/A	2E-05	N/A	2E-05		N/A	2E+01	N/A	2E+01
		Exposure Point Total					2E-05					2E+01
	Exposure Medium Total						2E-05					2E+01
Groundwater Total							5E-05					2E+01
Receptor Risk Total from soil inside and outside fenced area and groundwater							5E-05	Receptor HI Total from soil inside and outside fenced area and groundwater				2E+01
Receptor Risk Total from soil within fenced area and groundwater							2E-04	Receptor HI Total from soil within fenced area and groundwater				2E+01

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Soil* Inside and Outside fenced Area and Groundwater Target Organ Totals

Total Reproductive System HI Across All Media =	5E-05
Total Whole Body/Body Weight Across All Media =	8E-02
Total Kidney Across All Media =	3E-03
Total Neurological/CNS HI Across All Media =	7E-02
Total Hair Across All Media =	1E-02
Total Blood HI Across All Media =	3E-02
Total Thyroid HI Across All Media =	1E-03
Total Gastrointestinal HI Across All Media =	3E-02
Total Immunological HI Across All Media =	1E-01
Total Skin HI Across All Media =	1E-01
Total Vascular HI Across All Media =	1E-01
Total Respiratory System HI Across All Media =	2E+01
Total Liver HI Across All Media =	2E-03
Total Ear HI Across All Media =	5E-04
Total Heart Malformations HI Across All Media =	8E-02
Total Developmental/Fetus HI Across All Media =	1E-03
Total Lung HI Across All Media =	2E-02

TABLE 9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Soil* Within Fenced Area and Groundwater

Total Liver HI Across All Media =	8E-04
Total Neurological/CNS HI Across All Media =	2E-02
Total Skin HI Across All Media =	2E-02
Total Vascular HI Across All Media =	2E-02
Total Thyroid HI Across All Media =	1E-03
Total Gastrointestinal HI Across All Media =	3E-02
Total Hair HI Across All Media =	3E-03
Total Respiratory System HI Across All Media =	1E+01
Total Immunological HI Across All Media =	2E-01
Total Whole Body/Body Weight Across All Media =	8E-02
Total Kidney Across All Media =	8E-03
Total Blood Across All Media =	3E-02
Total Heart Malformations HI Across All Media =	8E-02
Total Ear HI Across All Media =	5E-04
Total Developmental/Fetus HI Across All Media =	1E+00

TABLE 9.7.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	2E-06	N/A	3E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-05	N/A	2E-06	1E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-06	N/A	3E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	7E-08	N/A	1E-08	8E-08	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	4E-09	N/A	5E-10	4E-09	Liver	1E-04	N/A	1E-05	1E-04
			Carbazole	4E-08	N/A	5E-09	4E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	2E-08	N/A	3E-09	2E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-06	N/A	3E-07	2E-06	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-03	N/A	3E-04	3E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-03	N/A	N/A	1E-03
			Indeno(1,2,3-cd)pyrene	6E-07	N/A	1E-07	7E-07	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-04	N/A	2E-05	1E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	2E-04	1E-03
			Aldrin	4E-09	N/A	6E-10	5E-09	Liver	7E-05	N/A	9E-06	7E-05
			Aroclor-1242	1E-07	N/A	2E-08	1E-07	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	4E-08	N/A	8E-09	5E-08	N/A	N/A	N/A	N/A	N/A
			Dieldrin	2E-07	N/A	2E-08	2E-07	Liver	2E-03	N/A	2E-04	2E-03
			gamma-BHC (Lindane)	1E-08	N/A	8E-10	2E-08	Kidney, Liver	3E-04	N/A	2E-05	4E-04
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-03	N/A	8E-05	6E-03
			Arsenic	3E-06	N/A	1E-07	3E-06	Skin, Vascular	6E-02	N/A	2E-03	6E-02
			Chromium (hexavalent)	1E-08	N/A	6E-09	2E-08	NOE	6E-05	N/A	3E-05	9E-05
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	5E-03	N/A	7E-05	5E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-04	1E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-03	N/A	8E-04	3E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-02	N/A	2E-04	2E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	4E-05	3E-03
			Chemical Total	2E-05	N/A	3E-06	2E-05		1E-01	N/A	5E-03	1E-01
		Exposure Point Total					2E-05					1E-01
	Exposure Medium Total						2E-05					1E-01
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	8E-08	N/A	8E-08	Respiratory System	N/A	6E-03	N/A	6E-03
			Chemical Total	N/A	8E-08	N/A	8E-08		N/A	6E-03	N/A	6E-03
		Exposure Point Total					8E-08					6E-03
	Exposure Medium Total						8E-08					6E-03
Soil* from inside and outside Fenced Area							2E-05					1E-01
						Receptor Risk Total	2E-05				Receptor HI Total	1E-01

TABLE 9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Liver HI Across All Media =	3E-03
Total Whole Body/Body Weight Across All Media =	3E-03
Total Kidney Across All Media =	6E-03
Total Neurological/CNS HI Across All Media =	9E-03
Total Hair Across All Media =	2E-02
Total Blood HI Across All Media =	1E-03
Total Thyroid HI Across All Media =	5E-03
Total Gastrointestinal HI Across All Media =	1E-02
Total Skin HI Across All Media =	6E-02
Total Vascular HI Across All Media =	6E-02
Total Respiratory System HI Across All Media =	6E-03

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	Liver	N/A	N/A	1E-05	1E-05
			Carbazole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chrysene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-03	N/A	3E-04	3E-03
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-03	N/A	N/A	1E-03
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-04	N/A	2E-05	2E-04
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-03	N/A	2E-04	1E-03
			Aldrin	N/A	N/A	N/A	N/A	Liver	7E-05	N/A	8E-06	8E-05
			Aroclor-1242	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	N/A	N/A	N/A	N/A	Liver	2E-03	N/A	2E-04	2E-03
			gamma-BHC (Lindane)	N/A	N/A	N/A	N/A	Kidney, Liver	4E-04	N/A	2E-05	4E-04
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-03	N/A	7E-05	6E-03
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	6E-02	N/A	2E-03	6E-02
			Chromium (hexavalent)	N/A	N/A	N/A	N/A	NOE	7E-05	N/A	3E-05	1E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	5E-03	N/A	6E-05	6E-03
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-02	N/A	2E-04	1E-02
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-03	N/A	8E-04	4E-03
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-02	N/A	2E-04	2E-02
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-03	N/A	4E-05	3E-03
			Chemical Total	N/A	N/A	N/A	N/A		1E-01	N/A	4E-03	1E-01
		Exposure Point Total					N/A					1E-01
	Exposure Medium Total						N/A					1E-01
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	2E-02	N/A	2E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E-02	N/A	2E-02
		Exposure Point Total					N/A					2E-02
	Exposure Medium Total						N/A					2E-02
Soil* from inside and outside Fenced Area							N/A					1E-01

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	4E-04	N/A	2E-04	6E-04
			Benzene	N/A	N/A	N/A	N/A	Blood	4E-02	N/A	6E-03	5E-02
			Ethylbenzene	N/A	N/A	N/A	N/A	Liver, Kidney	1E-03	N/A	7E-04	2E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight, Mortality	1E-03	N/A	8E-04	2E-03
			Trichloroethene	N/A	N/A	N/A	N/A	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	1E-02	N/A	2E-03	1E-02
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight, Mortality	1E-03	N/A	7E-04	2E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Kidney	2E-03	N/A	3E-03	5E-03
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body, Blood	2E-02	N/A	3E-03	2E-02
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	3E-02	N/A	4E-02	6E-02
			Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	2E-01	N/A	2E-01	5E-01
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	8E-02	N/A	5E-02	1E-01
			Dieldrin	N/A	N/A	N/A	N/A	Liver	4E-03	N/A	3E-03	7E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	1E-01	N/A	5E-04	1E-01
			Antimony	N/A	N/A	N/A	N/A	Blood, Longevity	2E-02	N/A	4E-04	2E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	7E-01	N/A	2E-03	7E-01
			Barium	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	5E-04	1E-02
			Chromium	N/A	N/A	N/A	N/A	NOE	7E-02	N/A	2E-02	8E-02
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	1E-01	N/A	1E-04	1E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	5E-01	N/A	2E-03	5E-01
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	2E-01	N/A	1E-02	2E-01
			Mercury	N/A	N/A	N/A	N/A	Immune System	3E-02	N/A	1E-03	3E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	1E+00	N/A	5E-03	1E+00
			Vanadium	N/A	N/A	N/A	N/A	Kidney	7E-02	N/A	2E-04	7E-02
			Chemical Total	N/A	N/A	N/A	N/A		4E+00	N/A	4E-01	4E+00
		Exposure Point Total					N/A					4E+00
	Exposure Medium Total						N/A					4E+00

TABLE 9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	N/A	1E-05	N/A	1E-05
			Benzene	N/A	N/A	N/A	N/A	Blood	N/A	4E-03	N/A	4E-03
			Ethylbenzene	N/A	N/A	N/A	N/A	Developmental/Fetus	N/A	7E-05	N/A	7E-05
			m- and p-Xylene	N/A	N/A	N/A	N/A	Whole Body	N/A	1E-03	N/A	1E-03
			Trichloroethene	N/A	N/A	N/A	N/A	Immunotoxicity, Heart Malformations	N/A	1E-03	N/A	1E-03
			Xylene, total	N/A	N/A	N/A	N/A	Whole Body	N/A	1E-03	N/A	1E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Respiratory System	N/A	7E-02	N/A	7E-02
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	2E-01	N/A	2E-01
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E-01	N/A	2E-01
		Exposure Point Total					N/A					2E-01
	Exposure Medium Total						N/A					2E-01
Groundwater Total							N/A					4E+00
						Receptor Risk Total	N/A				Receptor HI Total	4E+00

Notes:
N/A = Not applicable
HI = Hazard Index
CNS = Central Nervous System
NOE = No Observed Effects
Soil* = combined surface and subsurface soil.

Target Organ Totals	
Total Skin HI Across All Media =	8E-01
Total Vascular HI Across All Media =	8E-01
Total Hair HI Across All Media =	1E+00
Total Thyroid HI Across All Media =	1E-01
Total Gastrointestinal HI Across All Media =	5E-01
Total Neurological/CNS Across All Media =	4E-01
Total Liver HI Across All Media =	1E-02
Total Respiratory System HI Across All Media =	3E-01
Total Whole Body/Body Weight Across All Media =	6E-01
Total Kidney Across All Media =	1E-01
Total Blood Across All Media =	1E-01
Total Mortality Across All Media =	4E-03
Total Immune System Across All Media =	4E-02
Total Heart Malformations Across All Media =	1E-02
Total Developmental/Fetus Across All Media =	7E-05
Total Longevity Across All Media =	2E-02
Total Lung Across All Media =	6E-02

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	N/A	N/A	N/A	N/A	Liver	1E-03	N/A	1E-04	1E-03
			Carbazole	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Chrysene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	3E-02	N/A	3E-03	3E-02
			Fluoranthene	N/A	N/A	N/A	N/A	Kidney, Liver, Blood	1E-02	N/A	N/A	1E-02
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	1E-03	N/A	2E-04	1E-03
			Pyrene	N/A	N/A	N/A	N/A	Kidney	1E-02	N/A	2E-03	1E-02
			Aldrin	N/A	N/A	N/A	N/A	Liver	7E-04	N/A	7E-05	7E-04
			Aroclor-1242	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Aroclor-1260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	N/A	N/A	N/A	N/A	Liver	2E-02	N/A	2E-03	2E-02
			gamma-BHC (Lindane)	N/A	N/A	N/A	N/A	Kidney, Liver	3E-03	N/A	2E-04	4E-03
			Aluminum	N/A	N/A	N/A	N/A	Neurological	6E-02	N/A	6E-04	6E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	6E-01	N/A	2E-02	6E-01
			Chromium (hexavalent)	N/A	N/A	N/A	N/A	NOE	6E-04	N/A	3E-04	9E-04
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	5E-02	N/A	6E-04	5E-02
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	1E-01	N/A	1E-03	1E-01
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	3E-02	N/A	7E-03	3E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	2E-01	N/A	2E-03	2E-01
			Vanadium	N/A	N/A	N/A	N/A	Kidney	3E-02	N/A	3E-04	3E-02
			Chemical Total	N/A	N/A	N/A	N/A		1E+00	N/A	4E-02	1E+00
		Exposure Point Total					N/A					1E+00
	Exposure Medium Total						N/A					1E+00
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	N/A	N/A	N/A	Respiratory System	N/A	2E-02	N/A	2E-02
			Chemical Total	N/A	N/A	N/A	N/A		N/A	2E-02	N/A	2E-02
		Exposure Point Total					N/A					2E-02
	Exposure Medium Total						N/A					2E-02
Soil* from inside and outside Fenced Area							N/A					1E+00

TABLE 9.9.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	N/A	N/A	N/A	N/A	Liver	1E-03	N/A	5E-04	2E-03
			Benzene	N/A	N/A	N/A	N/A	Blood	1E-01	N/A	1E-02	2E-01
			Ethylbenzene	N/A	N/A	N/A	N/A	Liver, Kidney	4E-03	N/A	1E-03	6E-03
			m- and p-Xylene	N/A	N/A	N/A	N/A	Body Weight, Mortality	4E-03	N/A	2E-03	6E-03
			Trichloroethene	N/A	N/A	N/A	N/A	Adult Immunological Effects, Developmental Immunotoxicity, Heart Malformations	3E-02	N/A	3E-03	4E-02
			Xylene, total	N/A	N/A	N/A	N/A	Body Weight, Mortality	4E-03	N/A	1E-03	5E-03
			1,1-Biphenyl	N/A	N/A	N/A	N/A	Kidney	7E-03	N/A	6E-03	1E-02
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A	Whole Body, Blood	6E-02	N/A	5E-03	7E-02
			2-Methylnaphthalene	N/A	N/A	N/A	N/A	Lung	9E-02	N/A	7E-02	2E-01
			Benzo(a)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A	Whole Body	8E-01	N/A	4E-01	1E+00
			Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A	Body Weight	3E-01	N/A	9E-02	4E-01
			Dieldrin	N/A	N/A	N/A	N/A	Liver	1E-02	N/A	6E-03	2E-02
			Aluminum	N/A	N/A	N/A	N/A	Neurological	5E-01	N/A	1E-03	5E-01
			Antimony	N/A	N/A	N/A	N/A	Blood, Longevity	6E-02	N/A	9E-04	6E-02
			Arsenic	N/A	N/A	N/A	N/A	Skin, Vascular	2E+00	N/A	5E-03	2E+00
			Barium	N/A	N/A	N/A	N/A	Kidney	3E-02	N/A	1E-03	3E-02
			Chromium	N/A	N/A	N/A	N/A	NOE	2E-01	N/A	4E-02	3E-01
			Cobalt	N/A	N/A	N/A	N/A	Thyroid	3E-01	N/A	3E-04	3E-01
			Iron	N/A	N/A	N/A	N/A	Gastrointestinal	2E+00	N/A	3E-03	2E+00
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A	CNS	6E-01	N/A	3E-02	6E-01
			Mercury	N/A	N/A	N/A	N/A	Immune System	8E-02	N/A	3E-03	9E-02
			Thallium	N/A	N/A	N/A	N/A	Hair	5E+00	N/A	1E-02	5E+00
			Vanadium	N/A	N/A	N/A	N/A	Kidney	2E-01	N/A	5E-04	2E-01
			Chemical Total	N/A	N/A	N/A	N/A		1E+01	N/A	7E-01	1E+01
		Exposure Point Total					N/A					1E+01
	Exposure Medium Total						N/A					1E+01
Groundwater Total							N/A					1E+01
						Receptor Risk Total	N/A				Receptor HI Total	1E+01

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

NOE = No Observed Effects

Soil* = combined surface and subsurface soil.

Target Organ Totals	
Total Skin HI Across All Media =	3E+00
Total Vascular HI Across All Media =	3E+00
Total Hair HI Across All Media =	5E+00
Total Thyroid HI Across All Media =	4E-01
Total Gastrointestinal HI Across All Media =	2E+00
Total Neurological/CNS Across All Media =	1E+00
Total Liver HI Across All Media =	6E-02
Total Respiratory System HI Across All Media =	2E-02
Total Whole Body/Body Weight Across All Media =	2E+00
Total Kidney Across All Media =	4E-01
Total Blood Across All Media =	3E-01
Total Mortality Across All Media =	1E-02
Total Immune System Across All Media =	1E-01
Total Heart Malformations Across All Media =	4E-02
Total Longevity Across All Media =	6E-02
Total Lung Across All Media =	2E-01

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	6E-05	N/A	9E-06	7E-05		N/A	N/A	N/A	N/A
			Benzo(a)pyrene	5E-04	N/A	7E-05	5E-04		N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	7E-05	N/A	1E-05	8E-05		N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	3E-06	N/A	4E-07	3E-06		N/A	N/A	N/A	N/A
			bis(2-Ethylhexyl)phthalate	3E-08	N/A	3E-09	3E-08		N/A	N/A	N/A	N/A
			Carbazole	3E-07	N/A	3E-08	3E-07		N/A	N/A	N/A	N/A
			Chrysene	7E-07	N/A	1E-07	9E-07		N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-05	N/A	1E-05	9E-05		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Fluoranthene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	4E-06	3E-05		N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Pyrene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Aldrin	3E-08	N/A	4E-09	4E-08		N/A	N/A	N/A	N/A
			Aroclor-1242	9E-07	N/A	1E-07	1E-06		N/A	N/A	N/A	N/A
			Aroclor-1260	3E-07	N/A	5E-08	4E-07		N/A	N/A	N/A	N/A
			Dieldrin	1E-06	N/A	1E-07	1E-06		N/A	N/A	N/A	N/A
			gamma-BHC (Lindane)	1E-07	N/A	5E-09	1E-07		N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Arsenic	3E-05	N/A	9E-07	3E-05		N/A	N/A	N/A	N/A
			Chromium (hexavalent)	5E-07	N/A	2E-07	7E-07		N/A	N/A	N/A	N/A
			Cobalt	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Lead	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Thallium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chemical Total	7E-04	N/A	1E-04	8E-04		N/A	N/A	N/A	N/A
		Exposure Point Total					8E-04					N/A
	Exposure Medium Total						8E-04					N/A
Soil* (cont'd)	Air	Emissions from Soil* inside and outside Fenced Area	Naphthalene	N/A	4E-07	N/A	4E-07		N/A	N/A	N/A	N/A
			Chemical Total	N/A	4E-07	N/A	4E-07		N/A	N/A	N/A	N/A
		Exposure Point Total					4E-07					N/A
	Exposure Medium Total						4E-07					N/A
Soil* from inside and outside Fenced Area							8E-04					N/A

TABLE 9.10.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	1,4-Dichlorobenzene	6E-08	N/A	3E-08	8E-08		N/A	N/A	N/A	N/A
			Benzene	4E-06	N/A	4E-07	5E-06		N/A	N/A	N/A	N/A
			Ethylbenzene	6E-07	N/A	2E-07	8E-07		N/A	N/A	N/A	N/A
			m- and p-Xylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene (†)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene (Kidney)	1E-07	N/A	6E-08	2E-07		N/A	N/A	N/A	N/A
			Trichloroethene (NHL + Live	8E-08	N/A	9E-09	9E-08		N/A	N/A	N/A	N/A
			Xylene, total	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			1,1-Biphenyl	3E-07	N/A	3E-07	7E-07		N/A	N/A	N/A	N/A
			2,4-Dimethylphenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Benzo(a)anthracene	2E-05	N/A	2E-04	2E-04		N/A	N/A	N/A	N/A
			Benzo(a)pyrene	1E-04	N/A	2E-03	2E-03		N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-05	N/A	3E-04	3E-04		N/A	N/A	N/A	N/A
			Benzo(k)fluoranthene	2E-06	N/A	3E-05	3E-05		N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-05	N/A	1E-03	1E-03		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	4E-04	4E-04		N/A	N/A	N/A	N/A
			Naphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Dieldrin	1E-06	N/A	7E-07	2E-06		N/A	N/A	N/A	N/A
			Aluminum	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Antimony	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Arsenic	1E-04	N/A	3E-07	1E-04		N/A	N/A	N/A	N/A
			Barium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chromium	2E-04	N/A	4E-05	3E-04		N/A	N/A	N/A	N/A
			Cobalt	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Lead	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Mercury	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Thallium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Vanadium	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Chemical Total	6E-04	N/A	4E-03	5E-03		N/A	N/A	N/A	N/A
		Exposure Point Total					5E-03					N/A
	Exposure Medium Total						5E-03					N/A

TABLE 9.10.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Air	Water Vapors at Showerhead	1,4-Dichlorobenzene	N/A	2E-11	N/A	2E-11		N/A	N/A	N/A	N/A
			Benzene	N/A	1E-10	N/A	1E-10		N/A	N/A	N/A	N/A
			Ethylbenzene	N/A	2E-11	N/A	2E-11		N/A	N/A	N/A	N/A
			m- and p-Xylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Trichloroethene	N/A	1E-12	N/A	1E-12		N/A	N/A	N/A	N/A
			Xylene, total	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			1,1-Biphenyl	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Dibenzofuran	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
			Naphthalene	N/A	2E-09	N/A	2E-09		N/A	N/A	N/A	N/A
			Chemical Total	N/A	2E-09	N/A	2E-09		N/A	N/A	N/A	N/A
		Exposure Point Total					2E-09					N/A
	Exposure Medium Total						2E-09					N/A
Groundwater Total							5E-03					N/A
						Receptor Risk Total	5E-03				Receptor HI Total	N/A

Notes:

N/A = Not applicable

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

Soil* = combined surface and subsurface soil.

TABLE 10.1.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil within Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	5E-05	N/A	4E-05	9E-05					
			Benzo(a)pyrene	3E-04	N/A	3E-04	6E-04					
			Benzo(b)fluoranthene	5E-05	N/A	4E-05	9E-05					
			Benzo(k)fluoranthene	2E-06	N/A	2E-06	4E-06					
			Dibenz(a,h)anthracene	6E-05	N/A	5E-05	1E-04					
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	2E-05	3E-05					
			Dieldrin	4E-06	N/A	2E-06	6E-06					
			Arsenic	4E-06	N/A	8E-07	5E-06					
			Chemical Total	5E-04	N/A	4E-04	9E-04					
		Exposure Point Total					9E-04					
	Exposure Medium Total						9E-04					
Surface Soil within Fenced Area of Site 4							9E-04					
Receptor Risk Total							9E-04					

Notes:

N/A = Not applicable

TABLE 10.2.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06					
			Arsenic	8E-06	N/A	1E-06	9E-06					
			Chemical Total	1E-05	N/A	2E-06	1E-05					
		Exposure Point Total					1E-05					
	Exposure Medium Total						1E-05					
Surface Soil outside Fenced Area of Site 4							1E-05					
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-05	2E-05					
			Chemical Total	5E-08	N/A	2E-05	2E-05					
		Exposure Point Total					2E-05					
	Exposure Medium Total						2E-05					
Surface Water - Upstream Pond Total							2E-05					
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	4E-06	N/A	9E-07	5E-06					
			Chemical Total	4E-06	N/A	9E-07	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Chromium	7E-07	N/A	1E-05	1E-05					
			Chemical Total	7E-07	N/A	1E-05	1E-05					
		Exposure Point Total					1E-05					
	Exposure Medium Total						1E-05					
Surface Sediment - Drainage Channel to Upstream Pond Total							1E-05					
Sediment	Surface and Subsurface Sediment	Youth Pond	Arsenic	4E-06	N/A	4E-06	8E-06					
			Chromium	4E-07	N/A	6E-06	6E-06					
			Chemical Total	4E-06	N/A	1E-05	1E-05					
		Exposure Point Total					1E-05					
	Exposure Medium Total						1E-05					
Surface and Subsurface Sediment - Youth Pond Total							1E-05					
Sediment	Surface and Subsurface Sediment	Upstream Pond	Aroclor-1242	4E-07	N/A	2E-06	2E-06					
			Arsenic	1E-06	N/A	1E-06	2E-06					
			Chemical Total	1E-06	N/A	3E-06	4E-06					
		Exposure Point Total					4E-06					
	Exposure Medium Total						4E-06					
Surface and Subsurface Sediment - Upstream Pond Total							4E-06					

TABLE 10.2.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-05	N/A	N/A	1E-05	Sperm	2E+00	N/A	N/A	2E+00
			Aroclor-1260	5E-05	N/A	N/A	5E-05					
			Dioxin-Like PCB TEQ	6E-05	N/A	N/A	6E-05					
			Chromium	8E-06	N/A	N/A	8E-06					
			Chemical Total	1E-04	N/A	N/A	1E-04		2E+00	N/A	N/A	2E+00
		Exposure Point Total					1E-04					2E+00
	Exposure Medium Total						1E-04					2E+00
Fish - Youth and Upstream Pond Fish Tissue Total							1E-04					2E+00
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				2E+00
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				2E+00

Notes:

N/A = Not applicable

HI = Hazard Index

Youth Pond total includes surface and subsurface sediment and Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Sperm HI Across All Media = 2E+00

Upstream Pond Target Organ Totals

Total Sperm HI Across All Media = 2E+00

TABLE 10.3.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil outside Fenced Area of Site 4	Benzo(a)anthracene	3E-06	N/A	1E-06	4E-06					
			Benzo(a)pyrene	2E-05	N/A	8E-06	3E-05					
			Benzo(b)fluoranthene	2E-06	N/A	8E-07	3E-06					
			Dibenz(a,h)anthracene	1E-06	N/A	5E-07	2E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	N/A	4E-07	2E-06					
			Arsenic	2E-05	N/A	2E-06	2E-05					
			Chemical Total	5E-05	N/A	1E-05	6E-05					
		Exposure Point Total					6E-05					
	Exposure Medium Total						6E-05					
Surface Soil outside Fenced Area of Site 4							6E-05					
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	3E-07	N/A	5E-05	5E-05					
			Chemical Total	3E-07	N/A	5E-05	5E-05					
		Exposure Point Total					5E-05					
	Exposure Medium Total						5E-05					
Surface Water - Upstream Pond Total							5E-05					
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	5E-06	N/A	4E-07	5E-06					
			Chemical Total	5E-06	N/A	4E-07	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Chromium	9E-06	N/A	1E-05	2E-05					
			Chemical Total	9E-06	N/A	1E-05	2E-05					
		Exposure Point Total					2E-05					
	Exposure Medium Total						2E-05					
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-05					

TABLE 10.3.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)pyrene	3E-06	N/A	2E-06	4E-06					
			Arsenic	9E-06	N/A	1E-06	1E-05					
			Chromium	5E-06	N/A	9E-06	1E-05					
			Chemical Total	2E-05	N/A	1E-05	3E-05					
		Exposure Point Total					3E-05					
	Exposure Medium Total						3E-05					
Surface and Subsurface Sediment - Youth Pond Total							3E-05					
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06					
			Arsenic	2E-06	N/A	3E-07	3E-06					
			Chemical Total	4E-06	N/A	1E-06	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface and Subsurface Sediment - Upstream Pond Total							5E-06					
Sediment/Surface Soil	Sediment/Surface Soil	Drainage Ditches to Youth Pond	Benzo(a)pyrene	1E-06	N/A	7E-07	2E-06					
			Chemical Total	1E-06	N/A	7E-07	2E-06					
		Exposure Point Total					2E-06					
	Exposure Medium Total						2E-06					
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							2E-06					

TABLE 10.3.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Current
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	5E-06	N/A	N/A	5E-06	Ocular, Finger and Toe Nails	2E+00	N/A	N/A	2E+00
			Aroclor-1260	3E-05	N/A	N/A	3E-05					
			Dioxin-Like PCB TEQ	3E-05	N/A	N/A	3E-05	Sperm	4E+00	N/A	N/A	4E+00
			Chromium	2E-05	N/A	N/A	2E-05					
			Chemical Total	9E-05	N/A	N/A	9E-05		6E+00	N/A	N/A	6E+00
		Exposure Point Total					9E-05					6E+00
	Exposure Medium Total						9E-05					6E+00
Fish - Youth and Upstream Pond Fish Tissue Total							9E-05					6E+00
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				6E+00
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				6E+00

Notes:

N/A = Not applicable

HI = Hazard Index

Youth Pond total includes Youth Pond and Upstream Pond fish tissue.

Upstream Pond total includes surface soil outside fenced area of Site 4, Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, Upstream Pond Sediment, and Youth Pond and Upstream Pond fish tissue.

Youth Pond Target Organ Totals

Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00

Upstream Pond Target Organ Totals

Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00

TABLE 10.4.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	5E-08	N/A	2E-05	2E-05					
			Chemical Total	5E-08	N/A	2E-05	2E-05					
		Exposure Point Total					2E-05					
	Exposure Medium Total						2E-05					
Surface Water - Upstream Pond Total							2E-05					
Surface Water	Surface Water	Drainage Channel Pond	Arsenic	4E-06	N/A	9E-07	5E-06					
			Chemical Total	4E-06	N/A	9E-07	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Chromium	7E-07	N/A	1E-05	1E-05					
			Chemical Total	7E-07	N/A	1E-05	1E-05					
		Exposure Point Total					1E-05					
	Exposure Medium Total						1E-05					
Surface Sediment - Drainage Channel to Upstream Pond Total							1E-05					
Sediment	Surface and Subsurface Sediment	Youth Pond	Arsenic Chromium	4E-06 4E-07	N/A N/A	4E-06 6E-06	8E-06 6E-06					
			Chemical Total	4E-06	N/A	1E-05	1E-05					
		Exposure Point Total					1E-05					
	Exposure Medium Total						1E-05					
Surface and Subsurface Sediment - Youth Pond Total							1E-05					
Sediment	Surface and Subsurface Sediment	Upstream Pond	Aroclor-1242 Arsenic	4E-07 1E-06	N/A N/A	2E-06 1E-06	2E-06 2E-06					
			Chemical Total	1E-06	N/A	3E-06	4E-06					
		Exposure Point Total					4E-06					
	Exposure Medium Total						4E-06					
Surface and Subsurface Sediment - Upstream Pond Total							4E-06					

TABLE 10.4.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	1E-05	N/A	N/A	1E-05	Sperm	2E+00	N/A	N/A	2
			Aroclor-1260	5E-05	N/A	N/A	5E-05					
			Dioxin-Like PCB TEQ	6E-05	N/A	N/A	6E-05					
			Chromium	8E-06	N/A	N/A	8E-06					
			Chemical Total	1E-04	N/A	N/A	1E-04		2E+00	N/A	N/A	2
		Exposure Point Total					1E-04					2
	Exposure Medium Total						1E-04					2
Fish - Youth and Upstream Pond Fish Tissue Total							1E-04					2
Soil*	Soil*	Soil* inside and outside the Fenced Area	Benzo(a)anthracene	2E-06	N/A	1E-06	3E-06					
			Benzo(a)pyrene	1E-05	N/A	8E-06	2E-05					
			Benzo(b)fluoranthene	2E-06	N/A	1E-06	3E-06					
			Dibenz(a,h)anthracene	2E-06	N/A	1E-06	4E-06					
			Arsenic	4E-06	N/A	5E-07	5E-06					
			Chemical Total	3E-05	N/A	1E-05	4E-05					
		Exposure Point Total					4E-05					
	Exposure Medium Total						4E-05					
Surface Soil outside Fenced Area of Site 4							4E-05					
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				2
Receptor Risk Total from Upstream Pond							2E-04	Receptor HI Total from Upstream Pond				2

Notes:

N/A = Not applicable

HI = Hazard Index

Youth Pond total includes Youth Pond surface water, surface and subsurface Youth Pond sediment,and sediment/surface soil from drainage ditches to Youth Pond outside fenced area, and fish tissue from Youth and Upstream Pond.

Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.

Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Sperm HI Across All Media = 2

Upstream Pond Target Organ Totals

Total Sperm HI Across All Media = 2

TABLE 10.5.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Upstream Pond	Benzo(a)pyrene	3E-07	N/A	5E-05	5E-05					
			Chemical Total	3E-07	N/A	5E-05	5E-05					
		Exposure Point Total					5E-05					
	Exposure Medium Total						5E-05					
Surface Water - Upstream Pond Total							5E-05					
Surface Water	Surface Water	Drainage Channel to Upstream Pond	Arsenic	5E-06	N/A	4E-07	5E-06					
			Chemical Total	5E-06	N/A	4E-07	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface Water - Drainage Channel to Upstream Pond Total							5E-06					
Sediment	Surface Sediment	Drainage Channel to Upstream Pond	Chromium	9E-06	N/A	1E-05	2E-05					
			Chemical Total	9E-06	N/A	1E-05	2E-05					
		Exposure Point Total					2E-05					
	Exposure Medium Total						2E-05					
Surface Sediment - Drainage Channel to Upstream Pond Total							2E-05					
Sediment	Surface and Subsurface Sediment	Youth Pond	Benzo(a)pyrene	3E-06	N/A	2E-06	4E-06					
			Arsenic	9E-06	N/A	1E-06	1E-05					
			Chromium	5E-06	N/A	9E-06	1E-05					
			Chemical Total	2E-05	N/A	1E-05	3E-05					
		Exposure Point Total					3E-05					
	Exposure Medium Total						3E-05					
Surface and Subsurface Sediment - Youth Pond Total							3E-05					
Sediment	Surface and Subsurface Sediment	Upstream Pond	Benzo(a)pyrene	2E-06	N/A	9E-07	3E-06					
			Arsenic	2E-06	N/A	3E-07	3E-06					
			Chemical Total	4E-06	N/A	1E-06	5E-06					
		Exposure Point Total					5E-06					
	Exposure Medium Total						5E-06					
Surface and Subsurface Sediment - Upstream Pond Total							5E-06					

TABLE 10.5.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Visitor/Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment/Surface Soil	Drainage Ditches to Youth Pond outside Fenced Area	Benzo(a)pyrene	1E-06	N/A	7E-07	2E-06					
			Chemical Total	1E-06	N/A	7E-07	2E-06					
		Exposure Point Total					2E-06					
	Exposure Medium Total						2E-06					
Sediment/Surface Soil - Drainage Ditches to Youth Pond outside Fenced Area							2E-06					
Fish	Fish	Youth and Up-Stream Pond Fish Tissue	Aroclor-1254	5E-06	N/A	N/A	5E-06	Ocular, Finger and Toe Nails	2E+00	N/A	N/A	2E+00
			Aroclor-1260	3E-05	N/A	N/A	3E-05					
			Dioxin-Like PCB TEQ	3E-05	N/A	N/A	3E-05	Sperm	4E+00	N/A	N/A	4E+00
			Chromium	2E-05	N/A	N/A	2E-05					
			Chemical Total	9E-05	N/A	N/A	9E-05		6E+00	N/A	N/A	6E+00
		Exposure Point Total					9E-05					6E+00
	Exposure Medium Total						9E-05					6E+00
Fish - Youth and Upstream Pond Fish Tissue Total							9E-05					6E+00
Soil*	Soil*	Soil* inside and outside the Fenced Area	Benzo(a)anthracene	2E-05	N/A	9E-06	3E-05					
			Benzo(a)pyrene	2E-04	N/A	7E-05	2E-04					
			Benzo(b)fluoranthene	3E-05	N/A	1E-05	4E-05					
			Benzo(k)fluoranthene	1E-06	N/A	4E-07	2E-06					
			Dibenz(a,h)anthracene	3E-05	N/A	1E-05	4E-05					
			Indeno(1,2,3-cd)pyrene	1E-05	N/A	3E-06	1E-05					
			Arsenic	1E-05	N/A	8E-07	1E-05					
			Chemical Total	3E-04	N/A	1E-04	4E-04					
		Exposure Point Total					4E-04					
	Exposure Medium Total						4E-04					
Receptor Risk Total from Youth Pond							1E-04	Receptor HI Total from Youth Pond				6E+00
Receptor Risk Total from Upstream Pond							6E-04	Receptor HI Total from Upstream Pond				6E+00

Notes:
N/A = Not applicable
HI = Hazard Index
Youth Pond total includes Youth Pond sediment, sediment/surface soil in drainage ditches to Youth Pond, and Youth Pond and Upstream Pond fish tissue.
Upstream Pond total includes Upstream Pond surface water, surface water from drainage channel to Upstream Pond, surface sediment from drainage channel to Upstream Pond, surface and subsurface sediment to Upstream Pond, fish tissue from Youth and Upstream Pond, and soil from inside and outside fenced area.
Soil* = combined surface and subsurface soil.

Youth Pond Target Organ Totals

Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00

Upstream Pond Target Organ Totals

Total Ocular HI Across All Media =	2E+00
Total Finger and Toe Nails HI Across All Media =	2E+00
Total Sperm HI Across All Media =	4E+00

TABLE 10.6.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)pyrene	5E-06	N/A	2E-06	7E-06					
			Chemical Total	5E-06	N/A	2E-06	7E-06					
		Exposure Point Total					7E-06					
	Exposure Medium Total						7E-06					
Soil* from inside and outside Fenced Area							7E-06					
Soil*	Soil*	Soil* within the Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	3E-06	N/A	1E-06	4E-06					
			Benzo(a)pyrene	1E-04	N/A	5E-05	2E-04					
			Benzo(b)fluoranthene	3E-06	N/A	1E-06	5E-06					
			Dibenz(a,h)anthracene	4E-06	N/A	1E-06	5E-06					
			Indeno(1,2,3-cd)pyrene	1E-06	N/A	5E-07	2E-06					
			Chemical Total	2E-04	N/A	6E-05	2E-04					
		Exposure Point Total					2E-04					
	Exposure Medium Total						2E-04					
Soil* within Fenced Area of Youth Pond/Site 4							2E-04					
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	Benzo(a)pyrene	N/A	N/A	2E-05	2E-05					
			Benzo(b)fluoranthene	N/A	N/A	3E-06	3E-06					
			Dibenz(a,h)anthracene	N/A	N/A	9E-06	9E-06					
			Indeno(1,2,3-cd)pyrene	N/A	N/A	3E-06	3E-06					
			Chromium	N/A	N/A	2E-06	2E-06					
			Chemical Total	N/A	N/A	3E-05	3E-05					
		Exposure Point Total					3E-05					
	Exposure Medium Total						3E-05					

TABLE 10.6.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Water Vapors in Excavation Trench	Benzene	N/A	2E-06	N/A	2E-06					
			1,1-Biphenyl					Respiratory System	N/A	3E+00	N/A	3E+00
			Naphthalene	N/A	4E-05	N/A	4E-05	Respiratory System	N/A	3E+01	N/A	3E+01
			Chemical Total	N/A	5E-05	N/A	5E-05		N/A	3E+01	N/A	3E+01
		Exposure Point Total					5E-05					3E+01
	Exposure Medium Total						5E-05					3E+01
Groundwater Total							8E-05					3E+01
Receptor Risk Total from Youth Pond							9E-05	Receptor HI Total from soil inside and outside fenced area and groundwater				3E+01
Receptor Risk Total from Upstream Pond							3E-04	Receptor HI Total from soil within fenced area and groundwater				3E+01

Notes:

N/A = Not applicable

HI = Hazard Index

Soil* = combined surface and subsurface soil.

Soil* Inside and Outside fenced Area and Groundwater Target Organ Totals

Total Respiratory System HI Across All Media = 3E+01

Soil* Within Fenced Area and Groundwater

Total Respiratory System HI Across All Media = 3E+01

TABLE 10.7.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	1E-05	N/A	9E-06	2E-05					
			Benzo(a)pyrene	7E-05	N/A	6E-05	1E-04					
			Benzo(b)fluoranthene	1E-05	N/A	1E-05	2E-05					
			Dibenz(a,h)anthracene	1E-05	N/A	1E-05	2E-05					
			Indeno(1,2,3-cd)pyrene	4E-06	N/A	3E-06	7E-06					
			Dieldrin	1E-06	N/A	7E-07	2E-06					
			Arsenic	2E-05	N/A	4E-06	2E-05					
			Chemical Total	1E-04	N/A	1E-04	2E-04					
		Exposure Point Total					2E-04					
	Exposure Medium Total						2E-04					
Soil* from inside and outside Fenced Area							2E-04					
						Receptor Risk Total	2E-04					

Notes:

N/A = Not applicable

Soil* = combined surface and subsurface soil.

TABLE 10.8.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Arsenic					Skin, Vascular	2E-01	N/A	2E-02	2E-01
			Chemical Total						2E-01	N/A	2E-02	2E-01
		Exposure Point Total										2E-01
	Exposure Medium Total											2E-01
Soil* from inside and outside Fenced Area												2E-01
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Arsenic					Skin, Vascular	2E+00	N/A	8E-03	2E+00
			Thallium					Hair	3E+00	N/A	2E-02	3E+00
			Chemical Total						5E+00	N/A	2E-02	5E+00
		Exposure Point Total										5E+00
	Exposure Medium Total											5E+00
Groundwater	Groundwater	Water Vapors at Showerhead	1,1-Biphenyl					Respiratory System	N/A	4E-01	N/A	4E-01
			Naphthalene					Respiratory System	N/A	1E+00	N/A	1E+00
			Chemical Total						N/A	2E+00	N/A	2E+00
		Exposure Point Total										2E+00
	Exposure Medium Total											2E+00
Groundwater Total												6E+00
											Receptor HI Total	6E+00

Notes:
N/A = Not applicable
HI = Hazard Index
Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Skin HI Across All Media =	2E+00
Total Vascular HI Across All Media =	2E+00
Total Hair HI Across All Media =	3E+00
Total Respiratory System HI Across All Media =	2E+00

TABLE 10.9.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Aluminum					Neurological	2E-01	N/A	5E-03	2E-01
			Arsenic					Skin, Vascular	2E+00	N/A	1E-01	2E+00
			Iron					Gastrointestinal	4E-01	N/A	1E-02	4E-01
			Manganese					CNS	8E-02	N/A	5E-02	1E-01
			Thallium					Hair	5E-01	N/A	1E-02	5E-01
			Chemical Total						3E+00	N/A	2E-01	3E+00
		Exposure Point Total										3E+00
	Exposure Medium Total											3E+00
Soil* from inside and outside Fenced Area												3E+00
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Dibenzofuran					Whole Body	1E+00	N/A	9E-01	2E+00
			Aluminum					Neurological	7E-01	N/A	5E-03	7E-01
			Arsenic					Skin, Vascular	4E+00	N/A	2E-02	4E+00
			Iron					Gastrointestinal	2E+00	N/A	2E-02	2E+00
			Manganese					CNS	9E-01	N/A	2E-01	1E+00
			Thallium					Hair	7E+00	N/A	5E-02	7E+00
			Chemical Total						2E+01	N/A	1E+00	2E+01
		Exposure Point Total										2E+01
	Exposure Medium Total											2E+01
Groundwater Total												2E+01
							Receptor Risk Total				Receptor HI Total	2E+01

TABLE 10.9.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total

Notes:

N/A = Not applicable

HI = Hazard Index

CNS = Central Nervous System

Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Skin HI Across All Media =	6E+00
Total Vascular HI Across All Media =	6E+00
Total Hair HI Across All Media =	8E+00
Total Gastrointestinal HI Across All Media =	3E+00
Total Neurological/CNS Across All Media =	2E+00
Total Whole Body/Body Weight Across All Media =	2E+00

TABLE 10.10.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	2E-04	N/A	7E-05	3E-04					
			Benzo(a)pyrene	1E-03	N/A	5E-04	2E-03					
			Benzo(b)fluoranthene	2E-04	N/A	8E-05	3E-04					
			Benzo(k)fluoranthene	9E-06	N/A	3E-06	1E-05					
			Carbazole	1E-06	N/A	3E-07	1E-06					
			Chrysene	2E-06	N/A	9E-07	3E-06					
			Dibenz(a,h)anthracene	2E-04	N/A	9E-05	3E-04					
			Indeno(1,2,3-cd)pyrene	7E-05	N/A	3E-05	1E-04					
			Aroclor-1242	3E-06	N/A	2E-06	5E-06					
			Aroclor-1260	1E-06	N/A	6E-07	2E-06					
			Dieldrin	5E-06	N/A	1E-06	6E-06					
			Arsenic	9E-05	N/A	9E-06	1E-04					
			Chromium (hexavalent)	1E-06	N/A	2E-06	3E-06					
			Chemical Total	2E-03	N/A	8E-04	3E-03					
		Exposure Point Total					3E-03					
	Exposure Medium Total						3E-03					
Soil* from inside and outside Fenced Area							3E-03					

TABLE 10.10.RME

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Benzene	1E-05	N/A	2E-06	1E-05					
			Ethylbenzene	2E-06	N/A	1E-06	3E-06					
			Trichloroethene (NHL + Live	2E-07	N/A	4E-08	3E-07					
			1,1-Biphenyl	1E-06	N/A	1E-06	2E-06					
			Benzo(a)anthracene	3E-05	N/A	4E-04	4E-04					
			Benzo(a)pyrene	2E-04	N/A	5E-03	5E-03					
			Benzo(b)fluoranthene	3E-05	N/A	7E-04	7E-04					
			Benzo(k)fluoranthene	3E-06	N/A	7E-05	7E-05					
			Dibenz(a,h)anthracene	8E-05	N/A	2E-03	3E-03					
			Indeno(1,2,3-cd)pyrene	4E-05	N/A	9E-04	1E-03					
			Dieldrin	4E-06	N/A	3E-06	7E-06					
			Arsenic	4E-04	N/A	2E-06	4E-04					
			Chromium	4E-04	N/A	2E-04	5E-04					
			Chemical Total	1E-03	N/A	1E-02	1E-02					
		Exposure Point Total					1E-02					
	Exposure Medium Total						1E-02					
Groundwater Total							1E-02					
						Receptor Risk Total	1E-02				Receptor HI Total	

Notes:

N/A = Not applicable

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

Soil* = combined surface and subsurface soil.

TABLE 10.1.CTE

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)pyrene	3E-06	N/A	6E-07	4E-06					
			Chemical Total	3E-06	N/A	6E-07	4E-06					
		Exposure Point Total					4E-06					
	Exposure Medium Total						4E-06					
Soil* from inside and outside Fenced Area							4E-06					
Soil*	Soil*	Soil* within the Fenced Area of Youth Pond/Site 4	Benzo(a)anthracene	2E-06	N/A	4E-07	2E-06					
			Benzo(a)pyrene	8E-05	N/A	2E-05	1E-04					
			Benzo(b)fluoranthene	2E-06	N/A	4E-07	2E-06					
			Dibenz(a,h)anthracene	2E-06	N/A	5E-07	3E-06					
			Chemical Total	9E-05	N/A	2E-05	1E-04					
		Exposure Point Total					1E-04					
	Exposure Medium Total						1E-04					
Soi* within Fenced Area of Youth Pond/Site 4							1E-04					
Groundwater	Groundwater	Shallow Aquifer - Water in Excavation Trench	Benzo(a)pyrene	N/A	N/A	1E-05	1E-05					
			Benzo(b)fluoranthene	N/A	N/A	2E-06	2E-06					
			Dibenz(a,h)anthracene	N/A	N/A	6E-06	6E-06					
			Indeno(1,2,3-cd)pyrene	N/A	N/A	2E-06	2E-06					
			Chemical Total	N/A	N/A	2E-05	2E-05					
		Exposure Point Total					2E-05					
	Exposure Medium Total						2E-05					
Groundwater	Air	Water Vapors in Excavation Trench	1,1-Biphenyl					Respiratory System	N/A	1E+00	N/A	1E+00
			Naphthalene	N/A	2E-05	N/A	2E-05	Respiratory System	N/A	1E+01	N/A	1E+01
			Chemical Total	N/A	2E-05	N/A	2E-05		N/A	2E+01	N/A	2E+01
		Exposure Point Total					2E-05					2E+01
	Exposure Medium Total						2E-05					2E+01
Groundwater Total							5E-05					2E+01
Receptor Risk Total from soil inside and outside fenced area and groundwater							5E-05	Receptor HI Total from soil inside and outside fenced area and groundwater				2E+01
Receptor Risk Total from soil within fenced area and groundwater							2E-04	Receptor HI Total from soil within fenced area and groundwater				2E+01

Notes:
N/A = Not applicable
HI = Hazard Index
Soil* = combined surface and subsurface soil.

Soil* Inside and Outside fenced Area and Groundwater Target Organ Totals

Total Respiratory System HI Across All Media = 2E+01

Soil* Within Fenced Area and Groundwater

Total Respiratory System HI Across All Media = 2E+01

TABLE 10.2.CTE

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Arsenic					Skin, Vascular	6E-01	N/A	2E-02	6E-01
			Thallium					Hair	2E-01	N/A	2E-03	2E-01
			Chemical Total						7E-01	N/A	2E-02	8E-01
		Exposure Point Total										8E-01
	Exposure Medium Total											8E-01
Soil* from inside and outside Fenced Area												8E-01
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Dibenzofuran					Whole Body	8E-01	N/A	4E-01	1E+00
			Naphthalene					Body Weight	3E-01	N/A	9E-02	4E-01
			Arsenic					Skin, Vascular	2E+00	N/A	5E-03	2E+00
			Iron					Gastrointestinal	2E+00	N/A	3E-03	2E+00
			Thallium					Hair	5E+00	N/A	1E-02	5E+00
			Chemical Total						1E+01	N/A	5E-01	1E+01
		Exposure Point Total										1E+01
	Exposure Medium Total											1E+01
Groundwater Total												1E+01
							Receptor Risk Total	N/A			Receptor HI Total	1E+01

Notes:
N/A = Not applicable
HI = Hazard Index
Soil* = combined surface and subsurface soil.

Target Organ Totals

Total Skin HI Across All Media =	3
Total Vascular HI Across All Media =	3
Total Hair HI Across All Media =	5
Total Gastrointestinal HI Across All Media =	2
Total Whole Body/Body Weight Across All Media =	2

TABLE 10.3.CTE

RISK SUMMARY

CENTRAL TENDENCY EXPOSURE

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil*	Soil*	Soil* inside and outside Fenced Area	Benzo(a)anthracene	6E-05	N/A	9E-06	7E-05					
			Benzo(a)pyrene	5E-04	N/A	7E-05	5E-04					
			Benzo(b)fluoranthene	7E-05	N/A	1E-05	8E-05					
			Benzo(k)fluoranthene	3E-06	N/A	4E-07	3E-06					
			Carbazole	3E-07	N/A	3E-08	3E-07					
			Dibenz(a,h)anthracene	8E-05	N/A	1E-05	9E-05					
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	4E-06	3E-05					
			Arsenic	3E-05	N/A	9E-07	3E-05					
			Chemical Total	7E-04	N/A	1E-04	8E-04					
		Exposure Point Total					8E-04					
	Exposure Medium Total						8E-04					
Soil* from inside and outside Fenced Area							8E-04					
Groundwater	Groundwater	Shallow Aquifer - Tap Water	Benzene	4E-06	N/A	4E-07	5E-06					
			Trichloroethene (NHL + Live	8E-08	N/A	9E-09	9E-08					
			Benzo(a)anthracene	2E-05	N/A	2E-04	2E-04					
			Benzo(a)pyrene	1E-04	N/A	2E-03	2E-03					
			Benzo(b)fluoranthene	2E-05	N/A	3E-04	3E-04					
			Benzo(k)fluoranthene	2E-06	N/A	3E-05	3E-05					
			Dibenz(a,h)anthracene	4E-05	N/A	1E-03	1E-03					
			Indeno(1,2,3-cd)pyrene	2E-05	N/A	4E-04	4E-04					
			Dieldrin	1E-06	N/A	7E-07	2E-06					
			Arsenic	1E-04	N/A	3E-07	1E-04					
			Chromium	2E-04	N/A	4E-05	3E-04					
			Chemical Total	6E-04	N/A	4E-03	5E-03					
		Exposure Point Total					5E-03					
	Exposure Medium Total						5E-03					
Groundwater Total							5E-03					
						Receptor Risk Total	5E-03				Receptor HI Total	

Notes:

N/A = Not applicable

† Carcinogenic risks were estimated for TCE by summing the risks for two different approaches: 1) Using the oral slope factor for kidney cancer, which has a mutagenic mode of action, and 2) using the oral slope factor for liver cancer and non-Hodgkin lymphoma (NHL).

Soil* = combined surface and subsurface soil.

TABLE 11.1a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations –Surface Soil within Fenced Area of Youth Pond/Site 4–Industrial Worker
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	151.25	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.1b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.1.RME
What was the point of exposure and location?	Surface Soil within Fenced Area of Youth Pond/Site 4
Where are the output values located in the risk assessment report?	Attached as Table 11.1b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	Yes
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	Yes
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Surface Soil within Fenced Area of Youth Pond/Site 4	An input value of 151.25 ppm in surface soil results in geometric mean blood lead levels ranging from 1.2 to1.7 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.9 to 5.2 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.008% to 0.6%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Calculations of Preliminary Remediation Goals (PRGs)

Table 11.1b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Surface Soil within Fenced Area of Youth Pond/Site 4
Receptor: Industrial Worker

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	151.25	151.25
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.05	0.05
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.9	5.2
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.008%**	**0.6%**

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.2a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations –Surface and Subsurface Sediment in Upstream Pond– Visitor/Recreational
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	151.25	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.2b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in sediment; See RAGS D Table 3.9.RME
What was the point of exposure and location?	Surface and subsurface sediment in Upstream Pond
Where are the output values located in the risk assessment report?	Attached as Table 11.2b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	No. A value of 52 days/year was used for the visitor/recreational scenario.
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	Yes
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Surface Soil within Fenced Area of Youth Pond/Site 4	An input value of 60.1 ppm in surface soil results in geometric mean blood lead levels ranging from 1.0 to1.5 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.4 to 4.6 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.002% to 0.4%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.2b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Surface and Subsurface Sediment in Upstream Pond
Receptor: Visitor/Recreational

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	60.1	60.1
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.05	0.05
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.0**	**1.5**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.4	4.6
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.002%**	**0.4%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.3a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations – Soil inside and outside Fenced Area–Visitor/Recreational
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.3b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.12.RME
What was the point of exposure and location?	Soil inside and outside fenced area
Where are the output values located in the risk assessment report?	Attached as Table 11.3b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	No. A value of 52 days/year was used for the visitor/recreational scenario.
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No. An IR value of 100 mg/day was used. This is the intake value used in the risk calculations for a visitor/recreational user.
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil inside and outside fenced area	An input value of 36.8 ppm in soil results in geometric mean blood lead levels ranging from 1.0 to1.5 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.4 to 4.7 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.003% to 0.4%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.3b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Soil* inside and outside Fenced Area
Receptor: Visitor/Recreational

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	36.8	36.8
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.1	0.1
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.0**	**1.5**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.4	4.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.4a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations – Soil inside and outside Fenced Area–Construction Worker
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.4b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.12.RME
What was the point of exposure and location?	Soil inside and outside fenced area
Where are the output values located in the risk assessment report?	Attached as Table 11.4b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	No. A value of 125 days/year was used for the construction worker scenario.
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No. An IR value of 100 mg/day was used. This is the model suggested ingestion rate for contact-intensive worker scenario.
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil inside and outside fenced area	An input value of 36.8 ppm in soil results in geometric mean blood lead levels ranging from 1.1 to 1.6 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.5 to 4.8 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.003% to 0.4%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.4b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Soil* inside and outside Fenced Area
Receptor: Construction Worker

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	36.8	36.8
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.1	0.1
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.5	4.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.5a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations – Soil inside and outside Fenced Area–Industrial Worker
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.5b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.12.RME
What was the point of exposure and location?	Soil inside and outside fenced area
Where are the output values located in the risk assessment report?	Attached as Table 11.5b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	Yes
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	Yes
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil inside and outside fenced area	An input value of 36.8 ppm in soil results in geometric mean blood lead levels ranging from 1.1 to 1.6 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.5 to 4.7 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.003% to 0.4%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.5b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Soil* inside and outside Fenced Area
Receptor: Industrial Worker

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	36.8	36.8
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.05	0.05
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	219	219
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.5	4.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.6a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations – Soil inside and outside Fenced Area–Maintenance Worker
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.6b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.12.RME
What was the point of exposure and location?	Soil inside and outside fenced area
Where are the output values located in the risk assessment report?	Attached as Table 11.6b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	No. A value of 52 days/year was used for the maintenance worker scenario.
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No. An IR value of 100 mg/day was used. This is the intake value used in the risk calculations for a maintenance worker.
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil inside and outside fenced area	An input value of 36.8 ppm in soil results in geometric mean blood lead levels ranging from 1.0 to 1.5 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.4 to 4.7 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.003% to 0.4%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.6b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Soil* inside and outside Fenced Area
Receptor: Maintenance Worker

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	36.8	36.8
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.1	0.1
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.0**	**1.5**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.4	4.7
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.7a
RAGS D ADULT LEAD WORKSHEET
Calculations of Blood Lead Concentrations – Soil within Fenced Area of Youth Pond/Site 4–Construction Worker
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	117	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	USEPA Adult Lead Model, Version dated 6/21/2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Attached as Table 11.7b
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Exposure point concentration was based on the arithmetic mean of lead concentrations in soil; See RAGS D Table 3.14.RME
What was the point of exposure and location?	Soil within Fenced Area of Youth Pond/Site
Where are the output values located in the risk assessment report?	Attached as Table 11.7b
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	Default values were used.
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	Default values from ALM were used (1.0 and 1.5 ug/dL).
Was the default exposure frequency (EF; 219 days/year) used?	No. A value of 125 days/year was used for the construction worker scenario.
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No. An IR value of 100 mg/day was used. This is the model suggested ingestion rate for contact-intensive worker scenario.
If non-default values were used for any of the parameters listed above, where is the rationale for the values located in the risk assessment report?	Discussion of parameters in HHRA Section.

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil within fenced area	An input value of 117 ppm in soil results in geometric mean blood lead levels ranging from 1.2 to 1.7 ug/dL for women of child-bearing age in homogeneous and heterogeneous populations. The 95th percentile fetal blood lead concentrations range from 2.8 to 5.2 ug/dL. The probabilities that the fetal blood lead levels exceed 10 ug/dL range from 0.007% to 0.6%. These values are below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	PRG not calculated.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table 11.7b
Calculations of Blood Lead Concentrations (PbBs)
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Exposure Medium: Soil* within Fenced Area of Youth Pond/Site 4
Receptor: Construction Worker

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	117	117
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.1	0.1
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.8	5.2
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.007%**	**0.6%**

Soil* = combined surface and subsurface soil

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

TABLE 11.8a
RAGS D IEUBK LEAD WORKSHEET
Child (Age 0 – 84 Months), Surface and Subsurface Sediment in Upstream Pond–Visitor/Recreational
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	60	mg/kg	Average Detected Value in Soil	400	mg/kg	Recommended Soil Screening Level
Water	4	µg/L	Model Default Value	15	µg/L	Recommended Drinking Water Action Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date was used)?	Lead Model for Windows, Version 1.1 Build 11 (February, 2010)
Where are the input values located in the risk assessment report?	Located in IEUBKwin OUTPUT (Attached as Table 11.8b)
What range of media concentrations were used for the model?	4.2 – 417 mg/kg (sedimet) 4 µg/L (model default for groundwater)
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic Mean Concentrations; Data are located in an Appendix.
Was soil sample taken from top 2 cm? If not, why?	No—Sediment is from surface and subsurface soil
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No -- Sediment samples were collected from multiple analyses.
What was the point of exposure/location?	Sediment in Upstream Pond
Where are the output values located in the risk assessment report?	IEUBKwin OUTPUT (Attached as Table 11.8b)
Was the model run using default values only?	No – Assumed site-specific arithmetic mean concentration of lead in soil.
Was the default soil bioavailability used?	Yes -- Default is 30%
Was the default soil ingestion rate used?	Yes -- Default values for 7 age groups are 85, 135, 135, 100, 090, and 85 mg/day
If non-default values were used, where is the rationale for the values located in the risk assessment report?	In the HHRA section of the report.

3. Final Result

Medium	Result	Comment/PRG [1]
Soil inside and outside fenced area	Input value of 60 mg/kg in sediment results in 0.002% of children above a blood lead level of 10 µg/dL. Geometric mean blood lead = 1.4 µg/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 µg/dL blood lead.	PRG not calculated.

1. For additional information, see www.epa.gov/superfund/health/contaminants/lead

Table 11.8b
IEUBK Model Results - Surface and Subsurface Sediment in Upstream Pond
Cheatham Annex Site 4/Youth Pond
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name: Warren
Date: 8/14/2013
Site Name: Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
Operable Unit: Cheatham Annex Site 4/Youth Pond
Run Mode: Researc Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 52.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	60.000	52.000
1-2	60.000	52.000
2-3	60.000	52.000
3-4	60.000	52.000
4-5	60.000	52.000
5-6	60.000	52.000
6-7	60.000	52.000

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****

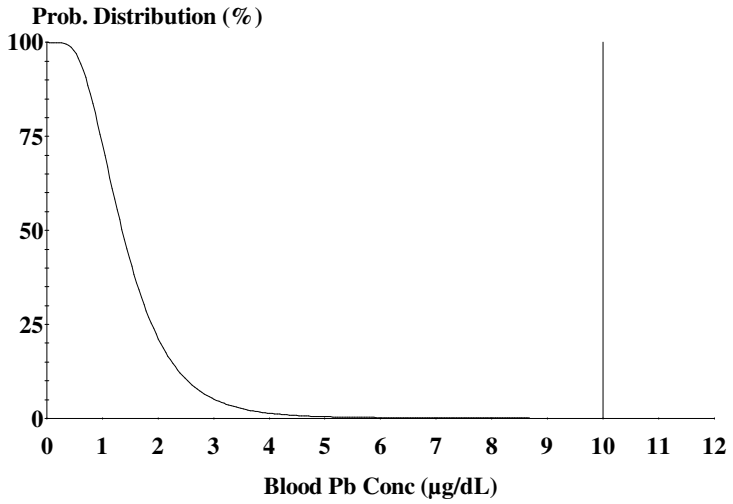
CALCULATED BLOOD LEAD AND LEAD UPTAKES:

****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.094	0.000	0.387
1-2	0.034	0.946	0.000	0.965
2-3	0.062	1.032	0.000	1.008
3-4	0.067	0.993	0.000	1.032
4-5	0.067	0.956	0.000	1.078
5-6	0.093	1.007	0.000	1.140
6-7	0.093	1.092	0.000	1.161

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	1.373	2.875	1.6
1-2	2.173	4.118	1.7
2-3	2.183	4.285	1.6
3-4	2.193	4.285	1.5
4-5	1.635	3.736	1.3
5-6	1.475	3.716	1.2
6-7	1.395	3.742	1.1

IEUBK Distribution Probability Percent



Cutoff = 10.000 µg/dl
Geo Mean = 1.419
GSD = 1.600
% Above = 0.002

Age Range = 0 to 84 months

Run Mode = Research

TABLE 11.9a
RAGS D IEUBK LEAD WORKSHEET
Child (Age 0 – 84 Months), Soil inside and outside Fenced Area–Visitor/Recreational
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value in Soil	400	mg/kg	Recommended Soil Screening Level
Water	4	µg/L	Model Default Value	15	µg/L	Recommended Drinking Water Action Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date was used)?	Lead Model for Windows, Version 1.1 Build 11 (February, 2010)
Where are the input values located in the risk assessment report?	Located in IEUBKwin OUTPUT (Attached as Table 11.9b)
What range of media concentrations were used for the model?	0.32 - 45.3mg/kg (soil) 4 µg/L (model default for groundwater)
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic Mean Concentrations; Data are located in an Appendix.
Was soil sample taken from top 2 cm? If not, why?	No-- Soil is from surface and subsurface soil
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No -- Soil samples were collected from multiple analyses.
What was the point of exposure/location?	Soil inside and outside fenced area
Where are the output values located in the risk assessment report?	IEUBKwin OUTPUT (Attached as Table 11.9b)
Was the model run using default values only?	No – Assumed site-specific arithmetic mean concentration of lead in soil.
Was the default soil bioavailability used?	Yes -- Default is 30%
Was the default soil ingestion rate used?	Yes -- Default values for 7 age groups are 85, 135, 135, 100, 090, and 85 mg/day
If non-default values were used, where is the rationale for the values located in the risk assessment report?	In the HHRA section of the report.

3. Final Result

Medium	Result	Comment/PRG [1]
Soil inside and outside fenced area	Input value of 36.8 mg/kg in soil results in less than 0.01% of children above a blood lead level of 10 µg/dL. Geometric mean blood lead = 1.2 µg/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 µg/dL blood lead.	PRG not calculated.

1. For additional information, see www.epa.gov/superfund/health/contaminants/lead

Table 11.9b
IEUBK Model Results - Soil* inside and outside Fenced Area
Cheatham Annex Site 4/Youth Pond
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

LEAD MODEL FOR WINDOWS: Version 1.1

Model Version: 1.1 Build11
User Name: Stannard
Date: 7/22/2013
Site Name: Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
Operable Unit: Cheatham Annex Site 4/Youth Pond
Run Mode: Research

*** Air ***

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

*** Diet ***

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

*** Drinking Water ***

Drinking Water Concentration: 4.000 µg Pb/L
Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

*** Soil & Dust ***

Multiple Source Analysis Used

Average multiple source concentration: 35.7600 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700

Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	36.80	35.760
1-2	36.80	35.760
2-3	36.80	35.760
3-4	36.80	35.760
4-5	36.80	35.760
5-6	36.80	35.760
6-7	36.80	35.760

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

*** Maternal Contribution: Infant Model ***

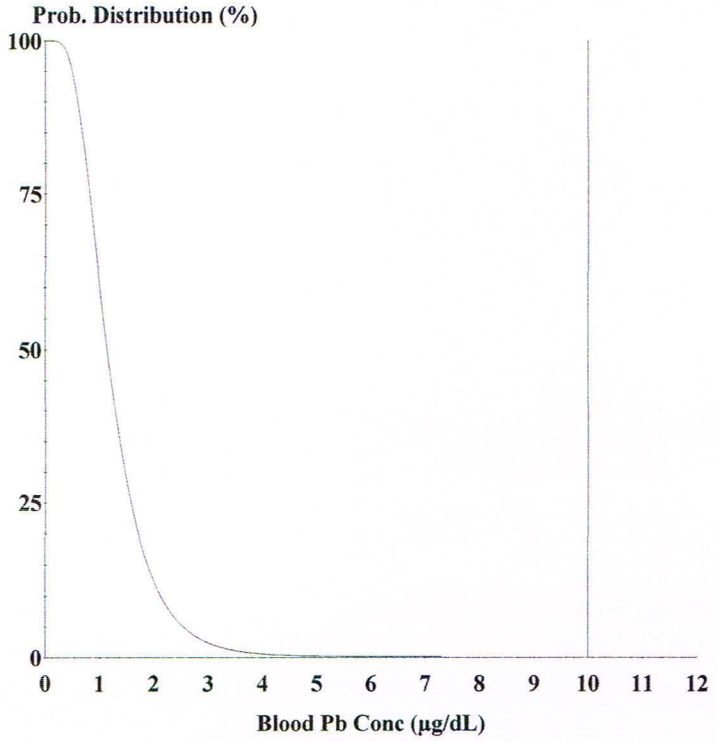
Maternal Blood Concentration : 1.000 µg Pb/dL

****

CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.100	0.000	0.389
1-2	0.034	0.952	0.000	0.971
2-3	0.062	1.038	0.000	1.014
3-4	0.067	0.998	0.000	1.037
4-5	0.067	0.959	0.000	1.082
5-6	0.093	1.010	0.000	1.143
6-7	0.093	1.095	0.000	1.164

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.899	2.410	1.3
1-2	1.425	3.383	1.4
2-3	1.430	3.544	1.3
3-4	1.435	3.537	1.2
4-5	1.069	3.175	1.1
5-6	0.964	3.209	1.0
6-7	0.911	3.262	0.9



Cutoff = 10.000 µg/dl
Geo Mean = 1.194
GSD = 1.600
% Above = 0.000

Age Range = 0 to 84 months

Run Mode = Research

TABLE 11.10a
RAGS D IEUBK LEAD WORKSHEET
Child (Age 0 – 84 Months), Soil inside and outside Fenced Area–Resident
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil	36.8	mg/kg	Average Detected Value in Soil	400	mg/kg	Recommended Soil Screening Level
Water	4.5	µg/L	Average Detected Value in Groundwater	15	µg/L	Recommended Drinking Water Action Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date was used)?	Lead Model for Windows, Version 1.1 Build 11 (February, 2010)
Where are the input values located in the risk assessment report?	Located in IEUBKwin OUTPUT (Attached as Table 11.10b)
What range of media concentrations were used for the model?	3.8 - 793 mg/kg (Soil); 1.6 – 18.6 µg/L (Groundwater)
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic Mean Concentrations; Data are located in an Appendix.
Was soil sample taken from top 2 cm? If not, why?	No-- Soil is from subsurface soil and detritus (surface of utility vaults).
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No -- Soil samples were collected from multiple analyses.
What was the point of exposure/location?	Soil inside and outside fenced area, and shallow groundwater
Where are the output values located in the risk assessment report?	IEUBKwin OUTPUT (Attached as Table 11.10b)
Was the model run using default values only?	No – Assumed site-specific arithmetic mean concentration of lead in both soil and groundwater.
Was the default soil bioavailability used?	Yes -- Default is 30%
Was the default soil ingestion rate used?	Yes -- Default values for 7 age groups are 85, 135, 135, 100, 090, and 85 mg/day
If non-default values were used, where is the rationale for the values located in the risk assessment report?	In the HHRA section of the report.

3. Final Result

Medium	Result	Comment/PRG [1]
Soil and Groundwater	Input value of 4.5 µg/L in groundwater and 36.8 mg/kg in soil results in >0.001% of children above a blood lead level of 10 µg/dL. Geometric mean blood lead = 1.2 µg/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 µg/dL blood lead.	PRG not calculated.

1. For additional information, see www.epa.gov/superfund/health/contaminants/lead

Table 11.10b
IEUBK Model Results - Soil* inside and outside Fenced Are and Shallow Aquifer Groundwater
Cheatham Annex Site 4/Youth Pond
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
LEAD MODEL FOR WINDOWS Version 1.1

==========

User Name: Stannard
Date: 7/25/2013
Site Name: Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
Operable Unit: Cheatham Annex Site 4/Youth Pond
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)

.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.500 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 35.760 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	36.800	35.760
1-2	36.800	35.760
2-3	36.800	35.760
3-4	36.800	35.760
4-5	36.800	35.760
5-6	36.800	35.760
6-7	36.800	35.760

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****

CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.099	0.000	0.438
1-2	0.034	0.951	0.000	1.092
2-3	0.062	1.037	0.000	1.139
3-4	0.067	0.997	0.000	1.166
4-5	0.067	0.958	0.000	1.216
5-6	0.093	1.009	0.000	1.285
6-7	0.093	1.094	0.000	1.308

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.899	2.457	1.4
1-2	1.424	3.501	1.5
2-3	1.429	3.667	1.4
3-4	1.434	3.664	1.3
4-5	1.068	3.308	1.1
5-6	0.963	3.350	1.0
6-7	0.910	3.406	1.0

IEUBK Model Results - Shallow Aquifer Groundwater
Cheatham Annex Site 4/Youth Pond
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
LEAD MODEL FOR WINDOWS Version 1.1

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User Name: Stannard
Date: 7/23/2013
Site Name: Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia
Operable Unit: Cheatham Annex Site 4/Youth Pond
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)

.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.500 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 150.000 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	200.000	150.000
1-2	200.000	150.000
2-3	200.000	150.000
3-4	200.000	150.000
4-5	200.000	150.000
5-6	200.000	150.000
6-7	200.000	150.000

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

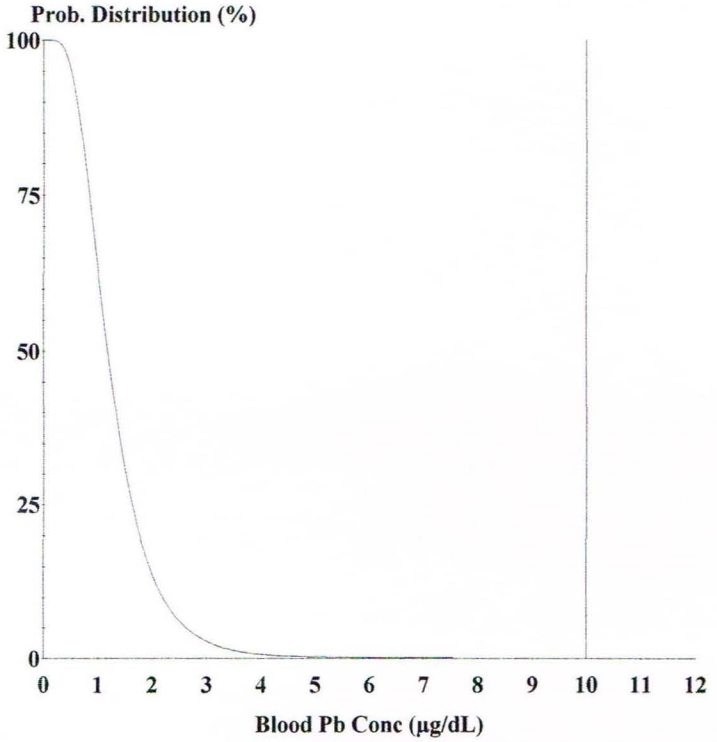
Maternal Blood Concentration: 1.000 µg Pb/dL

****

CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.060	0.000	0.422
1-2	0.034	0.910	0.000	1.045
2-3	0.062	0.999	0.000	1.097
3-4	0.067	0.965	0.000	1.128
4-5	0.067	0.938	0.000	1.190
5-6	0.093	0.992	0.000	1.263
6-7	0.093	1.078	0.000	1.289

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	4.126	5.630	3.1
1-2	6.487	8.476	3.5
2-3	6.550	8.708	3.3
3-4	6.610	8.770	3.1
4-5	4.978	7.173	2.6
5-6	4.507	6.856	2.2
6-7	4.271	6.731	1.9



Cutoff = 10.000 µg/dl
Geo Mean = 1.234
GSD = 1.600
% Above = 0.000

Age Range = 0 to 84 months

Run Mode = Research

Table 12.1
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Surface Soil within Fenced Area of Youth Pond/Site 4
Risk assessment evaluted risks to current industrial worker exposed to this data group

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	9.2E-02 - 1.8E+02	6/6	1.8E+02	Dixon's	CAA03-SS06-1109	1.8E+02	CAA03-SS06-1109	1.8E+02	no - but COC	outlier is EPC
Benzo(a)pyrene	7.9E-02 - 1.3E+02	6/6	1.3E+02	Dixon's	CAA03-SS06-1109	1.3E+02	CAA03-SS06-1109	1.3E+02	yes	yes - outlier is EPC
Benzo(b)fluoranthene	1.6E-01 - 2.0E+02	6/6	2.0E+02	Dixon's	CAA03-SS06-1109	2.0E+02	CAA03-SS06-1109	2.0E+02	no - but COC	outlier is EPC
Benzo(k)fluoranthene	5.8E-02 - 8.1E+01	6/6	8.1E+01	Dixon's	CAA03-SS06-1109	8.1E+01	CAA03-SS06-1109	8.1E+01	no - but COC	outlier is EPC
Carbazole	9.0E-02 J - 1.2E+02 J	4/5	1.2E+02	Dixon's	CAA03-SS06-1109	1.2E+02	CAA03-SS06-1109	1.2E+02	no	no - outlier is EPC
Chrysene	1.2E-01 - 2.1E+02	6/6	2.1E+02	Dixon's	CAA03-SS06-1109	2.1E+02	CAA03-SS06-1109	2.1E+02	no	no - outlier is EPC
Dibenz(a,h)anthracene	1.7E-02 J - 2.2E+01 K	5/6	2.2E+01	Dixon's	CAA03-SS06-1109	2.2E+01	CAA03-SS06-1109	2.2E+01	no - but COC	outlier is EPC
Dibenzofuran	3.8E-01 J - 1.9E+01	2/5	1.9E+01	Dixon's	CAA03-SS06-1109	1.9E+01	CAA03-SS06-1109	1.9E+01	no	no - outlier is EPC
Fluoranthene	7.5E-02 - 5.0E+02	6/6	5.0E+02	Dixon's	CAA03-SS06-1109	5.0E+02	CAA03-SS06-1109	5.0E+02	no	no - outlier is EPC
Indeno(1,2,3-cd)pyrene	4.2E-02 - 6.9E+01 J	6/6	6.9E+01	Dixon's	CAA03-SS06-1109	6.9E+01	CAA03-SS06-1109	6.9E+01	no - but COC	outlier is EPC
Naphthalene	6.6E-03 J - 2.6E+01 J	4/6	2.6E+01	Dixon's	CAA03-SS06-1109	2.6E+01	CAA03-SS06-1109	2.6E+01	no	no - outlier is EPC
Pyrene	7.9E-02 - 3.9E+02	6/6	3.9E+02	Dixon's	CAA03-SS06-1109	3.9E+02	CAA03-SS06-1109	3.9E+02	no	no - outlier is EPC
Dieldrin	6.5E-01 J - 6.5E-01 J	1/5	6.5E-01	Dixon's	CAA03-SS06-1109	6.5E-01	CAA03-SS06-1109	6.5E-01	no - but COC	outlier is EPC
gamma-BHC (Lindane)	5.2E-03 J - 8.6E-01	2/5	8.6E-01	Dixon's	CAA03-SS06-1109	8.6E-01	CAA03-SS06-1109	8.6E-01	no	no - outlier is EPC
Aluminum	5.3E+03 - 1.3E+04	6/6	1.3E+04	Dixon's	None		None		no	N/A
Arsenic	2.8E+00 - 7.3E+00	6/6	7.3E+00	Dixon's	None		CAA03-SS01-1109	7.3E+00	no - but COC	outlier is EPC
Chromium (hexavalent)	5.3E-01 - 5.3E-01	1/1	5.3E-01	Dixon's	None		None		no	N/A
Cobalt	1.5E+00 - 4.9E+00	6/6	4.9E+00	Dixon's	None		None		no	N/A
Iron	1.1E+04 - 1.9E+04	6/6	1.9E+04	Dixon's	None		None		no	N/A
Lead	9.4E+00 K - 7.9E+02	5/6	1.5E+02	Dixon's	CAA03-SS06-1109	7.9E+02	CAA03-SS06-1109	7.9E+02	no	no
Manganese	5.3E+01 - 3.2E+02	6/6	3.2E+02	Dixon's	None		None		no	N/A

J = Estimated Value
K = Biased High
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.2
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data group: Surface Soil Outside Fenced Area of Site 4

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	1.0E-02 J - 8.8E+00	22/25	4.2E+00	Rosner's	CAS004-4HA06-00-1199	8.8E+00	CAS004-4HA06-00-1199	8.8E+00	no	no
					CAS004-4HA04-00-1199	2.6E+00 ND	CAS004-4HA04-00-1199	2.6E+00 ND		no - not detected
Benzo(a)pyrene	4.4E-03 J - 7.0E+00	22/25	3.5E+00	Rosner's	CAS004-4HA06-00-1199	7.0E+00	CAS004-4HA06-00-1199	7.0E+00	no	no
					CAS004-4HA04-00-1199	2.6E+00 ND	CAS004-4HA04-00-1199	2.6E+00 ND		no - not detected
					CAS004-4HA05-00-1199	2.3E+00	CAS004-4HA05-00-1199	2.3E+00		no
Benzo(b)fluoranthene	1.0E-02 J - 6.8E+00	22/25	3.5E+00	Rosner's	CAS004-4HA06-00-1199	6.8E+00	CAS004-4HA06-00-1199	6.8E+00	no	no
							CAA03-SS02-1109	2.1E+00		
							CAS004-4HA05-00-1199	1.7E+00		no
							CAS04-SS09-1012	1.6E+00		
Benzo(k)fluoranthene	3.7E-03 J - 6.8E+00	19/25	1.7E+00	Rosner's	CAS004-4HA06-00-1199	6.8E+00	CAS004-4HA06-00-1199	6.8E+00	no	no
					CAS004-4HA05-00-1199	1.7E+00	CAS004-4HA05-00-1199	1.7E+00		
Dibenz(a,h)anthracene	3.6E-03 J - 1.4E+00 J	15/25	2.2E-01	Rosner's	CAS004-4HA06-00-1199	1.4E+00	CAS004-4HA06-00-1199	1.4E+00	no	no
					CAS004-4HA05-00-1199	5.5E+00 ND	CAS004-4HA05-00-1199	5.5E+00 ND		no - not detected
					CAS004-4HA04-00-1199	2.6E+00 ND	CAS004-4HA04-00-1199	2.6E+00 ND		no - not detected
					CAS004-4HA02-00-1199	2.1E+00 ND	CAS004-4HA02-00-1199	2.1E+00 ND		no - not detected
Indeno(1,2,3-cd)pyrene	9.8E-03 K - 3.4E+00 J	20/25	1.8E+00	Rosner's	CAS004-4HA06-00-1199	3.4E+00	CAS004-4HA06-00-1199	3.4E+00	no	no
					CAS004-4HA04-00-1199	2.6E+00 ND	CAS004-4HA04-00-1199	2.6E+00 ND		no - not detected
							CAS004-4HA05-00-1199	1.3E+00		no
							CAS04-SS09-1012	8.5E-01		
							CAS04-SS13-1012	7.7E-01		
Aldrin	3.3E-02 K - 3.3E-02 K	1/18	3.3E-02	Dixon's	CAS004-4HA05-00-1199	3.3E-02	CAS004-4HA05-00-1199	3.3E-02	no	no - outlier is EPC
Aroclor-1242	1.0E+00 K - 1.0E+00 K	1/25	1.0E+00	Rosner's	CAS004-4HA05-00-1199	1.0E+00	CAS004-4HA05-00-1199	1.0E+00	no	no - outlier is EPC
Aroclor-1260	1.9E-02 J - 2.7E+00 K	10/25	8.6E-01	Rosner's	CAS004-4HA05-00-1199	2.7E+00	CAS004-4HA05-00-1199	2.7E+00	no	no
					CAS004-4HA04-00-1199	6.0E-01	CAS004-4HA04-00-1199	6.0E-01		
							CAS004-4HA06-00-1199	9.1E-02		
							CAS004-4HA02D-00-1199	7.5E-02		
Aluminum	4.0E+03 - 2.9E+04	25/25	1.2E+04	Rosner's	CAS04-SS02-1109	2.9E+04	CAS04-SS02-1109	2.9E+04	no	no
Arsenic	1.0E+00 - 3.5E+02 J	25/25	7.7E+01	Rosner's	CAS04-SS13-1012	3.5E+02	CAS04-SS13-1012	3.5E+02	no	no
Cobalt	7.2E-01 - 1.2E+01 J	24/25	3.9E+00	Rosner's	CAS04-SS13-1012	1.2E+01	CAS04-SS13-1012	1.2E+01	no	no
					CAS004-4HA06-00-1199	8.8E+00	CAS004-4HA06-00-1199	8.8E+00		
Iron	3.5E+03 - 1.2E+05 J	25/25	4.0E+04	Rosner's	CAS04-SS13-1012	1.2E+05	CAS04-SS13-1012	1.2E+05	no	no
					CAS004-4HA06-00-1199	6.2E+04	CAS004-4HA06-00-1199	6.2E+04		
					CAS04-SS11-1012	5.3E+04	CAS04-SS11-1012	5.3E+04		
							CAS04-SS02-1109	2.8E+04		
Manganese	1.9E+01 - 5.1E+02 J	25/25	1.6E+02	Rosner's	CAS04-SS13-1012	5.1E+02	CAS04-SS13-1012	5.1E+02	no	no
Thallium	4.7E-01 L - 1.1E+00 L	2/25	5.6E-01	Rosner's	CAS04-SS11-1012	2.0E+00 ND	CAS04-SS11-1012	2.0E+00 ND	no	no - not detected
							CAS004-4HA06-00-1199	1.1E+00		no
							CAS04-SS10-1012	1.1E+00 ND		no - not detected
Vanadium	8.6E+00 - 6.4E+01	25/25	2.7E+01	Rosner's	CAS04-SS02-1109	6.4E+01	CAS04-SS02-1109	6.4E+01	no	no

K = Biased High
L = Biased Low
ND = Not detected, detection limit is an outlier
MG/KG = milligrams per kilogram

Table 12.3
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Youth Pond Surface Water

Chemical	Range of Detections UG/L	Detection Frequency	Exposure Point Concentration UG/L	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration UG/L	Sample	Concentration UG/L		
Arsenic	1.2E+00 J - 1.6E+00 J	6/6	1.6E+00	Dixon's	None		None		no	N/A

J = Estimated Value
UG/L = micrograms per liter
N/A = not available/not applicable

Table 12.4

Outlier Evaluation

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Upstream Pond Surface Water

Chemical	Range of Detections UG/L	Detection Frequency	Exposure Point Concentration UG/L	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration UG/L	Sample	Concentration UG/L		
Benzo(a)pyrene	7.3E-02 J - 2.4E-01 J	2/8	1.5E-01	Dixon's	CAS04-SW04-1209	2.4E-01	CAS04-SW04-1209	2.4E-01	no	no
Arsenic	1.0E+01 - 1.0E+01	1/8	1.0E+01	Dixon's	None		CAS04-SW03-1209	1.0E+01	no	no - outlier is EPC
Iron	1.1E+03 - 1.9E+04	8/8	1.3E+04	Dixon's	CAS04-SW03-1209	1.9E+04	CAS04-SW03-1209	1.9E+04	no	no

J = Estimated Value

UG/L = micrograms per liter

Table 12.5
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Drainage Channel to Upstream Pond

Chemical	Range of Detections UG/L	Detection Frequency	Exposure Point Concentration UG/L	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration UG/L	Sample	Concentration UG/L		
Arsenic	5.8E+01 - 5.8E+01	1/5	5.8E+01	Dixon's	CAS04-SW09-1209	5.8E+01	CAS04-SW09-1209	5.8E+01	no	no - outlier is EPC
Iron	3.4E+02 - 3.0E+04	5/5	3.0E+04	Dixon's	CAS04-SW09-1209	3.0E+04	CAS04-SW09-1209	3.0E+04	no	no - outlier is EPC

UG/L = micrograms per liter

Table 12.6
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Surface Sediment in Drainage Channel to Upstream Pond

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)pyrene	1.2E-04 - 3.8E-01	11/13	1.9E-01	Dixon's	CAS04-SD05-1209A	3.8E-01	CAS04-SD05-1209A	3.8E-01	no	no
Arsenic	2.3E+00 L - 1.3E+01 L	13/13	7.3E+00	Dixon's	None		None		no	N/A
Chromium	9.4E+00 L - 7.2E+01 L	13/13	4.0E+01	Dixon's	CAS04-SD07-1209B	7.2E+01	CAS04-SD07-1209B	7.2E+01	no	no

L = Biased Low
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.7
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Surface and Subsurface Sediment in Youth Pond

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	2.5E-02 J - 2.4E+00	19/26	8.3E-01	Rosner's	CAYP-SD11-1012 CAYP-SSD11-1012	2.4E+00 1.3E+00	CAYP-SD11-1012 CAYP-SSD11-1012	2.4E+00 1.3E+00	no	no
Benzo(a)pyrene	1.9E-02 J - 2.7E+00	17/26	9.2E-01	Rosner's	CAYP-SD11-1012 CAYP-SSD11-1012	2.7E+00 1.4E+00	CAYP-SD11-1012 CAYP-SSD11-1012	2.7E+00 1.4E+00	no	no
Benzo(b)fluoranthene	3.2E-02 J - 3.7E+00	17/26	1.3E+00	Rosner's	CAYP-SD11-1012 CAYP-SSD11-1012	3.7E+00 1.8E+00	CAYP-SD11-1012 CAYP-SSD11-1012 CAYP-SD13-1012 CAYP-SD01-1012	3.7E+00 1.8E+00 3.2E-01 3.1E-01	no	no
Dibenz(a,h)anthracene	1.7E-01 - 4.0E-01	2/26	2.0E-01	Rosner's	CAYP-SD11-1012	4.0E-01	CAYP-SD11-1012	4.0E-01	no	no
Indeno(1,2,3-cd)pyrene	2.7E-02 J - 1.5E+00	7/26	2.6E-01	Rosner's	CAYP-SD11-1012 CAYP-SSD11-1012	1.5E+00 6.6E-01	CAYP-SD11-1012 CAYP-SSD11-1012	1.5E+00 6.6E-01	no	no
Arsenic	9.8E-01 J - 2.7E+02	26/26	7.5E+01	Rosner's	CAYP-SD05-1112 CAYP-SD13-1012 CAYP-SSD05-1112 CAYP-SSD13-1012 CAYP-SD04-1112	2.7E+02 1.9E+02 1.3E+02 1.1E+02 4.5E+01	CAYP-SD05-1112 CAYP-SD13-1012 CAYP-SSD05-1112 CAYP-SSD13-1012 CAYP-SD04-1112	2.7E+02 1.9E+02 1.3E+02 1.1E+02 4.5E+01	no	no
Chromium	3.1E+00 - 3.5E+01	26/26	2.5E+01	Rosner's	None		None		no	N/A
Thallium	5.3E-01 J - 1.9E+00 J	5/26	1.4E+00	Rosner's	None		CAYP-SD12-1012	1.0E+01 ND	no	no

J = Estimated Value
ND = Not detected, detection limit is an outlier
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.8
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Upstream Pond Surface and Subsurface Sediment

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	2.6E-02 J - 1.5E+00	25/35	3.4E-01	Rosner's	CAS04-SD04-1209A CAS04-SD03-1209A	1.5E+00 1.3E+00	CAS04-SD04-1209A CAS04-SD03-1209A	1.5E+00 1.3E+00	no	no
Benzo(a)pyrene	2.8E-02 - 2.1E+00	28/35	5.7E-01	Rosner's	CAS04-SD03-1209A CAS04-SD04-1209A	2.1E+00 1.5E+00	CAS04-SD03-1209A CAS04-SD04-1209A	2.1E+00 1.5E+00	no	no
Benzo(b)fluoranthene	5.7E-02 J - 3.9E+00	27/35	1.1E+00	Rosner's	CAS04-SD03-1209A CAS04-SD04-1209A	3.9E+00 3.3E+00	CAS04-SD03-1209A CAS04-SD04-1209A	3.9E+00 3.3E+00	no	no
Dibenz(a,h)anthracene	9.1E-03 J - 6.6E-01	16/35	1.1E-01	Rosner's	CAS004-4-SD04-00D-1199 CAS004-4-SD02-00-1199; CAS004-4-SD04-00-1199	1.6E+00 ND 1.2E+00 ND	CAS004-4-SD04-00D-1199 CAS004-4-SD02-00-1199; CAS004-4-SD04-00-1199	1.6E+00 ND 1.2E+00 ND	no	no - not detected
Indeno(1,2,3-cd)pyrene	3.4E-02 - 2.8E+00	23/35	8.2E-01	Rosner's	CAS04-SD03-1209A CAS04-SD04-1209A	2.8E+00 1.5E+00	CAS04-SD03-1209A CAS04-SD04-1209A	2.8E+00 1.5E+00	no	no
Aroclor-1242	2.4E-01 - 2.1E+01	7/35	5.3E+00	Rosner's	CAS04-SD03-1209A CAS04-SD03-1209B	2.1E+01 8.9E+00	CAS04-SD03-1209A CAS04-SD03-1209B	2.1E+01 8.9E+00	no	no
				three more but below screening level of 1.1 mg/kg						
Aroclor-1260	7.9E-03 J - 2.4E+00	30/35	1.0E+00	Rosner's	CAS04-SD10-1012 CAS04-SD11-1012 CAS04-SD22-1012	2.4E+00 2.4E+00 2.3E+00	CAS04-SD10-1012 CAS04-SD11-1012 CAS04-SD22-1012 CAS04-SD23-1012	2.4E+00 2.4E+00 2.3E+00 1.6E+00	no	no
Dieldrin	1.7E-03 J - 1.4E+00 J	6/24	2.0E-01	Dixon's	CAS04-SD03-1209A CAS04-SD03-1209B	1.4E+00 6.0E-01	CAS04-SD03-1209A	1.4E+00	no	no
Heptachlor epoxide	7.1E-04 J - 5.4E-01 J	3/24	8.2E-02	Dixon's	CAS04-SD03-1209A	5.4E-01	CAS04-SD03-1209A	5.4E-01	no	no
Arsenic	9.8E-01 J - 1.1E+02	35/35	2.0E+01	Rosner's	CAS04-SD18-1012 CAA03-SD02-1209A CAS04-SD10P-1012	1.1E+02 4.4E+01 4.2E+01	CAS04-SD18-1012 CAA03-SD02-1209A CAS04-SD10P-1012	1.1E+02 4.4E+01 4.2E+01	no	no
Chromium	5.5E+00 - 5.7E+01	35/35	2.8E-02	Rosner's	None		None		no	N/A
Lead	4.2E+00 - 4.2E+02	35/35	6.0E+01	N/A	only one detect slightly above residential soil screening level, and average below				no	N/A

J = Estimated Value
ND = Not detected, detection limit is an outlier
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.9
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Sediment/Surface Soil in Drainage Ditches to Youth Pond Outside Fenced Area

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	2.5E-02 J - 4.5E-01	6/6	4.5E-01	Dixon's	CAYP-SS05-1012	4.5E-01	CAYP-SS05-1012	4.5E-01	no	no - outlier is EPC
Benzo(a)pyrene	1.7E-02 J 4.5E-01	6/6	4.5E-01	Dixon's	CAYP-SS05-1012	4.5E-01	CAYP-SS05-1012	4.5E-01	no	no - outlier is EPC
Benzo(b)fluoranthene	3.3E-02 J 8.1E-01	6/6	8.1E-01	Dixon's	CAYP-SS05-1012	8.1E-01	CAYP-SS05-1012	8.1E-01	no	no - outlier is EPC
Dibenz(a,h)anthracene	5.4E-02 5.4E-02	1/6	5.4E-02	Dixon's	CAYP-SS05-1012	5.4E-02	CAYP-SS05-1012	5.4E-02	no	no - outlier is EPC
Indeno(1,2,3-cd)pyrene	2.6E-02 J 1.9E-01	5/6	1.9E-01	Dixon's	CAYP-SS05-1012	1.9E-01	CAYP-SS05-1012	1.9E-01	no	no - outlier is EPC
Arsenic	1.5E+00 J 7.7E+00	6/6	7.7E+00	Dixon's	None		None		no	N/A
Cobalt	5.6E-01 J 2.7E+00	6/6	2.7E+00	Dixon's	None		None		no	N/A
Iron	2.9E+03 1.1E+04	6/6	1.1E+04	Dixon's	None		None		no	N/A
Manganese	1.2E+01 2.2E+02	6/6	2.2E+02	Dixon's	None		None		no	N/A

J = Estimated Value
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.10
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Fish from Youth Pond and Upstream Pond

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Aroclor-1254	8.2E-02 J - 8.2E-02 J	1/2	8.2E-02	None*					yes	N/A
Aroclor-1260	5.8E-02 - 4.2E-01	2/2	4.2E-01	None*					no - but COC	N/A
Dioxin-Like PCB TEQ	2.0E-06 - 8.1E-06	2/2	8.1E-06	None*					yes	N/A
Chromium	1.4E-01 J - 1.4E-01 J	1/2	1.4E-01	None*					no - but COC	N/A
Mercury	3.0E-02 - 9.0E-02	2/2	9.0E-02	None*					no	N/A

* Only 2 samples, outlier test not run
J = Estimated Value
MG/KG = milligrams per kilogram
N/A = not available/not applicable

Table 12.11
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Soil inside and outside Fenced Area

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance			Outliers at 5% Significance			Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG		Sample	Concentration MG/KG			
Benzo(a)anthracene	2.7E-03 J - 1.8E+02	41/51	3.9E+01	Rosner's	CAA03-SS06-1109	1.8E+02		CAA03-SS06-1109	1.8E+02		yes	yes
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA06-00-1199	8.8E+00		CAS004-4HA06-00-1199	8.8E+00			no
					CAS004-4-HA05-01-1199	4.3E+00	ND	CAS004-4-HA05-01-1199	4.3E+00	ND		no - not detected
Benzo(a)pyrene	4.4E-03 J - 1.3E+02	36/51	2.8E+01	Rosner's	CAA03-SS06-1109	1.3E+02		CAA03-SS06-1109	1.3E+02		yes	yes
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA06-00-1199	7.0E+00		CAS004-4HA06-00-1199	7.0E+00			yes
					CAS004-4HA04-00-1199	2.6E+00	ND	CAS004-4HA04-00-1199	2.6E+00	ND		no - not detected
Benzo(b)fluoranthene	8.9E-03 J - 2.0E+02	36/51	4.4E+01	Rosner's	CAA03-SS06-1109	2.0E+02		CAA03-SS06-1109	2.0E+02		yes	yes
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA06-00-1199	6.8E+00		CAS004-4HA06-00-1199	6.8E+00			yes
Benzo(k)fluoranthene	3.7E-03 J - 8.1E+01	31/51	1.8E+01	Rosner's	CAA03-SS06-1109	8.1E+01		CAA03-SS06-1109	8.1E+01		no - but COC	no
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA06-00-1199	6.8E+00		CAS004-4HA06-00-1199	6.8E+00			no
					CAS004-4HA05-00-1199	1.7E+00		CAS004-4HA05-00-1199	1.7E+00			no
bis(2-Ethylhexyl)phthalate	4.1E-02 J - 6.3E+01 J	5/41	4.6E+00	Rosner's	CAA03-SS06-1109	2.4E+02	ND	CAA03-SS06-1109	2.4E+02	ND	no	no - not detected
					CAS004-4-HA03-02-1199	6.3E+01		CAS004-4-HA03-02-1199	6.3E+01			no
					CAS004-4HA02-00-1199	1.6E+01	ND	CAS004-4HA02-00-1199	1.6E+01	ND		no - not detected
					CAS004-4HA04-00-1199	1.1E+01	ND	CAS004-4HA04-00-1199	1.1E+01	ND		no - not detected
					CAS004-4HA05-00-1199	5.5E+00	ND	CAS004-4HA05-00-1199	5.5E+00	ND		no - not detected
Carbazole	2.1E-03 J - 1.2E+02 J	20/41	3.2E+01	Rosner's	CAA03-SS06-1109	1.2E+02		CAA03-SS06-1109	1.2E+02		no - but COC	no
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA05-00-1199	5.5E+00	ND	CAS004-4HA05-00-1199	5.5E+00	ND		no - not detected
								CAS004-4-HA05-01-1199	4.3E+00	ND		no - not detected
Chrysene	2.2E-03 J - 2.1E+02	35/51	4.6E+01	Rosner's	CAA03-SS06-1109	2.1E+02		CAA03-SS06-1109	2.1E+02		no - but COC	no
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA06-00-1199	8.6E+00		CAS004-4HA06-00-1199	8.6E+00			no
					CAS004-4-HA05-01-1199	4.3E+00	ND	CAS004-4-HA05-01-1199	4.3E+00	ND		no - not detected
Dibenz(a,h)anthracene	3.6E-03 J - 2.2E+01 K	26/51	4.8E+00	Rosner's	CAA03-SS06-1109	2.2E+01		CAA03-SS06-1109	2.2E+01		yes	yes
					CAS004-4-HA04-01-1199	1.7E+01	ND	CAS004-4-HA04-01-1199	1.7E+01	ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01	ND	CAS004-4-HA03-02-1199	1.1E+01	ND		no - not detected
					CAS004-4HA05-00-1199	5.5E+00	ND	CAS004-4HA05-00-1199	5.5E+00	ND		no - not detected
					CAS004-4-HA05-01-1199	4.3E+00	ND	CAS004-4-HA05-01-1199	4.3E+00	ND		no - not detected

Table 12.11
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Soil inside and outside Fenced Area

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Dibenzofuran	1.2E-01 J - 1.9E+01	3/41	6.1E+00	Rosner's	CAA03-SS06-1109	1.9E+01	CAA03-SS06-1109	1.9E+01	no	no
					CAS004-4-HA04-01-1199	1.7E+01 ND	CAS004-4-HA04-01-1199	1.7E+01 ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01 ND	CAS004-4-HA03-02-1199	1.1E+01 ND		no - not detected
					CAS004-4HA05-00-1199	5.5E+00 ND	CAS004-4HA05-00-1199	5.5E+00 ND		no - not detected
							CAS004-4-HA05-01-1199	4.3E+00 ND		no - not detected
Fluoranthene	2.7E-03 J - 5.0E+02	39/51	1.1E+02	Rosner's	CAA03-SS06-1109	5.0E+02	CAA03-SS06-1109	5.0E+02	no	no
					CAS004-4-HA04-01-1199	1.7E+01 ND	CAS004-4-HA04-01-1199	1.7E+01 ND		no - not detected
					CAS004-4HA06-00-1199	1.4E+01	CAS004-4HA06-00-1199	1.4E+01		no
					CAS004-4-HA03-02-1199	1.1E+01 ND	CAS004-4-HA03-02-1199	1.1E+01 ND		no - not detected
					CAA03-SB01-1109	5.4E+00	CAA03-SB01-1109	5.4E+00		no
Indeno(1,2,3-cd)pyrene	3.7E-03 J - 6.9E+01 J	33/51	1.5E+01	Rosner's	CAA03-SS06-1109	6.9E+01	CAA03-SS06-1109	6.9E+01	no - but COC	yes
					CAS004-4-HA04-01-1199	1.7E+01 ND	CAS004-4-HA04-01-1199	1.7E+01 ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01 ND	CAS004-4-HA03-02-1199	1.1E+01 ND		no - not detected
					CAS004-4-HA05-01-1199	4.3E+00 ND	CAS004-4-HA05-01-1199	4.3E+00 ND		no - not detected
					CAS004-4-HA06-02-1199	3.8E+00 ND	CAS004-4-HA06-02-1199	3.8E+00 ND		no - not detected
Naphthalene	6.6E-03 J - 2.6E+01 J	13/51	5.8E+00	Rosner's	CAA03-SS06-1109	2.6E+01	CAA03-SS06-1109	2.6E+01	no	no
					CAS004-4-HA04-01-1199	1.7E+01 ND	CAS004-4-HA04-01-1199	1.7E+01 ND		no - not detected
					CAS004-4-HA03-02-1199	1.1E+01 ND	CAS004-4-HA03-02-1199	1.1E+01 ND		no - not detected
					CAS004-4HA05-00-1199	5.5E+00 ND	CAS004-4HA05-00-1199	5.5E+00 ND		no - not detected
					CAS004-4-HA05-01-1199	4.3E+00 ND	CAS004-4-HA05-01-1199	4.3E+00 ND		no - not detected
Pyrene	3.8E-03 J - 3.9E+02	39/51	8.5E+01	Rosner's	CAA03-SS06-1109	3.9E+02	CAA03-SS06-1109	3.9E+02	no	no
					CAS004-4-HA04-01-1199	1.7E+01 ND	CAS004-4-HA04-01-1199	1.7E+01 ND		no - not detected
					CAS004-4HA06-00-1199	1.1E+01	CAS004-4HA06-00-1199	1.1E+01		no
					CAS004-4-HA03-02-1199	1.1E+01 ND	CAS004-4-HA03-02-1199	1.1E+01 ND		no - not detected
							CAA03-SB01-1109	4.0E+00		no
Aldrin	1.1E-03 J - 3.3E-02 K	3/41	4.6E-03	Rosner's	CAA03-SS06-1109	4.0E-02 ND	CAA03-SS06-1109	4.0E-02 ND	no	no - not detected
					CAS004-4HA05-00-1199	3.3E-02	CAS004-4HA05-00-1199	3.3E-02		no
					CAS004-4-HA05-01-1199	2.7E-02	CAS004-4-HA05-01-1199	2.7E-02		no
					CAS004-4-HA04-01-1199	3.4E-03 ND	CAS004-4-HA04-01-1199	3.4E-03 ND		no - not detected
							CAA03-SB08-1109	1.1E-03		no
Aroclor-1242	1.0E+00 K - 2.3E+00 L	2/51	1.1E+00	Rosner's	CAS004-4-HA05-01-1199	2.3E+00	CAS004-4-HA05-01-1199	2.3E+00	no - but COC	no
					CAS004-4HA05-00-1199	1.0E+00	CAS004-4HA05-00-1199	1.0E+00		
					CAS004-4-HA04-01-1199	6.7E-02 ND	CAS004-4-HA04-01-1199	6.7E-02 ND		no - not detected
Aroclor-1260	1.9E-02 J - 2.7E+00 K	13/51	4.0E-01	Rosner's	CAS004-4HA05-00-1199	2.7E+00	CAS004-4HA05-00-1199	2.7E+00	no - but COC	no
					CAS004-4-HA05-01-1199	1.6E+00	CAS004-4-HA05-01-1199	1.6E+00		
					CAS004-4HA04-00-1199	6.0E-01	CAS004-4HA04-00-1199	6.0E-01		
					CAS004-4-HA04-01-1199	3.3E-01	CAS004-4-HA04-01-1199	3.3E-01		
					CAS004-4HA06-00-1199	9.1E-02	CAS004-4HA06-00-1199	9.1E-02		

Table 12.11

Outlier Evaluation

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Soil inside and outside Fenced Area

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Dieldrin	6.5E-04 J - 6.5E-01 J	8/41	1.8E-01	Rosner's	CAA03-SS06-1109	6.5E-01	CAA03-SS06-1109	6.5E-01	no - but COC	no
					CAS004-4HA05-00-1199	2.7E-02 ND	CAS004-4HA05-00-1199	2.7E-02 ND		no - not detected
gamma-BHC (Lindane)	5.7E-04 J - 8.6E-01	8/41	2.4E-01	Rosner's	CAA03-SS06-1109	8.6E-01	CAA03-SS06-1109	8.6E-01	no	no
					CAS004-4HA05-00-1199	1.4E-02 ND	CAS004-4HA05-00-1199	1.4E-02 ND		no - not detected
					CAA03-SS02-1109	9.6E-03	CAA03-SS02-1109	9.6E-03		no
					CAA03-SB01-1109	6.4E-03	CAA03-SB01-1109	6.4E-03		no
					CAA03-SS01-1109	5.2E-03	CAA03-SS01-1109	5.2E-03		no
Aluminum	3.6E+03 L - 3.2E+04	51/51	1.3E+04	Rosner's	None		None		no - but COC	N/A
Arsenic	6.2E-01 - 3.5E+02 J	51/51	4.0E+01	Rosner's	CAS04-SS13-1012	3.5E+02	CAS04-SS13-1012	3.5E+02	yes	yes
					CAA03-SB09-1109	1.3E+01	CAA03-SB09-1109	1.3E+01		no
Chromium (hexavalent)	4.3E-01 J - 4.3E-01 J	1/4	4.3E-01	Dixon's	None		CAS04-SB16-1012	4.3E-01	no - but COC	outlier is EPC
Cobalt	7.2E-01 - 1.2E+01 J	50/51	3.6E+00	Rosner's	CAS04-SS13-1012	1.2E+01	CAS04-SS13-1012	1.2E+01	no - but COC	no
					CAS004-4HA06-00-1199	8.8E+00	CAS004-4HA06-00-1199	8.8E+00		
Iron	3.4E+03 - 1.2E+05 J	51/51	2.1E+04	Rosner's	CAS04-SS13-1012	1.2E+05	CAS04-SS13-1012	1.2E+05	no - but COC	yes
					CAS004-4HA06-00-1199	6.2E+04	CAS004-4HA06-00-1199	6.2E+04		no
					CAS04-SS11-1012	5.3E+04	CAS04-SS11-1012	5.3E+04		
Lead	3.8E+00 - 7.9E+02	47/51	3.7E+01	Rosner's	CAA03-SS06-1109	7.9E+02	CAA03-SS06-1109	7.9E+02	no	yes
					CAS004-4HA05-00-1199	1.3E+02	CAS004-4HA05-00-1199	1.3E+02		no
					CAS004-4HA06-00-1199	1.1E+02	CAS004-4HA06-00-1199	1.1E+02		
Manganese	1.9E+01 - 5.1E+02 J	51/51	1.4E+02	Rosner's	CAS04-SS13-1012	5.1E+02	CAS04-SS13-1012	5.1E+02	no	no
Thallium	3.3E-01 - 1.1E+00 L	3/51	3.8E-01	Rosner's	CAS04-SS11-1012	2.0E+00 ND	CAS04-SS11-1012	2.0E+00 ND	no - but COC	no - not detected
Vanadium	6.5E+00 - 6.4E+01	50/51	3.5E+01	Rosner's	None		None		no	NA

J = Estimated Value

K = Biased High

L = Biased Low

ND = Not detected, detection limit is an outlier

N/A = not available/not applicable

MG/KG = milligrams per kilogram

Table 12.12
Outlier Evaluation
Cheatham Annex Site 4/Youth Pond Investigation Report
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Soil within Fenced Area of Youth Pond/Site 4

Chemical	Range of Detections MG/KG	Detection Frequency	Exposure Point Concentration MG/KG	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration MG/KG	Sample	Concentration MG/KG		
Benzo(a)anthracene	9.2E-02 / 1.8E+02	9/9	1.8E+02	Dixon's	CAA03-SS06-1109	1.8E+02	CAA03-SS06-1109	1.8E+02	no - but COC	outlier is EPC
Benzo(a)pyrene	7.9E-02 / 1.3E+02	9/9	8.2E+02	Dixon's	CAA03-SS06-1109	1.3E+02	CAA03-SS06-1109	1.3E+02	yes	no
Benzo(b)fluoranthene	1.6E-01 / 2.0E+02	9/9	2.0E+02	Dixon's	CAA03-SS06-1109	2.0E+02	CAA03-SS06-1109	2.0E+02	no - but COC	no - outlier is EPC
Benzo(k)fluoranthene	5.8E-02 / 8.1E+01	9/9	8.1E+01	Dixon's	CAA03-SS06-1109	8.1E+01	CAA03-SS06-1109	8.1E+01	no	no - outlier is EPC
Carbazole	9.0E-02 J / 1.2E+02 J	7/8	1.2E+02	Dixon's	CAA03-SS06-1109	1.2E+02	CAA03-SS06-1109	1.2E+02	no	no - outlier is EPC
Chrysene	1.2E-01 / 2.1E+02	9/9	2.1E+02	Dixon's	CAA03-SS06-1109	2.1E+02	CAA03-SS06-1109	2.1E+02	no	no - outlier is EPC
Dibenz(a,h)anthracene	1.7E-02 J / 2.2E+01 K	8/9	2.2E+01	Dixon's	CAA03-SS06-1109	2.2E+01	CAA03-SS06-1109	2.2E+01	no - but COC	outlier is EPC
Dibenzofuran	1.2E-01 J / 1.9E+01	4/8	7.4E+00	Dixon's	CAA03-SS06-1109	1.9E+01	CAA03-SS06-1109	1.9E+01	no	no
Fluoranthene	7.5E-02 / 5.0E+02	9/9	5.0E+02	Dixon's	CAA03-SS06-1109	5.0E+02	CAA03-SS06-1109	5.0E+02	no	no - outlier is EPC
Indeno(1,2,3-cd)pyrene	4.2E-02 / 6.9E+01 J	9/9	6.9E+01	Dixon's	CAA03-SS06-1109	6.9E+01	CAA03-SS06-1109	6.9E+01	no - but COC	outlier is EPC
Naphthalene	6.6E-03 J / 2.6E+01 J	7/9	2.6E+01	Dixon's	CAA03-SS06-1109	2.6E+01	CAA03-SS06-1109	2.6E+01	no	no - outlier is EPC
Pyrene	7.9E-02 / 3.9E+02	9/9	3.9E+02	Dixon's	CAA03-SS06-1109	3.9E+02	CAA03-SS06-1109	3.9E+02	no	no - outlier is EPC
Dieldrin	6.5E-01 J / 6.5E-01 J	1/8	6.5E-01	Dixon's	CAA03-SS06-1109	6.5E-01	CAA03-SS06-1109	6.5E-01	no	no - outlier is EPC
gamma-BHC (Lindane)	4.1E-03 J / 8.6E-01	4/8	8.6E-01	Dixon's	CAA03-SS06-1109	8.6E-01	CAA03-SS06-1109	8.6E-01	no	no - outlier is EPC
Aluminum	5.3E+03 / 1.3E+04	9/9	1.1E+04	Dixon's	None		None		no	N/A
Arsenic	2.4E+00 / 7.3E+00	9/9	4.8E+00	Dixon's	None		CAA03-SS01-1109	7.3E+00	no	no
Chromium (hexavalent)	5.3E-01 / 5.3E-01	1/1	5.3E-01	NA					no	N/A
Cobalt	1.5E+00 / 4.9E+00	9/9	3.8E+00	Dixon's	None		None		no	N/A
Iron	8.0E+03 / 1.9E+04	9/9	1.6E+04	Dixon's	None		None		no	N/A
Lead	9.4E+00 K / 7.9E+02	8/9	1.2E+02	Dixon's	CAA03-SS06-1109	7.9E+02	CAA03-SS06-1109	7.9E+02	no	yes
Manganese	4.7E+01 J / 3.2E+02	9/9	2.1E+02	Dixon's	None		None		no	N/A

J = Estimated Value
K = Biased High
MG/KG = milligrams per kilogram
N/A = not applicable/ not available

Table 12.13

Outlier Evaluation

Cheatham Annex Site 4/Youth Pond Investigation Report

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Data Group: Shallow Aquifer

Chemical	Range of Detections UG/L	Detection Frequency	Exposure Point Concentration UG/L	Outlier Test	Outliers at 1% Significance		Outliers at 5% Significance		Unacceptable Risk at EPC?	Unacceptable Risk at Outlier?
					Sample	Concentration UG/L	Sample	Concentration		
1,4-Dichlorobenzene	2.0E+00 J - 2.0E+00 J	1/14	2.0E+00	Dixon's	CAA03-GW03-1109	2.0E+00	CAA03-GW03-1109	2.0E+00	no	no - outlier is EPC
Benzene	1.4E+01 - 1.4E+01	1/14	1.4E+01	Dixon's	CAA03-GW05-1109	1.4E+01	CAA03-GW05-1109	1.4E+01	no - but COC	outlier is EPC
Ethylbenzene	2.0E-01 J - 1.0E+01	2/14	1.0E+01	Dixon's	CAA03-GW05-1109	1.0E+01	CAA03-GW05-1109	1.0E+01	no - but COC	outlier is EPC
m- and p-Xylene	1.0E+00 J - 2.0E+01	2/14	2.0E+01	Dixon's	CAA03-GW05-1109	2.0E+01	CAA03-GW05-1109	2.0E+01	no	no - outlier is EPC
Trichloroethene	4.0E-01 J - 4.0E-01 J	1/14	4.0E-01	Dixon's	None		None		no - but COC	N/A
Xylene, total	2.0E+00 J - 2.5E+01	2/14	1.8E+01	Dixon's	CAA03-GW05-1109	2.5E+01	CAA03-GW05-1109	2.5E+01	no	no
1,1-Biphenyl	8.0E+00 J - 8.0E+00 J	1/8	8.0E+00	Dixon's	None		CAA03-GW05-1109	1.2E+01 ND	yes	yes
2,4-Dimethylphenol	2.9E+01 - 2.9E+01	1/8	2.9E+01	Dixon's	CAA03-GW05-1109	2.9E+01	CAA03-GW05-1109	2.9E+01	no	no
2-Methylnaphthalene	1.5E+00 - 3.2E+01	3/14	8.3E+00	Dixon's	CAA03-GW05-1109	3.2E+01	CAA03-GW05-1109	3.2E+01	no	no
Benzo(a)anthracene	2.9E-01 - 2.9E+00	3/14	9.6E-01	Dixon's	CAA03-GW05-1109	2.9E+00	CAA03-GW05-1109	2.9E+00	yes	yes
Benzo(a)pyrene	1.0E-01 J - 2.0E+00	4/14	6.9E-01	Dixon's	CAA03-GW05-1109	2.0E+00	CAA03-GW05-1109	2.0E+00	yes	yes
Benzo(b)fluoranthene	1.5E-01 J - 2.7E+00	3/14	9.5E-01	Dixon's	CAA03-GW05-1109	2.7E+00	CAA03-GW05-1109	2.7E+00	yes	yes
Benzo(k)fluoranthene	9.2E-01 - 9.4E-01	2/14	9.3E-01	Dixon's	CAA03-GW05-1109	9.4E-01	CAA03-GW05-1109	9.4E-01	no - but COC	no
Dibenz(a,h)anthracene	2.1E-01 J - 2.6E-01 J	2/14	2.2E-01	Dixon's	None		None		yes	N/A
Dibenzofuran	3.0E+00 J - 1.9E+01	2/8	1.9E+01	Dixon's	CAA03-GW05-1109	1.9E+01	CAA03-GW05-1109	1.9E+01	yes	yes - outlier is EPC
Indeno(1,2,3-cd)pyrene	1.2E+00 J - 1.2E+00 J	1/14	1.2E+00	Dixon's	CAA03-GW05-1109	1.2E+00	CAA03-GW05-1109	1.2E+00	yes	yes - outlier is EPC
Naphthalene	6.3E-02 J - 5.6E+02	4/14	1.2E+02	Dixon's	CAA03-GW05-1109	5.6E+02	CAA03-GW05-1109	5.6E+02	yes	yes
Dieldrin	1.7E-02 J - 1.7E-02 J	1/8	1.7E-02	Dixon's	None		None		no - but COC	N/A
Aluminum	5.2E+01 J - 2.3E+04	13/14	1.1E+04	Dixon's	CAA03-GW03-1109	2.3E+04	CAA03-GW03-1109	2.3E+04	no - but COC	yes
Antimony	1.7E-01 J - 6.7E-01 J	8/14	5.5E-01	Dixon's	None		None		no	N/A
Arsenic	1.8E+00 J - 5.4E+01	8/14	1.7E+01	Dixon's	CAA03-GW03-1109	5.4E+01	CAA03-GW03-1109	5.4E+01	yes	yes
Barium	1.2E+01 - 3.0E+02	14/14	1.6E+02	Dixon's	CAA03-GW05-1109	3.0E+02	CAA03-GW05-1109	3.0E+02	no	no
Chromium	7.2E-01 J - 4.5E+01	14/14	1.5E+01	Dixon's	CAA03-GW03-1109	4.5E+01	CAA03-GW03-1109	4.5E+01	yes	yes
Cobalt	2.7E-01 J - 5.1E+00 J	8/14	2.4E+00	Dixon's	CAA03-GW04-1109	3.0E+01 ND	CAA03-GW04-1109	3.0E+01 ND	no	no - not detected
Iron	3.0E+02 - 3.9E+04	12/14	2.6E+04	Dixon's	None		None		yes	N/A
Lead	1.6E+00 J - 1.9E+01	6/14	4.5E+00	Dixon's	CAA03-GW02-1109	1.9E+01	CAA03-GW02-1109	1.9E+01	no	yes
Manganese	2.7E+01 - 6.4E+02	14/14	3.5E+02	Dixon's	None		None		no - but COC	NA
Mercury	3.0E-02 J - 2.3E+00	3/14	5.9E-01	Dixon's	CAA03-GW05-1109	2.3E+00	CAA03-GW05-1109	2.3E+00	no	no
Thallium	1.1E+00 J - 1.1E+00 J	1/14	1.1E+00	Dixon's	None		None		yes	N/A
Vanadium	3.6E-01 J - 5.5E+01	10/14	2.9E+01	Dixon's	None		CAA03-GW03-1109	5.5E+01	no	no

J = Estimated Value

UG/L = micrograms per liter

ND = Not detected, detection limit is an outlier

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface and Subsurface Sediment - Youth Pond**							
2			**User Selected Options**									
3			From File		data manip for ProUCL input.wst							
4			Full Precision		OFF							
5		Test for Suspected Outliers with Dixon test			1							
6		Test for Suspected Outliers with Rosner test			5							
7												
8												
9			**Rosner's Outlier Test for Methylcyclohexane**									
10												
11												
12			**Mean**	**3.173**								
13			**Standard Deviation**	**2.313**								
14			**Number of data**	**26**								
15		**Number of suspected outliers**		**5**								
16												
17				Potential	Obs.	Test	Critical	Critical				
18	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
19	1	3.173	2.268	11	26	3.45	2.84	3.16				
20	2	2.86	1.709	7.1	25	2.481	2.82	3.14				
21	3	2.683	1.494	5.8	24	2.086	2.8	3.11				
22	4	2.548	1.369	5.1	23	1.865	2.78	3.09				
23	5	2.432	1.28	4.6	22	1.694	2.76	3.06				
24												
25	For 5% Significance Level, there is 1 Potential Outlier											
26	Therefore, Observation 11 is a Potential Statistical Outlier											
27												
28	For 1% Significance Level, there is 1 Potential Outlier											
29	Therefore, Observation 11 is a Potential Statistical Outlier											
30												
31												
32			**Rosner's Outlier Test for Benzo(a)anthracene**									
33												
34												
35			**Mean**	**214.5**								
36			**Standard Deviation**	**507.6**								
37			**Number of data**	**26**								
38		**Number of suspected outliers**		**5**								
39												
40				Potential	Obs.	Test	Critical	Critical				
41	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
42	1	214.5	497.7	2400	26	4.391	2.84	3.16				
43	2	127.1	247.8	1300	25	4.734	2.82	3.14				
44	3	78.25	41.97	170	24	2.186	2.8	3.11				
45	4	74.26	37.98	150	23	1.994	2.78	3.09				
46	5	70.82	35.01	140	21	1.976	2.76	3.06				
47												
48	For 5% significance level, there are 2 Potential Outliers											
49	Therefore, Potential Statistical Outliers are											
50	2400, 1300											
51												
52	For 1% Significance Level, there are 2 Potential Outliers											
53	Therefore, Potential Statistical Outliers are											
54	2400, 1300											
55												
56												
57			**Rosner's Outlier Test for Benzo(a)pyrene**									
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59												
60				**Mean**	**225.7**							
61				**Standard Deviation**	**569**							
62				**Number of data**	**26**							
63				**Number of suspected outliers**	**5**							
64												
65				Potential	Obs.	Test	Critical	Critical				
66	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
67	1	225.7	557.9	2700	26	4.435	2.84	3.16				
68	2	126.8	268.2	1400	25	4.747	2.82	3.14				
69	3	73.71	40.69	160	24	2.121	2.8	3.11				
70	4	69.96	37.12	150	23	2.156	2.78	3.09				
71	5	66.32	33.54	140	22	2.197	2.76	3.06				
72												
73	For 5% significance level, there are 2 Potential Outliers											
74	Therefore, Potential Statistical Outliers are											
75	2700, 1400											
76												
77	For 1% Significance Level, there are 2 Potential Outliers											
78	Therefore, Potential Statistical Outliers are											
79	2700, 1400											
80												
81												
82	**Rosner's Outlier Test for Benzo(b)fluoranthene**											
83												
84												
85				**Mean**	**318.2**							
86				**Standard Deviation**	**768.4**							
87				**Number of data**	**26**							
88				**Number of suspected outliers**	**5**							
89												
90				Potential	Obs.	Test	Critical	Critical				
91	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
92	1	318.2	753.5	3700	26	4.488	2.84	3.16				
93	2	183	345.7	1800	25	4.678	2.82	3.14				
94	3	115.6	79.04	320	24	2.586	2.8	3.11				
95	4	106.7	67.44	310	23	3.014	2.78	3.09				
96	5	97.45	52.03	240	22	2.739	2.76	3.06				
97												
98	For 5% significance level, there are 4 Potential Outliers											
99	Therefore, Potential Statistical Outliers are											
100	3700, 1800, 320, 310											
101												
102	For 1% Significance Level, there are 2 Potential Outliers											
103	Therefore, Potential Statistical Outliers are											
104	3700, 1800											
105												
106												
107	**Rosner's Outlier Test for Dibenz(a,h)anthracene**											
108												
109												
110				**Mean**	**89**							
111				**Standard Deviation**	**72.32**							
112				**Number of data**	**26**							
113				**Number of suspected outliers**	**5**							
114												
115				Potential	Obs.	Test	Critical	Critical				
116	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				

	A	B	C	D	E	F	G	H	I	J	K	L
117	1	89	70.92	400	26	4.385	2.84	3.16				
118	2	76.56	35.46	170	25	2.635	2.82	3.14				
119	3	72.67	30.27	150	24	2.555	2.8	3.11				
120	4	69.3	25.97	130	23	2.337	2.78	3.09				
121	5	66.55	22.87	110	22	1.9	2.76	3.06				
122												
123	For 5% Significance Level, there is 1 Potential Outlier											
124	Therefore, Observation 400 is a Potential Statistical Outlier											
125												
126	For 1% Significance Level, there is 1 Potential Outlier											
127	Therefore, Observation 400 is a Potential Statistical Outlier											
128												
129												
130	**Rosner's Outlier Test for Indeno(1,2,3-cd)pyrene**											
131												
132												
133			**Mean**	**148.6**								
134			**Standard Deviation**	**300.3**								
135			**Number of data**	**26**								
136			**Number of suspected outliers**	**5**								
137												
138				Potential	Obs.	Test	Critical	Critical				
139	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
140	1	148.6	294.5	1500	26	4.589	2.84	3.16				
141	2	94.52	121.7	660	25	4.648	2.82	3.14				
142	3	70.96	31.04	150	24	2.547	2.8	3.11				
143	4	67.52	26.66	130	23	2.344	2.78	3.09				
144	5	64.68	23.46	110	22	1.932	2.76	3.06				
145												
146	For 5% significance level, there are 2 Potential Outliers											
147	Therefore, Potential Statistical Outliers are											
148	1500, 660											
149												
150	For 1% Significance Level, there are 2 Potential Outliers											
151	Therefore, Potential Statistical Outliers are											
152	1500, 660											
153												
154												
155	**Rosner's Outlier Test for Arsenic**											
156												
157												
158			**Mean**	**35.59**								
159			**Standard Deviation**	**65.01**								
160			**Number of data**	**26**								
161			**Number of suspected outliers**	**5**								
162												
163				Potential	Obs.	Test	Critical	Critical				
164	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
165	1	35.59	63.75	265	26	3.599	2.84	3.16				
166	2	26.41	46.06	191	25	3.573	2.82	3.14				
167	3	19.56	31.42	126	24	3.388	2.8	3.11				
168	4	14.93	22.24	108	23	4.184	2.78	3.09				
169	5	10.7	9.329	45	22	3.677	2.76	3.06				
170												
171	For 5% significance level, there are 5 Potential Outliers											
172	Therefore, Potential Statistical Outliers are											
173	265, 191, 126, 108, 45											
174												

	A	B	C	D	E	F	G	H	I	J	K	L
175	For 1% Significance Level, there are 5 Potential Outliers											
176	Therefore, Potential Statistical Outliers are											
177	265, 191, 126, 108, 45											
178												
179												
180	**Rosner's Outlier Test for Chromium**											
181												
182												
183			**Mean**	**17.25**								
184			**Standard Deviation**	**9.027**								
185			**Number of data**	**26**								
186			**Number of suspected outliers**	**5**								
187												
188				Potential	Obs.	Test	Critical	Critical				
189	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
190	1	17.25	8.851	35	26	2.005	2.84	3.16				
191	2	16.54	8.44	34.7	25	2.151	2.82	3.14				
192	3	15.79	7.707	3.14	1	1.641	2.8	3.11				
193	4	16.34	7.383	6.91	2	1.277	2.78	3.09				
194	5	16.77	7.258	7.15	3	1.325	2.76	3.06				
195												
196	For 5% Significance Level, there is no Potential Outlier											
197												
198	For 1% Significance Level, there is no Potential Outlier											
199												
200												
201	**Rosner's Outlier Test for Thallium**											
202												
203												
204			**Mean**	**3.5**								
205			**Standard Deviation**	**2.262**								
206			**Number of data**	**26**								
207			**Number of suspected outliers**	**5**								
208												
209				Potential	Obs.	Test	Critical	Critical				
210	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
211	1	3.5	2.218	10.1	26	2.976	2.84	3.16				
212	2	3.236	1.855	7.88	25	2.503	2.82	3.14				
213	3	3.042	1.617	6.4	24	2.076	2.8	3.11				
214	4	2.896	1.483	5.42	23	1.702	2.78	3.09				
215	5	2.781	1.41	5.17	22	1.695	2.76	3.06				
216												
217	For 5% Significance Level, there is 1 Potential Outlier											
218	Therefore, Observation 10.1 is a Potential Statistical Outlier											
219												
220	For 1% Significance Level, there is no Potential Outlier											
221												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - SD/SS - Drainage Ditches to Youth Pond Outside Fenced Area**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9	**Dixon's Outlier Test for Benzo(a)anthracene**											
10												
11	Number of data = 6											
12	10% critical value: 0.482											
13	5% critical value: 0.56											
14	1% critical value: 0.698											
15												
16	**1. Data Value 450 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.800											
19												
20	For 10% significance level, 450 is an outlier.											
21	For 5% significance level, 450 is an outlier.											
22	For 1% significance level, 450 is an outlier.											
23												
24	**2. Data Value 25 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.061											
27												
28	For 10% significance level, 25 is not an outlier.											
29	For 5% significance level, 25 is not an outlier.											
30	For 1% significance level, 25 is not an outlier.											
31												
32												
33	**Dixon's Outlier Test for Benzo(a)pyrene**											
34												
35	Number of data = 6											
36	10% critical value: 0.482											
37	5% critical value: 0.56											
38	1% critical value: 0.698											
39												
40	**1. Data Value 450 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.822											
43												
44	For 10% significance level, 450 is an outlier.											
45	For 5% significance level, 450 is an outlier.											
46	For 1% significance level, 450 is an outlier.											
47												
48	**2. Data Value 17 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.065											
51												
52	For 10% significance level, 17 is not an outlier.											
53	For 5% significance level, 17 is not an outlier.											
54	For 1% significance level, 17 is not an outlier.											
55												
56												
57	**Dixon's Outlier Test for Benzo(b)fluoranthene**											
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	Number of data = 6											
60	10% critical value: 0.482											
61	5% critical value: 0.56											
62	1% critical value: 0.698											
63												
64	**1. Data Value 810 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.824											
67												
68	For 10% significance level, 810 is an outlier.											
69	For 5% significance level, 810 is an outlier.											
70	For 1% significance level, 810 is an outlier.											
71												
72	**2. Data Value 33 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.060											
75												
76	For 10% significance level, 33 is not an outlier.											
77	For 5% significance level, 33 is not an outlier.											
78	For 1% significance level, 33 is not an outlier.											
79												
80												
81	**Dixon's Outlier Test for Dibenz(a,h)anthracene**											
82												
83	Number of data = 6											
84	10% critical value: 0.482											
85	5% critical value: 0.56											
86	1% critical value: 0.698											
87												
88	**1. Data Value 54 is a Potential Outlier (Upper Tail)?**											
89												
90	Test Statistic: 0.875											
91												
92	For 10% significance level, 54 is an outlier.											
93	For 5% significance level, 54 is an outlier.											
94	For 1% significance level, 54 is an outlier.											
95												
96	**2. Data Value 30 is a Potential Outlier (Lower Tail)?**											
97												
98	Test Statistic: 0.042											
99												
100	For 10% significance level, 30 is not an outlier.											
101	For 5% significance level, 30 is not an outlier.											
102	For 1% significance level, 30 is not an outlier.											
103												
104												
105	**Dixon's Outlier Test for Indeno(1,2,3-cd)pyrene**											
106												
107	Number of data = 6											
108	10% critical value: 0.482											
109	5% critical value: 0.56											
110	1% critical value: 0.698											
111												
112	**1. Data Value 190 is a Potential Outlier (Upper Tail)?**											
113												
114	Test Statistic: 0.890											
115												
116	For 10% significance level, 190 is an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
117	For 5% significance level, 190 is an outlier.											
118	For 1% significance level, 190 is an outlier.											
119												
120	**2. Data Value 26 is a Potential Outlier (Lower Tail)?**											
121												
122	Test Statistic: 0.012											
123												
124	For 10% significance level, 26 is not an outlier.											
125	For 5% significance level, 26 is not an outlier.											
126	For 1% significance level, 26 is not an outlier.											
127												
128												
129	**Dixon's Outlier Test for Arsenic**											
130												
131	Number of data = 6											
132	10% critical value: 0.482											
133	5% critical value: 0.56											
134	1% critical value: 0.698											
135												
136	**1. Data Value 7.69 is a Potential Outlier (Upper Tail)?**											
137												
138	Test Statistic: 0.258											
139												
140	For 10% significance level, 7.69 is not an outlier.											
141	For 5% significance level, 7.69 is not an outlier.											
142	For 1% significance level, 7.69 is not an outlier.											
143												
144	**2. Data Value 1.46 is a Potential Outlier (Lower Tail)?**											
145												
146	Test Statistic: 0.098											
147												
148	For 10% significance level, 1.46 is not an outlier.											
149	For 5% significance level, 1.46 is not an outlier.											
150	For 1% significance level, 1.46 is not an outlier.											
151												
152												
153	**Dixon's Outlier Test for Chromium**											
154												
155	Number of data = 6											
156	10% critical value: 0.482											
157	5% critical value: 0.56											
158	1% critical value: 0.698											
159												
160	**1. Data Value 17.8 is a Potential Outlier (Upper Tail)?**											
161												
162	Test Statistic: 0.449											
163												
164	For 10% significance level, 17.8 is not an outlier.											
165	For 5% significance level, 17.8 is not an outlier.											
166	For 1% significance level, 17.8 is not an outlier.											
167												
168	**2. Data Value 3.77 is a Potential Outlier (Lower Tail)?**											
169												
170	Test Statistic: 0.101											
171												
172	For 10% significance level, 3.77 is not an outlier.											
173	For 5% significance level, 3.77 is not an outlier.											
174	For 1% significance level, 3.77 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
175												
176												
177	**Dixon's Outlier Test for Cobalt**											
178												
179	Number of data = 6											
180	10% critical value: 0.482											
181	5% critical value: 0.56											
182	1% critical value: 0.698											
183												
184	**1. Data Value 2.69 is a Potential Outlier (Upper Tail)?**											
185												
186	Test Statistic: 0.047											
187												
188	For 10% significance level, 2.69 is not an outlier.											
189	For 5% significance level, 2.69 is not an outlier.											
190	For 1% significance level, 2.69 is not an outlier.											
191												
192	**2. Data Value 0.556 is a Potential Outlier (Lower Tail)?**											
193												
194	Test Statistic: 0.089											
195												
196	For 10% significance level, 0.556 is not an outlier.											
197	For 5% significance level, 0.556 is not an outlier.											
198	For 1% significance level, 0.556 is not an outlier.											
199												
200												
201	**Dixon's Outlier Test for Iron**											
202												
203	Number of data = 6											
204	10% critical value: 0.482											
205	5% critical value: 0.56											
206	1% critical value: 0.698											
207												
208	**1. Data Value 11300 is a Potential Outlier (Upper Tail)?**											
209												
210	Test Statistic: 0.096											
211												
212	For 10% significance level, 11300 is not an outlier.											
213	For 5% significance level, 11300 is not an outlier.											
214	For 1% significance level, 11300 is not an outlier.											
215												
216	**2. Data Value 2940 is a Potential Outlier (Lower Tail)?**											
217												
218	Test Statistic: 0.344											
219												
220	For 10% significance level, 2940 is not an outlier.											
221	For 5% significance level, 2940 is not an outlier.											
222	For 1% significance level, 2940 is not an outlier.											
223												
224												
225	**Dixon's Outlier Test for Manganese**											
226												
227	Number of data = 6											
228	10% critical value: 0.482											
229	5% critical value: 0.56											
230	1% critical value: 0.698											
231												
232	**1. Data Value 217 is a Potential Outlier (Upper Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
233												
234	Test Statistic: 0.137											
235												
236	For 10% significance level, 217 is not an outlier.											
237	For 5% significance level, 217 is not an outlier.											
238	For 1% significance level, 217 is not an outlier.											
239												
240	**2. Data Value 12 is a Potential Outlier (Lower Tail)?**											
241												
242	Test Statistic: 0.038											
243												
244	For 10% significance level, 12 is not an outlier.											
245	For 5% significance level, 12 is not an outlier.											
246	For 1% significance level, 12 is not an outlier.											
247												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Soil within Fenced Area of YP/Site 4**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		1							
7												
8												
9	**Dixon's Outlier Test for Benzo(a)anthracene**											
10												
11	Number of data = 9											
12	10% critical value: 0.441											
13	5% critical value: 0.512											
14	1% critical value: 0.635											
15												
16	**1. Data Value 180000 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.990											
19												
20	For 10% significance level, 180000 is an outlier.											
21	For 5% significance level, 180000 is an outlier.											
22	For 1% significance level, 180000 is an outlier.											
23												
24	**2. Data Value 92 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.015											
27												
28	For 10% significance level, 92 is not an outlier.											
29	For 5% significance level, 92 is not an outlier.											
30	For 1% significance level, 92 is not an outlier.											
31												
32												
33	**Dixon's Outlier Test for Benzo(a)pyrene**											
34												
35	Number of data = 9											
36	10% critical value: 0.441											
37	5% critical value: 0.512											
38	1% critical value: 0.635											
39												
40	**1. Data Value 130000 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.990											
43												
44	For 10% significance level, 130000 is an outlier.											
45	For 5% significance level, 130000 is an outlier.											
46	For 1% significance level, 130000 is an outlier.											
47												
48	**2. Data Value 79 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.013											
51												
52	For 10% significance level, 79 is not an outlier.											
53	For 5% significance level, 79 is not an outlier.											
54	For 1% significance level, 79 is not an outlier.											
55												
56												
57	**Dixon's Outlier Test for Benzo(b)fluoranthene**											
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	Number of data = 9											
60	10% critical value: 0.441											
61	5% critical value: 0.512											
62	1% critical value: 0.635											
63												
64	**1. Data Value 200000 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.989											
67												
68	For 10% significance level, 200000 is an outlier.											
69	For 5% significance level, 200000 is an outlier.											
70	For 1% significance level, 200000 is an outlier.											
71												
72	**2. Data Value 160 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.014											
75												
76	For 10% significance level, 160 is not an outlier.											
77	For 5% significance level, 160 is not an outlier.											
78	For 1% significance level, 160 is not an outlier.											
79												
80												
81	**Dixon's Outlier Test for Benzo(k)fluoranthene**											
82												
83	Number of data = 9											
84	10% critical value: 0.441											
85	5% critical value: 0.512											
86	1% critical value: 0.635											
87												
88	**1. Data Value 81000 is a Potential Outlier (Upper Tail)?**											
89												
90	Test Statistic: 0.992											
91												
92	For 10% significance level, 81000 is an outlier.											
93	For 5% significance level, 81000 is an outlier.											
94	For 1% significance level, 81000 is an outlier.											
95												
96	**2. Data Value 58 is a Potential Outlier (Lower Tail)?**											
97												
98	Test Statistic: 0.002											
99												
100	For 10% significance level, 58 is not an outlier.											
101	For 5% significance level, 58 is not an outlier.											
102	For 1% significance level, 58 is not an outlier.											
103												
104												
105	**Dixon's Outlier Test for Carbazole**											
106												
107	Number of data = 8											
108	10% critical value: 0.479											
109	5% critical value: 0.554											
110	1% critical value: 0.683											
111												
112	**1. Data Value 120000 is a Potential Outlier (Upper Tail)?**											
113												
114	Test Statistic: 0.996											
115												
116	For 10% significance level, 120000 is an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
117	For 5% significance level, 120000 is an outlier.											
118	For 1% significance level, 120000 is an outlier.											
119												
120	**2. Data Value 90 is a Potential Outlier (Lower Tail)?**											
121												
122	Test Statistic: 0.071											
123												
124	For 10% significance level, 90 is not an outlier.											
125	For 5% significance level, 90 is not an outlier.											
126	For 1% significance level, 90 is not an outlier.											
127												
128												
129	**Dixon's Outlier Test for Chrysene**											
130												
131	Number of data = 9											
132	10% critical value: 0.441											
133	5% critical value: 0.512											
134	1% critical value: 0.635											
135												
136	**1. Data Value 210000 is a Potential Outlier (Upper Tail)?**											
137												
138	Test Statistic: 0.992											
139												
140	For 10% significance level, 210000 is an outlier.											
141	For 5% significance level, 210000 is an outlier.											
142	For 1% significance level, 210000 is an outlier.											
143												
144	**2. Data Value 120 is a Potential Outlier (Lower Tail)?**											
145												
146	Test Statistic: 0.006											
147												
148	For 10% significance level, 120 is not an outlier.											
149	For 5% significance level, 120 is not an outlier.											
150	For 1% significance level, 120 is not an outlier.											
151												
152												
153	**Dixon's Outlier Test for Dibenz(a,h)anthracene**											
154												
155	Number of data = 9											
156	10% critical value: 0.441											
157	5% critical value: 0.512											
158	1% critical value: 0.635											
159												
160	**1. Data Value 22000 is a Potential Outlier (Upper Tail)?**											
161												
162	Test Statistic: 0.986											
163												
164	For 10% significance level, 22000 is an outlier.											
165	For 5% significance level, 22000 is an outlier.											
166	For 1% significance level, 22000 is an outlier.											
167												
168	**2. Data Value 17 is a Potential Outlier (Lower Tail)?**											
169												
170	Test Statistic: 0.026											
171												
172	For 10% significance level, 17 is not an outlier.											
173	For 5% significance level, 17 is not an outlier.											
174	For 1% significance level, 17 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
175												
176												
177	**Dixon's Outlier Test for Dibenzofuran**											
178												
179	Number of data = 8											
180	10% critical value: 0.479											
181	5% critical value: 0.554											
182	1% critical value: 0.683											
183												
184	**1. Data Value 19000 is a Potential Outlier (Upper Tail)?**											
185												
186	Test Statistic: 0.987											
187												
188	For 10% significance level, 19000 is an outlier.											
189	For 5% significance level, 19000 is an outlier.											
190	For 1% significance level, 19000 is an outlier.											
191												
192	**2. Data Value 120 is a Potential Outlier (Lower Tail)?**											
193												
194	Test Statistic: 0.038											
195												
196	For 10% significance level, 120 is not an outlier.											
197	For 5% significance level, 120 is not an outlier.											
198	For 1% significance level, 120 is not an outlier.											
199												
200												
201	**Dixon's Outlier Test for Fluoranthene**											
202												
203	Number of data = 9											
204	10% critical value: 0.441											
205	5% critical value: 0.512											
206	1% critical value: 0.635											
207												
208	**1. Data Value 500000 is a Potential Outlier (Upper Tail)?**											
209												
210	Test Statistic: 0.990											
211												
212	For 10% significance level, 500000 is an outlier.											
213	For 5% significance level, 500000 is an outlier.											
214	For 1% significance level, 500000 is an outlier.											
215												
216	**2. Data Value 75 is a Potential Outlier (Lower Tail)?**											
217												
218	Test Statistic: 0.033											
219												
220	For 10% significance level, 75 is not an outlier.											
221	For 5% significance level, 75 is not an outlier.											
222	For 1% significance level, 75 is not an outlier.											
223												
224												
225	**Dixon's Outlier Test for Indeno(1,2,3-cd)pyrene**											
226												
227	Number of data = 9											
228	10% critical value: 0.441											
229	5% critical value: 0.512											
230	1% critical value: 0.635											
231												
232	**1. Data Value 69000 is a Potential Outlier (Upper Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
233												
234	Test Statistic: 0.981											
235												
236	For 10% significance level, 69000 is an outlier.											
237	For 5% significance level, 69000 is an outlier.											
238	For 1% significance level, 69000 is an outlier.											
239												
240	**2. Data Value 42 is a Potential Outlier (Lower Tail)?**											
241												
242	Test Statistic: 0.057											
243												
244	For 10% significance level, 42 is not an outlier.											
245	For 5% significance level, 42 is not an outlier.											
246	For 1% significance level, 42 is not an outlier.											
247												
248												
249	**Dixon's Outlier Test for Naphthalene**											
250												
251	Number of data = 9											
252	10% critical value: 0.441											
253	5% critical value: 0.512											
254	1% critical value: 0.635											
255												
256	**1. Data Value 26000 is a Potential Outlier (Upper Tail)?**											
257												
258	Test Statistic: 0.988											
259												
260	For 10% significance level, 26000 is an outlier.											
261	For 5% significance level, 26000 is an outlier.											
262	For 1% significance level, 26000 is an outlier.											
263												
264	**2. Data Value 6.6 is a Potential Outlier (Lower Tail)?**											
265												
266	Test Statistic: 0.032											
267												
268	For 10% significance level, 6.6 is not an outlier.											
269	For 5% significance level, 6.6 is not an outlier.											
270	For 1% significance level, 6.6 is not an outlier.											
271												
272												
273	**Dixon's Outlier Test for Pyrene**											
274												
275	Number of data = 9											
276	10% critical value: 0.441											
277	5% critical value: 0.512											
278	1% critical value: 0.635											
279												
280	**1. Data Value 390000 is a Potential Outlier (Upper Tail)?**											
281												
282	Test Statistic: 0.990											
283												
284	For 10% significance level, 390000 is an outlier.											
285	For 5% significance level, 390000 is an outlier.											
286	For 1% significance level, 390000 is an outlier.											
287												
288	**2. Data Value 79 is a Potential Outlier (Lower Tail)?**											
289												
290	Test Statistic: 0.041											

	A	B	C	D	E	F	G	H	I	J	K	L
291												
292	For 10% significance level, 79 is not an outlier.											
293	For 5% significance level, 79 is not an outlier.											
294	For 1% significance level, 79 is not an outlier.											
295												
296												
297	**Dixon's Outlier Test for Dieldrin**											
298												
299	Number of data = 8											
300	10% critical value: 0.479											
301	5% critical value: 0.554											
302	1% critical value: 0.683											
303												
304	**1. Data Value 650 is a Potential Outlier (Upper Tail)?**											
305												
306	Test Statistic: 0.985											
307												
308	For 10% significance level, 650 is an outlier.											
309	For 5% significance level, 650 is an outlier.											
310	For 1% significance level, 650 is an outlier.											
311												
312	**2. Data Value 3.2 is a Potential Outlier (Lower Tail)?**											
313												
314	Test Statistic: 0.000											
315												
316	For 10% significance level, 3.2 is not an outlier.											
317	For 5% significance level, 3.2 is not an outlier.											
318	For 1% significance level, 3.2 is not an outlier.											
319												
320												
321	**Dixon's Outlier Test for gamma-BHC (Lindane)**											
322												
323	Number of data = 8											
324	10% critical value: 0.479											
325	5% critical value: 0.554											
326	1% critical value: 0.683											
327												
328	**1. Data Value 860 is a Potential Outlier (Upper Tail)?**											
329												
330	Test Statistic: 0.987											
331												
332	For 10% significance level, 860 is an outlier.											
333	For 5% significance level, 860 is an outlier.											
334	For 1% significance level, 860 is an outlier.											
335												
336	**2. Data Value 1.7 is a Potential Outlier (Lower Tail)?**											
337												
338	Test Statistic: 0.018											
339												
340	For 10% significance level, 1.7 is not an outlier.											
341	For 5% significance level, 1.7 is not an outlier.											
342	For 1% significance level, 1.7 is not an outlier.											
343												
344												
345	**Dixon's Outlier Test for Aluminum**											
346												
347	Number of data = 9											
348	10% critical value: 0.441											

	A	B	C	D	E	F	G	H	I	J	K	L
349	5% critical value: 0.512											
350	1% critical value: 0.635											
351												
352	**1. Data Value 12600 is a Potential Outlier (Upper Tail)?**											
353												
354	Test Statistic: 0.221											
355												
356	For 10% significance level, 12600 is not an outlier.											
357	For 5% significance level, 12600 is not an outlier.											
358	For 1% significance level, 12600 is not an outlier.											
359												
360	**2. Data Value 5330 is a Potential Outlier (Lower Tail)?**											
361												
362	Test Statistic: 0.437											
363												
364	For 10% significance level, 5330 is not an outlier.											
365	For 5% significance level, 5330 is not an outlier.											
366	For 1% significance level, 5330 is not an outlier.											
367												
368												
369	**Dixon's Outlier Test for Arsenic**											
370												
371	Number of data = 9											
372	10% critical value: 0.441											
373	5% critical value: 0.512											
374	1% critical value: 0.635											
375												
376	**1. Data Value 7.3 is a Potential Outlier (Upper Tail)?**											
377												
378	Test Statistic: 0.527											
379												
380	For 10% significance level, 7.3 is an outlier.											
381	For 5% significance level, 7.3 is an outlier.											
382	For 1% significance level, 7.3 is not an outlier.											
383												
384	**2. Data Value 2.4 is a Potential Outlier (Lower Tail)?**											
385												
386	Test Statistic: 0.000											
387												
388	For 10% significance level, 2.4 is not an outlier.											
389	For 5% significance level, 2.4 is not an outlier.											
390	For 1% significance level, 2.4 is not an outlier.											
391												
392												
393	**No Outlier Test for Chromium (hexavalent)**											
394												
395	**Dixon's Outlier Test for Chromium**											
396												
397	Number of data = 9											
398	10% critical value: 0.441											
399	5% critical value: 0.512											
400	1% critical value: 0.635											
401												
402	**1. Data Value 24.9 is a Potential Outlier (Upper Tail)?**											
403												
404	Test Statistic: 0.163											
405												
406	For 10% significance level, 24.9 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
407	For 5% significance level, 24.9 is not an outlier.											
408	For 1% significance level, 24.9 is not an outlier.											
409												
410	**2. Data Value 10.9 is a Potential Outlier (Lower Tail)?**											
411												
412	Test Statistic: 0.092											
413												
414	For 10% significance level, 10.9 is not an outlier.											
415	For 5% significance level, 10.9 is not an outlier.											
416	For 1% significance level, 10.9 is not an outlier.											
417												
418												
419	**Dixon's Outlier Test for Cobalt**											
420												
421	Number of data = 9											
422	10% critical value: 0.441											
423	5% critical value: 0.512											
424	1% critical value: 0.635											
425												
426	**1. Data Value 4.9 is a Potential Outlier (Upper Tail)?**											
427												
428	Test Statistic: 0.217											
429												
430	For 10% significance level, 4.9 is not an outlier.											
431	For 5% significance level, 4.9 is not an outlier.											
432	For 1% significance level, 4.9 is not an outlier.											
433												
434	**2. Data Value 1.5 is a Potential Outlier (Lower Tail)?**											
435												
436	Test Statistic: 0.379											
437												
438	For 10% significance level, 1.5 is not an outlier.											
439	For 5% significance level, 1.5 is not an outlier.											
440	For 1% significance level, 1.5 is not an outlier.											
441												
442												
443	**Dixon's Outlier Test for Iron**											
444												
445	Number of data = 9											
446	10% critical value: 0.441											
447	5% critical value: 0.512											
448	1% critical value: 0.635											
449												
450	**1. Data Value 19400 is a Potential Outlier (Upper Tail)?**											
451												
452	Test Statistic: 0.063											
453												
454	For 10% significance level, 19400 is not an outlier.											
455	For 5% significance level, 19400 is not an outlier.											
456	For 1% significance level, 19400 is not an outlier.											
457												
458	**2. Data Value 8040 is a Potential Outlier (Lower Tail)?**											
459												
460	Test Statistic: 0.178											
461												
462	For 10% significance level, 8040 is not an outlier.											
463	For 5% significance level, 8040 is not an outlier.											
464	For 1% significance level, 8040 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
465												
466												
467				**Dixon's Outlier Test for Lead**								
468												
469	Number of data = 18											
470	10% critical value: 0.424											
471	5% critical value: 0.475											
472	1% critical value: 0.561											
473												
474	**1. Data Value 793 is a Potential Outlier (Upper Tail)?**											
475												
476	Test Statistic: 0.962											
477												
478	For 10% significance level, 793 is an outlier.											
479	For 5% significance level, 793 is an outlier.											
480	For 1% significance level, 793 is an outlier.											
481												
482	**2. Data Value 9.4 is a Potential Outlier (Lower Tail)?**											
483												
484	Test Statistic: 0.007											
485												
486	For 10% significance level, 9.4 is not an outlier.											
487	For 5% significance level, 9.4 is not an outlier.											
488	For 1% significance level, 9.4 is not an outlier.											
489												
490												
491				**Dixon's Outlier Test for Manganese**								
492												
493	Number of data = 18											
494	10% critical value: 0.424											
495	5% critical value: 0.475											
496	1% critical value: 0.561											
497												
498	**1. Data Value 315 is a Potential Outlier (Upper Tail)?**											
499												
500	Test Statistic: 0.214											
501												
502	For 10% significance level, 315 is not an outlier.											
503	For 5% significance level, 315 is not an outlier.											
504	For 1% significance level, 315 is not an outlier.											
505												
506	**2. Data Value 46.8 is a Potential Outlier (Lower Tail)?**											
507												
508	Test Statistic: 0.028											
509												
510	For 10% significance level, 46.8 is not an outlier.											
511	For 5% significance level, 46.8 is not an outlier.											
512	For 1% significance level, 46.8 is not an outlier.											
513												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Soil* Fenced Area of YP/Site 4**							
2				**User Selected Options**								
3				From File	WorkSheet.wst							
4				Full Precision	OFF							
5	Test for Suspected Outliers with Dixon test				1							
6	Test for Suspected Outliers with Rosner test				5							
7												
8												
9	**Dixon's Outlier Test for carbazole**											
10												
11	Number of data = 8											
12	10% critical value: 0.479											
13	5% critical value: 0.554											
14	1% critical value: 0.683											
15												
16	**1. Data Value 120000 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.996											
19												
20	For 10% significance level, 120000 is an outlier.											
21	For 5% significance level, 120000 is an outlier.											
22	For 1% significance level, 120000 is an outlier.											
23												
24	**2. Data Value 90 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.071											
27												
28	For 10% significance level, 90 is not an outlier.											
29	For 5% significance level, 90 is not an outlier.											
30	For 1% significance level, 90 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - SS Fenced Area YP/S4**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9	**Dixon's Outlier Test for Benzo(a)anthracene**											
10												
11	Number of data = 6											
12	10% critical value: 0.482											
13	5% critical value: 0.56											
14	1% critical value: 0.698											
15												
16	**1. Data Value 180000 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.993											
19												
20	For 10% significance level, 180000 is an outlier.											
21	For 5% significance level, 180000 is an outlier.											
22	For 1% significance level, 180000 is an outlier.											
23												
24	**2. Data Value 92 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.000											
27												
28	For 10% significance level, 92 is not an outlier.											
29	For 5% significance level, 92 is not an outlier.											
30	For 1% significance level, 92 is not an outlier.											
31												
32												
33	**Dixon's Outlier Test for Benzo(a)pyrene**											
34												
35	Number of data = 6											
36	10% critical value: 0.482											
37	5% critical value: 0.56											
38	1% critical value: 0.698											
39												
40	**1. Data Value 130000 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.992											
43												
44	For 10% significance level, 130000 is an outlier.											
45	For 5% significance level, 130000 is an outlier.											
46	For 1% significance level, 130000 is an outlier.											
47												
48	**2. Data Value 79 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.000											
51												
52	For 10% significance level, 79 is not an outlier.											
53	For 5% significance level, 79 is not an outlier.											
54	For 1% significance level, 79 is not an outlier.											
55												
56												
57	**Dixon's Outlier Test for Benzo(b)fluoranthene**											
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	Number of data = 6											
60	10% critical value: 0.482											
61	5% critical value: 0.56											
62	1% critical value: 0.698											
63												
64	**1. Data Value 200000 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.992											
67												
68	For 10% significance level, 200000 is an outlier.											
69	For 5% significance level, 200000 is an outlier.											
70	For 1% significance level, 200000 is an outlier.											
71												
72	**2. Data Value 160 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.000											
75												
76	For 10% significance level, 160 is not an outlier.											
77	For 5% significance level, 160 is not an outlier.											
78	For 1% significance level, 160 is not an outlier.											
79												
80												
81	**Dixon's Outlier Test for Benzo(k)fluoranthene**											
82												
83	Number of data = 6											
84	10% critical value: 0.482											
85	5% critical value: 0.56											
86	1% critical value: 0.698											
87												
88	**1. Data Value 81000 is a Potential Outlier (Upper Tail)?**											
89												
90	Test Statistic: 0.993											
91												
92	For 10% significance level, 81000 is an outlier.											
93	For 5% significance level, 81000 is an outlier.											
94	For 1% significance level, 81000 is an outlier.											
95												
96	**2. Data Value 58 is a Potential Outlier (Lower Tail)?**											
97												
98	Test Statistic: 0.000											
99												
100	For 10% significance level, 58 is not an outlier.											
101	For 5% significance level, 58 is not an outlier.											
102	For 1% significance level, 58 is not an outlier.											
103												
104												
105	**Dixon's Outlier Test for Carbazole**											
106												
107	Number of data = 5											
108	10% critical value: 0.557											
109	5% critical value: 0.642											
110	1% critical value: 0.78											
111												
112	**1. Data Value 120000 is a Potential Outlier (Upper Tail)?**											
113												
114	Test Statistic: 0.997											
115												
116	For 10% significance level, 120000 is an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
117	For 5% significance level, 120000 is an outlier.											
118	For 1% significance level, 120000 is an outlier.											
119												
120	**2. Data Value 90 is a Potential Outlier (Lower Tail)?**											
121												
122	Test Statistic: 0.000											
123												
124	For 10% significance level, 90 is not an outlier.											
125	For 5% significance level, 90 is not an outlier.											
126	For 1% significance level, 90 is not an outlier.											
127												
128												
129	**Dixon's Outlier Test for Chrysene**											
130												
131	Number of data = 6											
132	10% critical value: 0.482											
133	5% critical value: 0.56											
134	1% critical value: 0.698											
135												
136	**1. Data Value 210000 is a Potential Outlier (Upper Tail)?**											
137												
138	Test Statistic: 0.994											
139												
140	For 10% significance level, 210000 is an outlier.											
141	For 5% significance level, 210000 is an outlier.											
142	For 1% significance level, 210000 is an outlier.											
143												
144	**2. Data Value 120 is a Potential Outlier (Lower Tail)?**											
145												
146	Test Statistic: 0.000											
147												
148	For 10% significance level, 120 is not an outlier.											
149	For 5% significance level, 120 is not an outlier.											
150	For 1% significance level, 120 is not an outlier.											
151												
152												
153	**Dixon's Outlier Test for Dibenz(a,h)anthracene**											
154												
155	Number of data = 6											
156	10% critical value: 0.482											
157	5% critical value: 0.56											
158	1% critical value: 0.698											
159												
160	**1. Data Value 22000 is a Potential Outlier (Upper Tail)?**											
161												
162	Test Statistic: 0.986											
163												
164	For 10% significance level, 22000 is an outlier.											
165	For 5% significance level, 22000 is an outlier.											
166	For 1% significance level, 22000 is an outlier.											
167												
168	**2. Data Value 17 is a Potential Outlier (Lower Tail)?**											
169												
170	Test Statistic: 0.000											
171												
172	For 10% significance level, 17 is not an outlier.											
173	For 5% significance level, 17 is not an outlier.											
174	For 1% significance level, 17 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
175												
176												
177	**Dixon's Outlier Test for Dibenzofuran**											
178												
179	Number of data = 5											
180	10% critical value: 0.557											
181	5% critical value: 0.642											
182	1% critical value: 0.78											
183												
184	**1. Data Value 19000 is a Potential Outlier (Upper Tail)?**											
185												
186	Test Statistic: 0.987											
187												
188	For 10% significance level, 19000 is an outlier.											
189	For 5% significance level, 19000 is an outlier.											
190	For 1% significance level, 19000 is an outlier.											
191												
192	**2. Data Value 130 is a Potential Outlier (Lower Tail)?**											
193												
194	Test Statistic: 0.011											
195												
196	For 10% significance level, 130 is not an outlier.											
197	For 5% significance level, 130 is not an outlier.											
198	For 1% significance level, 130 is not an outlier.											
199												
200												
201	**Dixon's Outlier Test for Fluoranthene**											
202												
203	Number of data = 6											
204	10% critical value: 0.482											
205	5% critical value: 0.56											
206	1% critical value: 0.698											
207												
208	**1. Data Value 500000 is a Potential Outlier (Upper Tail)?**											
209												
210	Test Statistic: 0.993											
211												
212	For 10% significance level, 500000 is an outlier.											
213	For 5% significance level, 500000 is an outlier.											
214	For 1% significance level, 500000 is an outlier.											
215												
216	**2. Data Value 75 is a Potential Outlier (Lower Tail)?**											
217												
218	Test Statistic: 0.000											
219												
220	For 10% significance level, 75 is not an outlier.											
221	For 5% significance level, 75 is not an outlier.											
222	For 1% significance level, 75 is not an outlier.											
223												
224												
225	**Dixon's Outlier Test for Indeno(1,2,3-cd)pyrene**											
226												
227	Number of data = 6											
228	10% critical value: 0.482											
229	5% critical value: 0.56											
230	1% critical value: 0.698											
231												
232	**1. Data Value 69000 is a Potential Outlier (Upper Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
233												
234	Test Statistic: 0.987											
235												
236	For 10% significance level, 69000 is an outlier.											
237	For 5% significance level, 69000 is an outlier.											
238	For 1% significance level, 69000 is an outlier.											
239												
240	**2. Data Value 42 is a Potential Outlier (Lower Tail)?**											
241												
242	Test Statistic: 0.001											
243												
244	For 10% significance level, 42 is not an outlier.											
245	For 5% significance level, 42 is not an outlier.											
246	For 1% significance level, 42 is not an outlier.											
247												
248												
249	**Dixon's Outlier Test for Naphthalene**											
250												
251	Number of data = 6											
252	10% critical value: 0.482											
253	5% critical value: 0.56											
254	1% critical value: 0.698											
255												
256	**1. Data Value 26000 is a Potential Outlier (Upper Tail)?**											
257												
258	Test Statistic: 0.988											
259												
260	For 10% significance level, 26000 is an outlier.											
261	For 5% significance level, 26000 is an outlier.											
262	For 1% significance level, 26000 is an outlier.											
263												
264	**2. Data Value 6.6 is a Potential Outlier (Lower Tail)?**											
265												
266	Test Statistic: 0.000											
267												
268	For 10% significance level, 6.6 is not an outlier.											
269	For 5% significance level, 6.6 is not an outlier.											
270	For 1% significance level, 6.6 is not an outlier.											
271												
272												
273	**Dixon's Outlier Test for Pyrene**											
274												
275	Number of data = 6											
276	10% critical value: 0.482											
277	5% critical value: 0.56											
278	1% critical value: 0.698											
279												
280	**1. Data Value 390000 is a Potential Outlier (Upper Tail)?**											
281												
282	Test Statistic: 0.993											
283												
284	For 10% significance level, 390000 is an outlier.											
285	For 5% significance level, 390000 is an outlier.											
286	For 1% significance level, 390000 is an outlier.											
287												
288	**2. Data Value 79 is a Potential Outlier (Lower Tail)?**											
289												
290	Test Statistic: 0.000											

	A	B	C	D	E	F	G	H	I	J	K	L
291												
292	For 10% significance level, 79 is not an outlier.											
293	For 5% significance level, 79 is not an outlier.											
294	For 1% significance level, 79 is not an outlier.											
295												
296												
297	**Dixon's Outlier Test for Dieldrin**											
298												
299	Number of data = 5											
300	10% critical value: 0.557											
301	5% critical value: 0.642											
302	1% critical value: 0.78											
303												
304	**1. Data Value 650 is a Potential Outlier (Upper Tail)?**											
305												
306	Test Statistic: 0.985											
307												
308	For 10% significance level, 650 is an outlier.											
309	For 5% significance level, 650 is an outlier.											
310	For 1% significance level, 650 is an outlier.											
311												
312	**2. Data Value 3.2 is a Potential Outlier (Lower Tail)?**											
313												
314	Test Statistic: 0.000											
315												
316	For 10% significance level, 3.2 is not an outlier.											
317	For 5% significance level, 3.2 is not an outlier.											
318	For 1% significance level, 3.2 is not an outlier.											
319												
320												
321	**Dixon's Outlier Test for gamma-BHC (Lindane)**											
322												
323	Number of data = 5											
324	10% critical value: 0.557											
325	5% critical value: 0.642											
326	1% critical value: 0.78											
327												
328	**1. Data Value 860 is a Potential Outlier (Upper Tail)?**											
329												
330	Test Statistic: 0.987											
331												
332	For 10% significance level, 860 is an outlier.											
333	For 5% significance level, 860 is an outlier.											
334	For 1% significance level, 860 is an outlier.											
335												
336	**2. Data Value 1.7 is a Potential Outlier (Lower Tail)?**											
337												
338	Test Statistic: 0.004											
339												
340	For 10% significance level, 1.7 is not an outlier.											
341	For 5% significance level, 1.7 is not an outlier.											
342	For 1% significance level, 1.7 is not an outlier.											
343												
344												
345	**Dixon's Outlier Test for Aluminum**											
346												
347	Number of data = 6											
348	10% critical value: 0.482											

	A	B	C	D	E	F	G	H	I	J	K	L
349	5% critical value: 0.56											
350	1% critical value: 0.698											
351												
352	**1. Data Value 12600 is a Potential Outlier (Upper Tail)?**											
353												
354	Test Statistic: 0.220											
355												
356	For 10% significance level, 12600 is not an outlier.											
357	For 5% significance level, 12600 is not an outlier.											
358	For 1% significance level, 12600 is not an outlier.											
359												
360	**2. Data Value 5330 is a Potential Outlier (Lower Tail)?**											
361												
362	Test Statistic: 0.377											
363												
364	For 10% significance level, 5330 is not an outlier.											
365	For 5% significance level, 5330 is not an outlier.											
366	For 1% significance level, 5330 is not an outlier.											
367												
368												
369	**Dixon's Outlier Test for Arsenic**											
370												
371	Number of data = 6											
372	10% critical value: 0.482											
373	5% critical value: 0.56											
374	1% critical value: 0.698											
375												
376	**1. Data Value 7.3 is a Potential Outlier (Upper Tail)?**											
377												
378	Test Statistic: 0.573											
379												
380	For 10% significance level, 7.3 is an outlier.											
381	For 5% significance level, 7.3 is an outlier.											
382	For 1% significance level, 7.3 is not an outlier.											
383												
384	**2. Data Value 2.8 is a Potential Outlier (Lower Tail)?**											
385												
386	Test Statistic: 0.200											
387												
388	For 10% significance level, 2.8 is not an outlier.											
389	For 5% significance level, 2.8 is not an outlier.											
390	For 1% significance level, 2.8 is not an outlier.											
391												
392												
393	**No Outlier Test for Chromium (hexavalent)**											
394												
395	**Dixon's Outlier Test for Chromium**											
396												
397	Number of data = 6											
398	10% critical value: 0.482											
399	5% critical value: 0.56											
400	1% critical value: 0.698											
401												
402	**1. Data Value 24.9 is a Potential Outlier (Upper Tail)?**											
403												
404	Test Statistic: 0.150											
405												
406	For 10% significance level, 24.9 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
407	For 5% significance level, 24.9 is not an outlier.											
408	For 1% significance level, 24.9 is not an outlier.											
409												
410	**2. Data Value 10.9 is a Potential Outlier (Lower Tail)?**											
411												
412	Test Statistic: 0.343											
413												
414	For 10% significance level, 10.9 is not an outlier.											
415	For 5% significance level, 10.9 is not an outlier.											
416	For 1% significance level, 10.9 is not an outlier.											
417												
418												
419	**Dixon's Outlier Test for Cobalt**											
420												
421	Number of data = 6											
422	10% critical value: 0.482											
423	5% critical value: 0.56											
424	1% critical value: 0.698											
425												
426	**1. Data Value 4.9 is a Potential Outlier (Upper Tail)?**											
427												
428	Test Statistic: 0.147											
429												
430	For 10% significance level, 4.9 is not an outlier.											
431	For 5% significance level, 4.9 is not an outlier.											
432	For 1% significance level, 4.9 is not an outlier.											
433												
434	**2. Data Value 1.5 is a Potential Outlier (Lower Tail)?**											
435												
436	Test Statistic: 0.388											
437												
438	For 10% significance level, 1.5 is not an outlier.											
439	For 5% significance level, 1.5 is not an outlier.											
440	For 1% significance level, 1.5 is not an outlier.											
441												
442												
443	**Dixon's Outlier Test for Iron**											
444												
445	Number of data = 6											
446	10% critical value: 0.482											
447	5% critical value: 0.56											
448	1% critical value: 0.698											
449												
450	**1. Data Value 19400 is a Potential Outlier (Upper Tail)?**											
451												
452	Test Statistic: 0.073											
453												
454	For 10% significance level, 19400 is not an outlier.											
455	For 5% significance level, 19400 is not an outlier.											
456	For 1% significance level, 19400 is not an outlier.											
457												
458	**2. Data Value 11200 is a Potential Outlier (Lower Tail)?**											
459												
460	Test Statistic: 0.061											
461												
462	For 10% significance level, 11200 is not an outlier.											
463	For 5% significance level, 11200 is not an outlier.											
464	For 1% significance level, 11200 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
465												
466												
467				**Dixon's Outlier Test for Lead**								
468												
469	Number of data = 6											
470	10% critical value: 0.482											
471	5% critical value: 0.56											
472	1% critical value: 0.698											
473												
474	**1. Data Value 793 is a Potential Outlier (Upper Tail)?**											
475												
476	Test Statistic: 0.961											
477												
478	For 10% significance level, 793 is an outlier.											
479	For 5% significance level, 793 is an outlier.											
480	For 1% significance level, 793 is an outlier.											
481												
482	**2. Data Value 9.4 is a Potential Outlier (Lower Tail)?**											
483												
484	Test Statistic: 0.005											
485												
486	For 10% significance level, 9.4 is not an outlier.											
487	For 5% significance level, 9.4 is not an outlier.											
488	For 1% significance level, 9.4 is not an outlier.											
489												
490												
491				**Dixon's Outlier Test for Manganese**								
492												
493	Number of data = 6											
494	10% critical value: 0.482											
495	5% critical value: 0.56											
496	1% critical value: 0.698											
497												
498	**1. Data Value 315 is a Potential Outlier (Upper Tail)?**											
499												
500	Test Statistic: 0.236											
501												
502	For 10% significance level, 315 is not an outlier.											
503	For 5% significance level, 315 is not an outlier.											
504	For 1% significance level, 315 is not an outlier.											
505												
506	**2. Data Value 52.8 is a Potential Outlier (Lower Tail)?**											
507												
508	Test Statistic: 0.123											
509												
510	For 10% significance level, 52.8 is not an outlier.											
511	For 5% significance level, 52.8 is not an outlier.											
512	For 1% significance level, 52.8 is not an outlier.											
513												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Soil in and out fenced area**							
2			**User Selected Options**									
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9			**Rosner's Outlier Test for Acenaphthylene**									
10												
11												
12			**Mean**	**1113**								
13			**Standard Deviation**	**3013**								
14			**Number of data**	**51**								
15			**Number of suspected outliers**	**5**								
16												
17				Potential	Obs.	Test	Critical	Critical				
18	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
19	1	1113	2983	17000	27	5.326	3.137	3.488				
20	2	795.1	2002	11000	25	5.097	3.127	3.478				
21	3	586.8	1370	5500	28	3.586	3.118	3.469				
22	4	484.4	1180	4300	29	3.233	3.108	3.468				
23	5	403.3	1049	4100	16	3.524	3.098	3.458				
24												
25	For 5% significance level, there are 5 Potential Outliers											
26	Therefore, Potential Statistical Outliers are											
27	17000, 11000, 5500, 4300, 4100											
28												
29	For 1% Significance Level, there are 5 Potential Outliers											
30	Therefore, Potential Statistical Outliers are											
31	17000, 11000, 5500, 4300, 4100											
32												
33												
34			**Rosner's Outlier Test for Benzo(a)anthracene**									
35												
36												
37			**Mean**	**4697**								
38			**Standard Deviation**	**25221**								
39			**Number of data**	**51**								
40			**Number of suspected outliers**	**5**								
41												
42				Potential	Obs.	Test	Critical	Critical				
43	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
44	1	4697	24973	180000	51	7.02	3.137	3.488				
45	2	1191	3062	17000	50	5.164	3.127	3.478				
46	3	868.6	2063	11000	49	4.911	3.118	3.469				
47	4	657.5	1455	8800	48	5.596	3.108	3.468				
48	5	484.3	831.3	4300	47	4.59	3.098	3.458				
49												
50	For 5% significance level, there are 5 Potential Outliers											
51	Therefore, Potential Statistical Outliers are											
52	180000, 17000, 11000, 8800, 4300											
53												
54	For 1% Significance Level, there are 5 Potential Outliers											
55	Therefore, Potential Statistical Outliers are											
56	180000, 17000, 11000, 8800, 4300											
57												
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	**Rosner's Outlier Test for Benzo(a)pyrene**											
60												
61												
62			**Mean**	**3576**								
63		**Standard Deviation**		**18291**								
64		**Number of data**		**51**								
65	**Number of suspected outliers**			**5**								
66												
67				Potential	Obs.	Test	Critical	Critical				
68	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
69	1	3576	18111	130000	51	6.98	3.137	3.488				
70	2	1047	2949	17000	50	5.409	3.127	3.478				
71	3	721.7	1862	11000	49	5.519	3.118	3.469				
72	4	507.6	1117	7000	48	5.814	3.108	3.468				
73	5	369.4	581.8	2600	47	3.834	3.098	3.458				
74												
75	For 5% significance level, there are 5 Potential Outliers											
76	Therefore, Potential Statistical Outliers are											
77	130000, 17000, 11000, 7000, 2600											
78												
79	For 1% Significance Level, there are 5 Potential Outliers											
80	Therefore, Potential Statistical Outliers are											
81	130000, 17000, 11000, 7000, 2600											
82												
83												
84	**Rosner's Outlier Test for Benzo(b)fluoranthene**											
85												
86												
87			**Mean**	**4991**								
88		**Standard Deviation**		**28004**								
89		**Number of data**		**51**								
90	**Number of suspected outliers**			**5**								
91												
92				Potential	Obs.	Test	Critical	Critical				
93	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
94	1	4991	27728	200000	51	7.033	3.137	3.488				
95	2	1091	2937	17000	50	5.418	3.127	3.478				
96	3	766.2	1850	11000	49	5.532	3.118	3.469				
97	4	553	1105	6800	48	5.655	3.108	3.468				
98	5	420	616.8	2300	47	3.048	3.098	3.458				
99												
100	For 5% significance level, there are 4 Potential Outliers											
101	Therefore, Potential Statistical Outliers are											
102	200000, 17000, 11000, 6800											
103												
104	For 1% Significance Level, there are 4 Potential Outliers											
105	Therefore, Potential Statistical Outliers are											
106	200000, 17000, 11000, 6800											
107												
108												
109	**Rosner's Outlier Test for Benzo(k)fluoranthene**											
110												
111												
112			**Mean**	**2460**								
113		**Standard Deviation**		**11589**								
114		**Number of data**		**51**								
115	**Number of suspected outliers**			**5**								
116												

	A	B	C	D	E	F	G	H	I	J	K	L
117				Potential	Obs.	Test	Critical	Critical				
118	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
119	1	2460	11475	81000	51	6.844	3.137	3.488				
120	2	888.9	2940	17000	50	5.48	3.127	3.478				
121	3	560.1	1818	11000	49	5.742	3.118	3.469				
122	4	342.6	1005	6800	48	6.427	3.108	3.468				
123	5	205.2	324.8	1700	47	4.602	3.098	3.458				
124												
125	For 5% significance level, there are 5 Potential Outliers											
126	Therefore, Potential Statistical Outliers are											
127	81000, 17000, 11000, 6800, 1700											
128												
129	For 1% Significance Level, there are 5 Potential Outliers											
130	Therefore, Potential Statistical Outliers are											
131	81000, 17000, 11000, 6800, 1700											
132												
133												
134	**Rosner's Outlier Test for bis(2-Ethylhexyl)phthalate**											
135												
136												
137			**Mean**	**8653**								
138			**Standard Deviation**	**38394**								
139			**Number of data**	**41**								
140			**Number of suspected outliers**	**5**								
141												
142				Potential	Obs.	Test	Critical	Critical				
143	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
144	1	8653	37923	240000	41	6.101	3.05	3.39				
145	2	2869	10257	63000	40	5.862	3.04	3.38				
146	3	1327	3224	16000	39	4.552	3.03	3.37				
147	4	940.9	2168	11000	38	4.64	3.01	3.36				
148	5	669.1	1394	5500	37	3.464	3	3.34				
149												
150	For 5% significance level, there are 5 Potential Outliers											
151	Therefore, Potential Statistical Outliers are											
152	240000, 63000, 16000, 11000, 5500											
153												
154	For 1% Significance Level, there are 5 Potential Outliers											
155	Therefore, Potential Statistical Outliers are											
156	240000, 63000, 16000, 11000, 5500											
157												
158												
159	**Rosner's Outlier Test for Chrysene**											
160												
161												
162			**Mean**	**5264**								
163			**Standard Deviation**	**29398**								
164			**Number of data**	**51**								
165			**Number of suspected outliers**	**5**								
166												
167				Potential	Obs.	Test	Critical	Critical				
168	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
169	1	5264	29108	210000	51	7.034	3.137	3.488				
170	2	1170	3051	17000	50	5.189	3.127	3.478				
171	3	846.5	2043	11000	49	4.969	3.118	3.469				
172	4	634.9	1423	8600	48	5.598	3.108	3.468				
173	5	465.5	812.3	4300	47	4.721	3.098	3.458				
174												

For 5% significance level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

210000, 17000, 11000, 8600, 4300

For 1% Significance Level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

210000, 17000, 11000, 8600, 4300

Rosner's Outlier Test for Dibenz(a,h)anthracene

Mean	**1433**
Standard Deviation	**4163**
Number of data	**51**
Number of suspected outliers	**5**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1433	4122	22000	51	4.99	3.137	3.488
2	1022	2979	17000	50	5.363	3.127	3.478
3	695.7	1906	11000	49	5.406	3.118	3.469
4	481	1185	5500	48	4.235	3.108	3.468
5	374.3	935.9	4300	47	4.195	3.098	3.458

For 5% significance level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

22000, 17000, 11000, 5500, 4300

For 1% Significance Level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

22000, 17000, 11000, 5500, 4300

Rosner's Outlier Test for Dibenzofuran

Mean	**1970**
Standard Deviation	**4200**
Number of data	**41**
Number of suspected outliers	**5**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	1970	4149	19000	41	4.105	3.05	3.39
2	1545	3236	17000	40	4.776	3.04	3.38
3	1148	2074	11000	39	4.751	3.03	3.37
4	889.2	1313	5500	38	3.511	3.01	3.36
5	764.6	1080	4300	37	3.274	3	3.34

For 5% significance level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

19000, 17000, 11000, 5500, 4300

For 1% Significance Level, there are 4 Potential Outliers

Therefore, Potential Statistical Outliers are

19000, 17000, 11000, 5500

	A	B	C	D	E	F	G	H	I	J	K	L
233												
234				**Rosner's Outlier Test for Fluoranthene**								
235												
236												
237				**Mean**	**11319**							
238				**Standard Deviation**	**69881**							
239				**Number of data**	**51**							
240				**Number of suspected outliers**	**5**							
241												
242				Potential	Obs.	Test	Critical	Critical				
243	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
244	1	11319	69193	500000	51	7.063	3.137	3.488				
245	2	1545	3449	17000	50	4.481	3.127	3.478				
246	3	1230	2658	14000	49	4.804	3.118	3.469				
247	4	964.1	1917	11000	48	5.235	3.108	3.468				
248	5	750.5	1232	5400	47	3.773	3.098	3.458				
249												
250	For 5% significance level, there are 5 Potential Outliers											
251	Therefore, Potential Statistical Outliers are											
252	500000, 17000, 14000, 11000, 5400											
253												
254	For 1% Significance Level, there are 5 Potential Outliers											
255	Therefore, Potential Statistical Outliers are											
256	500000, 17000, 14000, 11000, 5400											
257												
258												
259				**Rosner's Outlier Test for Indeno(1,2,3-cd)pyrene**								
260												
261												
262				**Mean**	**2391**							
263				**Standard Deviation**	**9939**							
264				**Number of data**	**51**							
265				**Number of suspected outliers**	**5**							
266												
267				Potential	Obs.	Test	Critical	Critical				
268	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
269	1	2391	9841	69000	51	6.768	3.137	3.488				
270	2	1059	2907	17000	50	5.483	3.127	3.478				
271	3	733.8	1796	11000	49	5.716	3.118	3.469				
272	4	519.9	1003	4300	48	3.77	3.108	3.468				
273	5	439.4	842.6	3800	47	3.988	3.098	3.458				
274												
275	For 5% significance level, there are 5 Potential Outliers											
276	Therefore, Potential Statistical Outliers are											
277	69000, 17000, 11000, 4300, 3800											
278												
279	For 1% Significance Level, there are 5 Potential Outliers											
280	Therefore, Potential Statistical Outliers are											
281	69000, 17000, 11000, 4300, 3800											
282												
283												
284				**Rosner's Outlier Test for Naphthalene**								
285												
286												
287				**Mean**	**1541**							
288				**Standard Deviation**	**4594**							
289				**Number of data**	**51**							
290				**Number of suspected outliers**	**5**							

	A	B	C	D	E	F	G	H	I	J	K	L
291												
292				Potential	Obs.	Test	Critical	Critical				
293	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
294	1	1541	4548	26000	51	5.377	3.137	3.488				
295	2	1052	3013	17000	50	5.293	3.127	3.478				
296	3	726.1	1965	11000	49	5.228	3.118	3.469				
297	4	512	1285	5500	48	3.882	3.108	3.468				
298	5	405.9	1065	4300	47	3.656	3.098	3.458				
299												
300	For 5% significance level, there are 5 Potential Outliers											
301	Therefore, Potential Statistical Outliers are											
302	26000, 17000, 11000, 5500, 4300											
303												
304	For 1% Significance Level, there are 5 Potential Outliers											
305	Therefore, Potential Statistical Outliers are											
306	26000, 17000, 11000, 5500, 4300											
307												
308												
309	**Rosner's Outlier Test for Pyrene**											
310												
311												
312			**Mean**	**9022**								
313			**Standard Deviation**	**54508**								
314			**Number of data**	**51**								
315			**Number of suspected outliers**	**5**								
316												
317				Potential	Obs.	Test	Critical	Critical				
318	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
319	1	9022	53971	390000	51	7.059	3.137	3.488				
320	2	1402	3214	17000	50	4.853	3.127	3.478				
321	3	1084	2318	11000	48	4.279	3.118	3.469				
322	4	877	1830	11000	49	5.531	3.108	3.468				
323	5	661.6	1071	4000	47	3.116	3.098	3.458				
324												
325	For 5% significance level, there are 5 Potential Outliers											
326	Therefore, Potential Statistical Outliers are											
327	390000, 17000, 11000, 11000, 4000											
328												
329	For 1% Significance Level, there are 4 Potential Outliers											
330	Therefore, Potential Statistical Outliers are											
331	390000, 17000, 11000, 11000											
332												
333												
334	**Rosner's Outlier Test for Aldrin**											
335												
336												
337			**Mean**	**4.251**								
338			**Standard Deviation**	**8.407**								
339			**Number of data**	**41**								
340			**Number of suspected outliers**	**5**								
341												
342				Potential	Obs.	Test	Critical	Critical				
343	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
344	1	4.251	8.304	40	41	4.305	3.05	3.39				
345	2	3.358	6.237	33	40	4.753	3.04	3.38				
346	3	2.597	4.025	27	39	6.062	3.03	3.37				
347	4	1.955	0.352	3.4	38	4.1	3.01	3.36				
348	5	1.916	0.261	1.1	1	3.129	3	3.34				

For 5% significance level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

40, 33, 27, 3.4, 1.1

For 1% Significance Level, there are 4 Potential Outliers

Therefore, Potential Statistical Outliers are

40, 33, 27, 3.4

Rosner's Outlier Test for Aroclor-1242

Mean	**86.47**
Standard Deviation	**344.7**
Number of data	**51**
Number of suspected outliers	**5**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	86.47	341.3	2300	51	6.485	3.137	3.488
2	42.2	138.8	1000	50	6.903	3.127	3.478
3	22.65	12.29	67	49	3.61	3.118	3.469
4	21.73	10.56	52	48	2.868	3.108	3.468
5	21.08	9.669	48	47	2.784	3.098	3.458

For 5% significance level, there are 3 Potential Outliers

Therefore, Potential Statistical Outliers are

2300, 1000, 67

For 1% Significance Level, there are 3 Potential Outliers

Therefore, Potential Statistical Outliers are

2300, 1000, 67

Rosner's Outlier Test for Aroclor-1260

Mean	**125.6**
Standard Deviation	**437.2**
Number of data	**51**
Number of suspected outliers	**5**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	125.6	432.9	2700	51	5.947	3.137	3.488
2	74.16	238.9	1600	50	6.386	3.127	3.478
3	43.02	93.7	600	49	5.944	3.118	3.469
4	31.41	47.2	330	48	6.326	3.108	3.468
5	25.06	17.23	91	47	3.826	3.098	3.458

For 5% significance level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

2700, 1600, 600, 330, 91

For 1% Significance Level, there are 5 Potential Outliers

Therefore, Potential Statistical Outliers are

2700, 1600, 600, 330, 91

	A	B	C	D	E	F	G	H	I	J	K	L
407												
408												
409				**Rosner's Outlier Test for Dieldrin**								
410												
411												
412			**Mean**	**19.84**								
413			**Standard Deviation**	**100.9**								
414			**Number of data**	**41**								
415		**Number of suspected outliers**		**5**								
416												
417				Potential	Obs.	Test	Critical	Critical				
418	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
419	1	19.84	99.71	650	41	6.32	3.05	3.39				
420	2	4.081	3.879	27	40	5.909	3.04	3.38				
421	3	3.494	1.124	6.7	39	2.853	3.03	3.37				
422	4	3.409	1.006	0.65	1	2.743	3.01	3.36				
423	5	3.484	0.907	1	2	2.739	3	3.34				
424												
425	For 5% significance level, there are 2 Potential Outliers											
426	Therefore, Potential Statistical Outliers are											
427	650, 27											
428												
429	For 1% Significance Level, there are 2 Potential Outliers											
430	Therefore, Potential Statistical Outliers are											
431	650, 27											
432												
433												
434				**Rosner's Outlier Test for gamma-BHC (Lindane)**								
435												
436												
437			**Mean**	**23.58**								
438			**Standard Deviation**	**133.9**								
439			**Number of data**	**41**								
440		**Number of suspected outliers**		**5**								
441												
442				Potential	Obs.	Test	Critical	Critical				
443	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
444	1	23.58	132.3	860	41	6.324	3.05	3.39				
445	2	2.67	2.403	14	40	4.716	3.04	3.38				
446	3	2.379	1.568	9.6	39	4.605	3.03	3.37				
447	4	2.189	1.039	6.4	38	4.053	3.01	3.36				
448	5	2.075	0.777	5.2	37	4.022	3	3.34				
449												
450	For 5% significance level, there are 5 Potential Outliers											
451	Therefore, Potential Statistical Outliers are											
452	860, 14, 9.6, 6.4, 5.2											
453												
454	For 1% Significance Level, there are 5 Potential Outliers											
455	Therefore, Potential Statistical Outliers are											
456	860, 14, 9.6, 6.4, 5.2											
457												
458												
459				**Rosner's Outlier Test for Aluminum**								
460												
461												
462			**Mean**	**11505**								
463			**Standard Deviation**	**7300**								
464			**Number of data**	**51**								

	A	B	C	D	E	F	G	H	I	J	K	L
465	**Number of suspected outliers**			**5**								
466												
467				Potential	Obs.	Test	Critical	Critical				
468	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
469	1	11505	7228	31900	51	2.822	3.137	3.488				
470	2	11097	6761	29400	49	2.707	3.127	3.478				
471	3	10724	6289	29400	50	2.97	3.118	3.469				
472	4	10335	5728	25800	48	2.7	3.108	3.468				
473	5	10006	5312	24500	47	2.729	3.098	3.458				
474												
475	For 5% Significance Level, there is no Potential Outlier											
476												
477	For 1% Significance Level, there is no Potential Outlier											
478												
479												
480	**Rosner's Outlier Test for Arsenic**											
481												
482												
483			**Mean**	**10.48**								
484			**Standard Deviation**	**47.98**								
485			**Number of data**	**51**								
486	**Number of suspected outliers**			**5**								
487												
488				Potential	Obs.	Test	Critical	Critical				
489	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
490	1	10.48	47.51	346	51	7.062	3.137	3.488				
491	2	3.766	2.429	12.7	50	3.678	3.127	3.478				
492	3	3.584	2.08	8.9	49	2.556	3.118	3.469				
493	4	3.473	1.95	8.5	48	2.577	3.108	3.468				
494	5	3.366	1.824	8.4	47	2.76	3.098	3.458				
495												
496	For 5% significance level, there are 2 Potential Outliers											
497	Therefore, Potential Statistical Outliers are											
498	346, 12.7											
499												
500	For 1% Significance Level, there are 2 Potential Outliers											
501	Therefore, Potential Statistical Outliers are											
502	346, 12.7											
503												
504												
505	**Dixon's Outlier Test for Chromium (hexavalent)**											
506												
507	Number of data = 4											
508	10% critical value: 0.679											
509	5% critical value: 0.765											
510	1% critical value: 0.889											
511												
512	**1. Data Value 0.43 is a Potential Outlier (Upper Tail)?**											
513												
514	Test Statistic: 0.864											
515												
516	For 10% significance level, 0.43 is an outlier.											
517	For 5% significance level, 0.43 is an outlier.											
518	For 1% significance level, 0.43 is not an outlier.											
519												
520	**2. Data Value 0.21 is a Potential Outlier (Lower Tail)?**											
521												
522	Test Statistic: 0.045											

	A	B	C	D	E	F	G	H	I	J	K	L
523												
524	For 10% significance level, 0.21 is not an outlier.											
525	For 5% significance level, 0.21 is not an outlier.											
526	For 1% significance level, 0.21 is not an outlier.											
527												
528												
529	**Rosner's Outlier Test for Cobalt**											
530												
531												
532			**Mean**	**3.111**								
533			**Standard Deviation**	**1.776**								
534			**Number of data**	**51**								
535			**Number of suspected outliers**	**5**								
536												
537				Potential	Obs.	Test	Critical	Critical				
538	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
539	1	3.111	1.758	11.5	51	4.771	3.137	3.488				
540	2	2.943	1.324	8.8	50	4.423	3.127	3.478				
541	3	2.824	1.03	0.72	1	2.043	3.118	3.469				
542	4	2.868	0.993	4.9	49	2.046	3.108	3.468				
543	5	2.824	0.957	0.84	2	2.073	3.098	3.458				
544												
545	For 5% significance level, there are 2 Potential Outliers											
546	Therefore, Potential Statistical Outliers are											
547	11.5, 8.8											
548												
549	For 1% Significance Level, there are 2 Potential Outliers											
550	Therefore, Potential Statistical Outliers are											
551	11.5, 8.8											
552												
553												
554	**Rosner's Outlier Test for Iron**											
555												
556												
557			**Mean**	**17312**								
558			**Standard Deviation**	**18199**								
559			**Number of data**	**51**								
560			**Number of suspected outliers**	**5**								
561												
562				Potential	Obs.	Test	Critical	Critical				
563	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
564	1	17312	18020	116000	51	5.477	3.137	3.488				
565	2	15338	11629	61700	50	3.987	3.127	3.478				
566	3	14392	9611	53200	49	4.038	3.118	3.469				
567	4	13583	7850	31800	48	2.321	3.108	3.468				
568	5	13196	7456	31600	47	2.468	3.098	3.458				
569												
570	For 5% significance level, there are 3 Potential Outliers											
571	Therefore, Potential Statistical Outliers are											
572	116000, 61700, 53200											
573												
574	For 1% Significance Level, there are 3 Potential Outliers											
575	Therefore, Potential Statistical Outliers are											
576	116000, 61700, 53200											
577												
578												
579	**Rosner's Outlier Test for Lead**											
580												

	A	B	C	D	E	F	G	H	I	J	K	L
581												
582				**Mean**	**36.83**							
583				**Standard Deviation**	**110.4**							
584				**Number of data**	**51**							
585				**Number of suspected outliers**	**5**							
586												
587				Potential	Obs.	Test	Critical	Critical				
588	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
589	1	36.83	109.3	793	51	6.92	3.137	3.488				
590	2	21.71	22.92	129	50	4.681	3.127	3.478				
591	3	19.52	17.08	105	49	5.006	3.118	3.469				
592	4	17.74	11.79	53.3	48	3.016	3.108	3.468				
593	5	16.98	10.68	45.3	47	2.652	3.098	3.458				
594												
595	For 5% significance level, there are 3 Potential Outliers											
596	Therefore, Potential Statistical Outliers are											
597	793, 129, 105											
598												
599	For 1% Significance Level, there are 3 Potential Outliers											
600	Therefore, Potential Statistical Outliers are											
601	793, 129, 105											
602												
603												
604				**Rosner's Outlier Test for Manganese**								
605												
606												
607				**Mean**	**101.5**							
608				**Standard Deviation**	**97.6**							
609				**Number of data**	**51**							
610				**Number of suspected outliers**	**5**							
611												
612				Potential	Obs.	Test	Critical	Critical				
613	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
614	1	101.5	96.64	511	51	4.238	3.137	3.488				
615	2	93.3	78.93	315	50	2.809	3.127	3.478				
616	3	88.77	72.9	302	49	2.925	3.118	3.469				
617	4	84.33	66.63	263	48	2.681	3.108	3.468				
618	5	80.53	61.87	259	47	2.885	3.098	3.458				
619												
620	For 5% Significance Level, there is 1 Potential Outlier											
621	Therefore, Observation 511 is a Potential Statistical Outlier											
622												
623	For 1% Significance Level, there is 1 Potential Outlier											
624	Therefore, Observation 511 is a Potential Statistical Outlier											
625												
626												
627				**Rosner's Outlier Test for Thallium**								
628												
629												
630				**Mean**	**0.356**							
631				**Standard Deviation**	**0.366**							
632				**Number of data**	**51**							
633				**Number of suspected outliers**	**5**							
634												
635				Potential	Obs.	Test	Critical	Critical				
636	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
637	1	0.356	0.362	2	51	4.537	3.137	3.488				
638	2	0.323	0.284	1.1	49	2.74	3.127	3.478				

	A	B	C	D	E	F	G	H	I	J	K	L
639	3	0.307	0.263	1.1	50	3.013	3.118	3.469				
640	4	0.291	0.239	0.94	48	2.718	3.108	3.468				
641	5	0.277	0.221	0.85	47	2.59	3.098	3.458				
642												
643	For 5% Significance Level, there is 1 Potential Outlier											
644	Therefore, Observation 2 is a Potential Statistical Outlier											
645												
646	For 1% Significance Level, there is 1 Potential Outlier											
647	Therefore, Observation 2 is a Potential Statistical Outlier											
648												
649												
650	**Rosner's Outlier Test for Vanadium**											
651												
652												
653			**Mean**	**25.5**								
654			**Standard Deviation**	**16**								
655			**Number of data**	**51**								
656			**Number of suspected outliers**	**5**								
657												
658				Potential	Obs.	Test	Critical	Critical				
659	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
660	1	25.5	15.85	64	51	2.43	3.137	3.488				
661	2	24.73	15.18	63.6	50	2.56	3.127	3.478				
662	3	23.94	14.25	58.7	49	2.439	3.118	3.469				
663	4	23.21	13.46	57.7	48	2.562	3.108	3.468				
664	5	22.48	12.6	57	47	2.739	3.098	3.458				
665												
666	For 5% Significance Level, there is no Potential Outlier											
667												
668	For 1% Significance Level, there is no Potential Outlier											
669												

	A	B	C	D	E	F	G	H	I	J
1					Outlier Tests for Selected Variables - Soil in and out Fenced Area					
2	User Selected Options									
3	From File				WorkSheet.wst					
4	Full Precision				OFF					
5	Test for Suspected Outliers with Dixon test				1					
6	Test for Suspected Outliers with Rosner test				5					
7										
8										
9	Rosner's Outlier Test for carbazole									
10										
11										
12	Mean			4185						
13	Standard Deviation			18827						
14	Number of data			41						
15	Number of suspected outliers			5						
16										
17				Potential	Obs.	Test	Critical	Critical		
18	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)		
19	1	4185	18596	120000	16	6.228	3.05	3.39		
20	2	1290	3320	17000	27	4.732	3.04	3.38		
21	3	886.7	2156	11000	25	4.69	3.03	3.37		
22	4	620.6	1392	5500	28	3.505	3.01	3.36		
23	5	488.7	1146	4300	29	3.326	3	3.34		
24										
25	For 5% significance level, there are 5 Potential Outliers									
26	Therefore, Potential Statistical Outliers are									
27	120000, 17000, 11000, 5500, 4300									
28										
29	For 1% Significance Level, there are 4 Potential Outliers									
30	Therefore, Potential Statistical Outliers are									
31	120000, 17000, 11000, 5500									

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface Soil Outside Fenced Area**							
2			**User Selected Options**									
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5		Test for Suspected Outliers with Dixon test			1							
6		Test for Suspected Outliers with Rosner test			5							
7												
8												
9			**Rosner's Outlier Test for Benzo(a)anthracene**									
10												
11												
12			**Mean**	**802.7**								
13			**Standard Deviation**	**1787**								
14			**Number of data**	**25**								
15			**Number of suspected outliers**	**5**								
16												
17				Potential	Obs.	Test	Critical	Critical				
18	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
19	1	802.7	1751	8800	25	4.568	2.82	3.14				
20	2	469.5	659.5	2600	24	3.23	2.8	3.11				
21	3	376.9	489.3	1600	23	2.5	2.78	3.09				
22	4	321.3	420	1200	22	2.092	2.76	3.06				
23	5	279.4	380.5	1100	20	2.157	2.73	3.03				
24												
25	For 5% significance level, there are 2 Potential Outliers											
26	Therefore, Potential Statistical Outliers are											
27	8800, 2600											
28												
29	For 1% Significance Level, there are 2 Potential Outliers											
30	Therefore, Potential Statistical Outliers are											
31	8800, 2600											
32												
33												
34			**Rosner's Outlier Test for Benzo(a)pyrene**									
35												
36												
37			**Mean**	**720.9**								
38			**Standard Deviation**	**1483**								
39			**Number of data**	**25**								
40			**Number of suspected outliers**	**5**								
41												
42				Potential	Obs.	Test	Critical	Critical				
43	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
44	1	720.9	1453	7000	25	4.322	2.82	3.14				
45	2	459.3	712.9	2600	24	3.003	2.8	3.11				
46	3	366.2	560.4	2300	23	3.451	2.78	3.09				
47	4	278.3	377.9	1200	22	2.439	2.76	3.06				
48	5	234.4	324.7	970	21	2.265	2.73	3.03				
49												
50	For 5% significance level, there are 3 Potential Outliers											
51	Therefore, Potential Statistical Outliers are											
52	7000, 2600, 2300											
53												
54	For 1% Significance Level, there are 3 Potential Outliers											
55	Therefore, Potential Statistical Outliers are											
56	7000, 2600, 2300											
57												
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	**Rosner's Outlier Test for Benzo(b)fluoranthene**											
60												
61												
62			**Mean**	**699.2**								
63		**Standard Deviation**		**1412**								
64		**Number of data**		**25**								
65	**Number of suspected outliers**			**5**								
66												
67				Potential	Obs.	Test	Critical	Critical				
68	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
69	1	699.2	1383	6800	25	4.41	2.82	3.14				
70	2	445	627.9	2100	24	2.636	2.8	3.11				
71	3	373	531.3	1700	23	2.497	2.78	3.09				
72	4	312.7	456.2	1600	22	2.822	2.76	3.06				
73	5	251.4	362.9	1200	21	2.614	2.73	3.03				
74												
75	For 5% significance level, there are 4 Potential Outliers											
76	Therefore, Potential Statistical Outliers are											
77	6800, 2100, 1700, 1600											
78												
79	For 1% Significance Level, there is 1 Potential Outlier											
80	Therefore, Observation 6800 is a Potential Statistical Outlier											
81												
82												
83	**Rosner's Outlier Test for Benzo(k)fluoranthene**											
84												
85												
86			**Mean**	**495**								
87		**Standard Deviation**		**1367**								
88		**Number of data**		**25**								
89	**Number of suspected outliers**			**5**								
90												
91				Potential	Obs.	Test	Critical	Critical				
92	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
93	1	495	1339	6800	25	4.707	2.82	3.14				
94	2	232.3	386.6	1700	24	3.796	2.8	3.11				
95	3	168.5	232.6	770	23	2.585	2.78	3.09				
96	4	141.2	196.7	650	22	2.587	2.76	3.06				
97	5	116.9	164.5	560	21	2.693	2.73	3.03				
98												
99	For 5% significance level, there are 2 Potential Outliers											
100	Therefore, Potential Statistical Outliers are											
101	6800, 1700											
102												
103	For 1% Significance Level, there are 2 Potential Outliers											
104	Therefore, Potential Statistical Outliers are											
105	6800, 1700											
106												
107												
108	**Dixon's Outlier Test for Carbazole**											
109												
110	Number of data = 18											
111	10% critical value: 0.424											
112	5% critical value: 0.475											
113	1% critical value: 0.561											
114												
115	**1. Data Value 5500 is a Potential Outlier (Upper Tail)?**											
116												

	A	B	C	D	E	F	G	H	I	J	K	L
117	Test Statistic: 0.528											
118												
119	For 10% significance level, 5500 is an outlier.											
120	For 5% significance level, 5500 is an outlier.											
121	For 1% significance level, 5500 is not an outlier.											
122												
123	**2. Data Value 2.1 is a Potential Outlier (Lower Tail)?**											
124												
125	Test Statistic: 0.000											
126												
127	For 10% significance level, 2.1 is not an outlier.											
128	For 5% significance level, 2.1 is not an outlier.											
129	For 1% significance level, 2.1 is not an outlier.											
130												
131												
132	**Rosner's Outlier Test for Dibenz(a,h)anthracene**											
133												
134												
135				**Mean**	**534.4**							
136				**Standard Deviation**	**1236**							
137				**Number of data**	**25**							
138				**Number of suspected outliers**	**5**							
139												
140				Potential	Obs.	Test	Critical	Critical				
141	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
142	1	534.4	1211	5500	25	4.1	2.82	3.14				
143	2	327.5	691.1	2600	24	3.288	2.8	3.11				
144	3	228.6	504.4	2100	23	3.71	2.78	3.09				
145	4	143.6	303.6	1400	22	4.138	2.76	3.06				
146	5	83.76	118.8	400	21	2.662	2.73	3.03				
147												
148	For 5% significance level, there are 4 Potential Outliers											
149	Therefore, Potential Statistical Outliers are											
150	5500, 2600, 2100, 1400											
151												
152	For 1% Significance Level, there are 4 Potential Outliers											
153	Therefore, Potential Statistical Outliers are											
154	5500, 2600, 2100, 1400											
155												
156												
157	**Rosner's Outlier Test for Indeno(1,2,3-cd)pyrene**											
158												
159												
160				**Mean**	**462.4**							
161				**Standard Deviation**	**839.3**							
162				**Number of data**	**25**							
163				**Number of suspected outliers**	**5**							
164												
165				Potential	Obs.	Test	Critical	Critical				
166	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
167	1	462.4	822.3	3400	25	3.572	2.82	3.14				
168	2	340	586.7	2600	24	3.852	2.8	3.11				
169	3	241.7	343	1300	23	3.086	2.78	3.09				
170	4	193.6	259.7	850	22	2.527	2.76	3.06				
171	5	162.4	219.7	770	21	2.766	2.73	3.03				
172												
173	For 5% significance level, there are 5 Potential Outliers											
174	Therefore, Potential Statistical Outliers are											

	A	B	C	D	E	F	G	H	I	J	K	L
175	3400, 2600, 1300, 850, 770											
176												
177	For 1% Significance Level, there are 2 Potential Outliers											
178	Therefore, Potential Statistical Outliers are											
179	3400, 2600											
180												
181												
182			**Dixon's Outlier Test for Aldrin**									
183												
184	Number of data = 18											
185	10% critical value: 0.424											
186	5% critical value: 0.475											
187	1% critical value: 0.561											
188												
189	**1. Data Value 33 is a Potential Outlier (Upper Tail)?**											
190												
191	Test Statistic: 0.987											
192												
193	For 10% significance level, 33 is an outlier.											
194	For 5% significance level, 33 is an outlier.											
195	For 1% significance level, 33 is an outlier.											
196												
197	**2. Data Value 1.8 is a Potential Outlier (Lower Tail)?**											
198												
199	Test Statistic: 0.000											
200												
201	For 10% significance level, 1.8 is not an outlier.											
202	For 5% significance level, 1.8 is not an outlier.											
203	For 1% significance level, 1.8 is not an outlier.											
204												
205												
206				**Rosner's Outlier Test for Aroclor-1242**								
207												
208												
209				**Mean**	**61.39**							
210				**Standard Deviation**	**195.9**							
211				**Number of data**	**25**							
212				**Number of suspected outliers**	**5**							
213												
214				Potential	Obs.	Test	Critical	Critical				
215	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
216	1	61.39	191.9	1000	25	4.891	2.82	3.14				
217	2	22.28	11.64	52	24	2.553	2.8	3.11				
218	3	20.99	9.987	42	23	2.104	2.78	3.09				
219	4	20.04	9.084	40	22	2.198	2.76	3.06				
220	5	19.09	8.11	39	21	2.456	2.73	3.03				
221												
222	For 5% Significance Level, there is 1 Potential Outlier											
223	Therefore, Observation 1000 is a Potential Statistical Outlier											
224												
225	For 1% Significance Level, there is 1 Potential Outlier											
226	Therefore, Observation 1000 is a Potential Statistical Outlier											
227												
228												
229				**Rosner's Outlier Test for Aroclor-1260**								
230												
231												
232				**Mean**	**158.6**							

	A	B	C	D	E	F	G	H	I	J	K	L
233			**Standard Deviation**	**542**								
234			**Number of data**	**25**								
235		**Number of suspected outliers**		**5**								
236												
237				Potential	Obs.	Test	Critical	Critical				
238	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
239	1	158.6	531.1	2700	25	4.785	2.82	3.14				
240	2	52.7	118.5	600	24	4.617	2.8	3.11				
241	3	28.9	21.97	91	23	2.826	2.78	3.09				
242	4	26.08	17.71	75	22	2.762	2.76	3.06				
243	5	23.75	14.28	55	21	2.187	2.73	3.03				
244												
245	For 5% significance level, there are 4 Potential Outliers											
246	Therefore, Potential Statistical Outliers are											
247	2700, 600, 91, 75											
248												
249	For 1% Significance Level, there are 2 Potential Outliers											
250	Therefore, Potential Statistical Outliers are											
251	2700, 600											
252												
253												
254				**Rosner's Outlier Test for Aluminum**								
255												
256												
257			**Mean**	**9669**								
258			**Standard Deviation**	**5760**								
259			**Number of data**	**25**								
260		**Number of suspected outliers**		**5**								
261												
262				Potential	Obs.	Test	Critical	Critical				
263	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
264	1	9669	5643	29400	25	3.496	2.82	3.14				
265	2	8847	4121	19600	24	2.609	2.8	3.11				
266	3	8380	3503	18000	23	2.746	2.78	3.09				
267	4	7942	2872	15600	22	2.666	2.76	3.06				
268	5	7578	2365	12600	21	2.124	2.73	3.03				
269												
270	For 5% Significance Level, there is 1 Potential Outlier											
271	Therefore, Observation 29400 is a Potential Statistical Outlier											
272												
273	For 1% Significance Level, there is 1 Potential Outlier											
274	Therefore, Observation 29400 is a Potential Statistical Outlier											
275												
276												
277				**Rosner's Outlier Test for Arsenic**								
278												
279												
280			**Mean**	**17.05**								
281			**Standard Deviation**	**68.56**								
282			**Number of data**	**25**								
283		**Number of suspected outliers**		**5**								
284												
285				Potential	Obs.	Test	Critical	Critical				
286	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
287	1	17.05	67.17	346	25	4.897	2.82	3.14				
288	2	3.342	1.854	8.5	24	2.782	2.8	3.11				
289	3	3.117	1.527	7.2	23	2.674	2.78	3.09				
290	4	2.932	1.27	6.4	22	2.731	2.76	3.06				

	A	B	C	D	E	F	G	H	I	J	K	L
291	5	2.767	1.031	5.2	21	2.36	2.73	3.03				
292												
293	For 5% Significance Level, there is 1 Potential Outlier											
294	Therefore, Observation 346 is a Potential Statistical Outlier											
295												
296	For 1% Significance Level, there is 1 Potential Outlier											
297	Therefore, Observation 346 is a Potential Statistical Outlier											
298												
299												
300	**Rosner's Outlier Test for Chromium**											
301												
302												
303			**Mean**	**18.93**								
304			**Standard Deviation**	**14.88**								
305			**Number of data**	**27**								
306			**Number of suspected outliers**	**5**								
307												
308				Potential	Obs.	Test	Critical	Critical				
309	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
310	1	18.93	14.61	63	27	3.017	2.86	3.18				
311	2	17.23	12.24	56.6	26	3.217	2.84	3.16				
312	3	15.66	9.423	45.2	25	3.135	2.82	3.14				
313	4	14.43	7.289	34	24	2.685	2.8	3.11				
314	5	13.58	6.114	27.8	23	2.326	2.78	3.09				
315												
316	For 5% significance level, there are 3 Potential Outliers											
317	Therefore, Potential Statistical Outliers are											
318	63, 56.6, 45.2											
319												
320	For 1% Significance Level, there are 2 Potential Outliers											
321	Therefore, Potential Statistical Outliers are											
322	63, 56.6											
323												
324												
325	**Rosner's Outlier Test for Cobalt**											
326												
327												
328			**Mean**	**3.082**								
329			**Standard Deviation**	**2.404**								
330			**Number of data**	**25**								
331			**Number of suspected outliers**	**5**								
332												
333				Potential	Obs.	Test	Critical	Critical				
334	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
335	1	3.082	2.355	11.5	25	3.574	2.82	3.14				
336	2	2.732	1.679	8.8	24	3.614	2.8	3.11				
337	3	2.468	1.096	4.6	23	1.946	2.78	3.09				
338	4	2.371	1.016	4.5	22	2.097	2.76	3.06				
339	5	2.27	0.919	4.1	21	1.991	2.73	3.03				
340												
341	For 5% significance level, there are 2 Potential Outliers											
342	Therefore, Potential Statistical Outliers are											
343	11.5, 8.8											
344												
345	For 1% Significance Level, there are 2 Potential Outliers											
346	Therefore, Potential Statistical Outliers are											
347	11.5, 8.8											
348												

	A	B	C	D	E	F	G	H	I	J	K	L
349												
350				**Rosner's Outlier Test for Iron**								
351												
352												
353				**Mean**	**18845**							
354				**Standard Deviation**	**24594**							
355				**Number of data**	**25**							
356				**Number of suspected outliers**	**5**							
357												
358				Potential	Obs.	Test	Critical	Critical				
359	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
360	1	18845	24097	116000	25	4.032	2.82	3.14				
361	2	14797	14271	61700	24	3.287	2.8	3.11				
362	3	12757	10420	53200	23	3.881	2.78	3.09				
363	4	10919	5686	28300	22	3.057	2.76	3.06				
364	5	10091	4257	20300	21	2.398	2.73	3.03				
365												
366	For 5% significance level, there are 4 Potential Outliers											
367	Therefore, Potential Statistical Outliers are											
368	116000, 61700, 53200, 28300											
369												
370	For 1% Significance Level, there are 3 Potential Outliers											
371	Therefore, Potential Statistical Outliers are											
372	116000, 61700, 53200											
373												
374												
375				**Rosner's Outlier Test for Manganese**								
376												
377												
378				**Mean**	**112.3**							
379				**Standard Deviation**	**114.5**							
380				**Number of data**	**25**							
381				**Number of suspected outliers**	**5**							
382												
383				Potential	Obs.	Test	Critical	Critical				
384	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
385	1	112.3	112.2	511	25	3.554	2.82	3.14				
386	2	95.73	80.49	302	24	2.563	2.8	3.11				
387	3	86.76	68.96	263	23	2.556	2.78	3.09				
388	4	78.75	58.61	233	22	2.632	2.76	3.06				
389	5	71.4	48.58	175	21	2.132	2.73	3.03				
390												
391	For 5% Significance Level, there is 1 Potential Outlier											
392	Therefore, Observation 511 is a Potential Statistical Outlier											
393												
394	For 1% Significance Level, there is 1 Potential Outlier											
395	Therefore, Observation 511 is a Potential Statistical Outlier											
396												
397												
398				**Rosner's Outlier Test for Thallium**								
399												
400												
401				**Mean**	**0.41**							
402				**Standard Deviation**	**0.449**							
403				**Number of data**	**25**							
404				**Number of suspected outliers**	**5**							
405												
406				Potential	Obs.	Test	Critical	Critical				

	A	B	C	D	E	F	G	H	I	J	K	L
407	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
408	1	0.41	0.44	2	25	3.615	2.82	3.14				
409	2	0.344	0.309	1.1	23	2.444	2.8	3.11				
410	3	0.311	0.27	1.1	24	2.921	2.78	3.09				
411	4	0.275	0.213	0.72	22	2.087	2.76	3.06				
412	5	0.254	0.193	0.65	21	2.05	2.73	3.03				
413												
414	For 5% significance level, there are 3 Potential Outliers											
415	Therefore, Potential Statistical Outliers are											
416	2, 1.1, 1.1											
417												
418	For 1% Significance Level, there is 1 Potential Outlier											
419	Therefore, Observation 2 is a Potential Statistical Outlier											
420												
421												
422	**Rosner's Outlier Test for Vanadium**											
423												
424												
425			**Mean**	**22.27**								
426			**Standard Deviation**	**12.78**								
427			**Number of data**	**25**								
428			**Number of suspected outliers**	**5**								
429												
430				Potential	Obs.	Test	Critical	Critical				
431	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
432	1	22.27	12.53	63.6	25	3.3	2.82	3.14				
433	2	20.55	9.653	43.3	24	2.357	2.8	3.11				
434	3	19.56	8.535	41.7	23	2.594	2.78	3.09				
435	4	18.55	7.205	35.7	22	2.38	2.76	3.06				
436	5	17.73	6.253	34.1	21	2.618	2.73	3.03				
437												
438	For 5% Significance Level, there is 1 Potential Outlier											
439	Therefore, Observation 63.6 is a Potential Statistical Outlier											
440												
441	For 1% Significance Level, there is 1 Potential Outlier											
442	Therefore, Observation 63.6 is a Potential Statistical Outlier											
443												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Shallow Aquifer Groundwater**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9	**Dixon's Outlier Test for 1,4-Dichlorobenzene**											
10												
11	Number of data = 14											
12	10% critical value: 0.492											
13	5% critical value: 0.546											
14	1% critical value: 0.641											
15												
16	**1. Data Value 2 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.667											
19												
20	For 10% significance level, 2 is an outlier.											
21	For 5% significance level, 2 is an outlier.											
22	For 1% significance level, 2 is an outlier.											
23												
24	**2. Data Value 0.5 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.000											
27												
28	For 10% significance level, 0.5 is not an outlier.											
29	For 5% significance level, 0.5 is not an outlier.											
30	For 1% significance level, 0.5 is not an outlier.											
31												
32												
33	**Dixon's Outlier Test for Benzene**											
34												
35	Number of data = 14											
36	10% critical value: 0.492											
37	5% critical value: 0.546											
38	1% critical value: 0.641											
39												
40	**1. Data Value 14 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.963											
43												
44	For 10% significance level, 14 is an outlier.											
45	For 5% significance level, 14 is an outlier.											
46	For 1% significance level, 14 is an outlier.											
47												
48	**2. Data Value 0.5 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.000											
51												
52	For 10% significance level, 0.5 is not an outlier.											
53	For 5% significance level, 0.5 is not an outlier.											
54	For 1% significance level, 0.5 is not an outlier.											
55												
56												
57	**Dixon's Outlier Test for Ethylbenzene**											
58												
59	Number of data = 14											
60	10% critical value: 0.492											
61	5% critical value: 0.546											
62	1% critical value: 0.641											
63												
64	**1. Data Value 10 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.947											
67												
68	For 10% significance level, 10 is an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
69	For 5% significance level, 10 is an outlier.											
70	For 1% significance level, 10 is an outlier.											
71												
72	**2. Data Value 0.2 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.375											
75												
76	For 10% significance level, 0.2 is not an outlier.											
77	For 5% significance level, 0.2 is not an outlier.											
78	For 1% significance level, 0.2 is not an outlier.											
79												
80												
81	**Dixon's Outlier Test for m- and p-Xylene**											
82												
83	Number of data = 14											
84	10% critical value: 0.492											
85	5% critical value: 0.546											
86	1% critical value: 0.641											
87												
88	**1. Data Value 20 is a Potential Outlier (Upper Tail)?**											
89												
90	Test Statistic: 0.947											
91												
92	For 10% significance level, 20 is an outlier.											
93	For 5% significance level, 20 is an outlier.											
94	For 1% significance level, 20 is an outlier.											
95												
96	**2. Data Value 1 is a Potential Outlier (Lower Tail)?**											
97												
98	Test Statistic: 0.000											
99												
100	For 10% significance level, 1 is not an outlier.											
101	For 5% significance level, 1 is not an outlier.											
102	For 1% significance level, 1 is not an outlier.											
103												
104												
105	**Dixon's Outlier Test for Methylcyclohexane**											
106												
107	Number of data = 14											
108	10% critical value: 0.492											
109	5% critical value: 0.546											
110	1% critical value: 0.641											
111												
112	**1. Data Value 11 is a Potential Outlier (Upper Tail)?**											
113												
114	Test Statistic: 0.952											
115												
116	For 10% significance level, 11 is an outlier.											
117	For 5% significance level, 11 is an outlier.											
118	For 1% significance level, 11 is an outlier.											
119												
120	**2. Data Value 0.5 is a Potential Outlier (Lower Tail)?**											
121												
122	Test Statistic: 0.000											
123												
124	For 10% significance level, 0.5 is not an outlier.											
125	For 5% significance level, 0.5 is not an outlier.											
126	For 1% significance level, 0.5 is not an outlier.											
127												
128												
129	**Dixon's Outlier Test for Trichloroethene**											
130												
131	Number of data = 14											
132	10% critical value: 0.492											
133	5% critical value: 0.546											
134	1% critical value: 0.641											
135												
136	**1. Data Value 1 is a Potential Outlier (Upper Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
137												
138	Test Statistic: 0.000											
139												
140	For 10% significance level, 1 is not an outlier.											
141	For 5% significance level, 1 is not an outlier.											
142	For 1% significance level, 1 is not an outlier.											
143												
144	**2. Data Value 0.4 is a Potential Outlier (Lower Tail)?**											
145												
146	Test Statistic: 0.167											
147												
148	For 10% significance level, 0.4 is not an outlier.											
149	For 5% significance level, 0.4 is not an outlier.											
150	For 1% significance level, 0.4 is not an outlier.											
151												
152												
153	**Dixon's Outlier Test for Xylene, total**											
154												
155	Number of data = 14											
156	10% critical value: 0.492											
157	5% critical value: 0.546											
158	1% critical value: 0.641											
159												
160	**1. Data Value 25 is a Potential Outlier (Upper Tail)?**											
161												
162	Test Statistic: 0.936											
163												
164	For 10% significance level, 25 is an outlier.											
165	For 5% significance level, 25 is an outlier.											
166	For 1% significance level, 25 is an outlier.											
167												
168	**2. Data Value 1.5 is a Potential Outlier (Lower Tail)?**											
169												
170	Test Statistic: 0.000											
171												
172	For 10% significance level, 1.5 is not an outlier.											
173	For 5% significance level, 1.5 is not an outlier.											
174	For 1% significance level, 1.5 is not an outlier.											
175												
176												
177	**Dixon's Outlier Test for 1,1-Biphenyl**											
178												
179	Number of data = 8											
180	10% critical value: 0.479											
181	5% critical value: 0.554											
182	1% critical value: 0.683											
183												
184	**1. Data Value 12 is a Potential Outlier (Upper Tail)?**											
185												
186	Test Statistic: 0.667											
187												
188	For 10% significance level, 12 is an outlier.											
189	For 5% significance level, 12 is an outlier.											
190	For 1% significance level, 12 is not an outlier.											
191												
192	**2. Data Value 8 is a Potential Outlier (Lower Tail)?**											
193												
194	Test Statistic: 0.500											
195												
196	For 10% significance level, 8 is an outlier.											
197	For 5% significance level, 8 is not an outlier.											
198	For 1% significance level, 8 is not an outlier.											
199												
200												
201	**Dixon's Outlier Test for 2,4-Dimethylphenol**											
202												
203	Number of data = 8											
204	10% critical value: 0.479											

	A	B	C	D	E	F	G	H	I	J	K	L
205	5% critical value: 0.554											
206	1% critical value: 0.683											
207												
208	**1. Data Value 29 is a Potential Outlier (Upper Tail)?**											
209												
210	Test Statistic: 0.750											
211												
212	For 10% significance level, 29 is an outlier.											
213	For 5% significance level, 29 is an outlier.											
214	For 1% significance level, 29 is an outlier.											
215												
216	**2. Data Value 13 is a Potential Outlier (Lower Tail)?**											
217												
218	Test Statistic: 0.000											
219												
220	For 10% significance level, 13 is not an outlier.											
221	For 5% significance level, 13 is not an outlier.											
222	For 1% significance level, 13 is not an outlier.											
223												
224												
225	**Dixon's Outlier Test for 2-Methylnaphthalene**											
226												
227	Number of data = 14											
228	10% critical value: 0.492											
229	5% critical value: 0.546											
230	1% critical value: 0.641											
231												
232	**1. Data Value 32 is a Potential Outlier (Upper Tail)?**											
233												
234	Test Statistic: 0.956											
235												
236	For 10% significance level, 32 is an outlier.											
237	For 5% significance level, 32 is an outlier.											
238	For 1% significance level, 32 is an outlier.											
239												
240	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
241												
242	Test Statistic: 0.000											
243												
244	For 10% significance level, 0.094 is not an outlier.											
245	For 5% significance level, 0.094 is not an outlier.											
246	For 1% significance level, 0.094 is not an outlier.											
247												
248												
249	**Dixon's Outlier Test for Benzo(a)anthracene**											
250												
251	Number of data = 14											
252	10% critical value: 0.492											
253	5% critical value: 0.546											
254	1% critical value: 0.641											
255												
256	**1. Data Value 2.9 is a Potential Outlier (Upper Tail)?**											
257												
258	Test Statistic: 0.930											
259												
260	For 10% significance level, 2.9 is an outlier.											
261	For 5% significance level, 2.9 is an outlier.											
262	For 1% significance level, 2.9 is an outlier.											
263												
264	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
265												
266	Test Statistic: 0.000											
267												
268	For 10% significance level, 0.094 is not an outlier.											
269	For 5% significance level, 0.094 is not an outlier.											
270	For 1% significance level, 0.094 is not an outlier.											
271												
272												

	A	B	C	D	E	F	G	H	I	J	K	L
273	**Dixon's Outlier Test for Benzo(a)pyrene**											
274												
275	Number of data = 14											
276	10% critical value: 0.492											
277	5% critical value: 0.546											
278	1% critical value: 0.641											
279												
280	**1. Data Value 2 is a Potential Outlier (Upper Tail)?**											
281												
282	Test Statistic: 0.939											
283												
284	For 10% significance level, 2 is an outlier.											
285	For 5% significance level, 2 is an outlier.											
286	For 1% significance level, 2 is an outlier.											
287												
288	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
289												
290	Test Statistic: 0.000											
291												
292	For 10% significance level, 0.094 is not an outlier.											
293	For 5% significance level, 0.094 is not an outlier.											
294	For 1% significance level, 0.094 is not an outlier.											
295												
296												
297	**Dixon's Outlier Test for Benzo(b)fluoranthene**											
298												
299	Number of data = 14											
300	10% critical value: 0.492											
301	5% critical value: 0.546											
302	1% critical value: 0.641											
303												
304	**1. Data Value 2.7 is a Potential Outlier (Upper Tail)?**											
305												
306	Test Statistic: 0.898											
307												
308	For 10% significance level, 2.7 is an outlier.											
309	For 5% significance level, 2.7 is an outlier.											
310	For 1% significance level, 2.7 is an outlier.											
311												
312	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
313												
314	Test Statistic: 0.000											
315												
316	For 10% significance level, 0.094 is not an outlier.											
317	For 5% significance level, 0.094 is not an outlier.											
318	For 1% significance level, 0.094 is not an outlier.											
319												
320												
321	**Dixon's Outlier Test for Benzo(k)fluoranthene**											
322												
323	Number of data = 14											
324	10% critical value: 0.492											
325	5% critical value: 0.546											
326	1% critical value: 0.641											
327												
328	**1. Data Value 0.94 is a Potential Outlier (Upper Tail)?**											
329												
330	Test Statistic: 0.827											
331												
332	For 10% significance level, 0.94 is an outlier.											
333	For 5% significance level, 0.94 is an outlier.											
334	For 1% significance level, 0.94 is an outlier.											
335												
336	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
337												
338	Test Statistic: 0.000											
339												
340	For 10% significance level, 0.094 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
341	For 5% significance level, 0.094 is not an outlier.											
342	For 1% significance level, 0.094 is not an outlier.											
343												
344												
345	**Dixon's Outlier Test for Carbazole**											
346												
347	Number of data = 8											
348	10% critical value: 0.479											
349	5% critical value: 0.554											
350	1% critical value: 0.683											
351												
352	**1. Data Value 8.6 is a Potential Outlier (Upper Tail)?**											
353												
354	Test Statistic: 0.512											
355												
356	For 10% significance level, 8.6 is an outlier.											
357	For 5% significance level, 8.6 is not an outlier.											
358	For 1% significance level, 8.6 is not an outlier.											
359												
360	**2. Data Value 0.19 is a Potential Outlier (Lower Tail)?**											
361												
362	Test Statistic: 0.002											
363												
364	For 10% significance level, 0.19 is not an outlier.											
365	For 5% significance level, 0.19 is not an outlier.											
366	For 1% significance level, 0.19 is not an outlier.											
367												
368												
369	**Dixon's Outlier Test for Dibenz(a,h)anthracene**											
370												
371	Number of data = 14											
372	10% critical value: 0.492											
373	5% critical value: 0.546											
374	1% critical value: 0.641											
375												
376	**1. Data Value 0.3 is a Potential Outlier (Upper Tail)?**											
377												
378	Test Statistic: 0.291											
379												
380	For 10% significance level, 0.3 is not an outlier.											
381	For 5% significance level, 0.3 is not an outlier.											
382	For 1% significance level, 0.3 is not an outlier.											
383												
384	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
385												
386	Test Statistic: 0.000											
387												
388	For 10% significance level, 0.094 is not an outlier.											
389	For 5% significance level, 0.094 is not an outlier.											
390	For 1% significance level, 0.094 is not an outlier.											
391												
392												
393	**Dixon's Outlier Test for Dibenzofuran**											
394												
395	Number of data = 8											
396	10% critical value: 0.479											
397	5% critical value: 0.554											
398	1% critical value: 0.683											
399												
400	**1. Data Value 19 is a Potential Outlier (Upper Tail)?**											
401												
402	Test Statistic: 0.700											
403												
404	For 10% significance level, 19 is an outlier.											
405	For 5% significance level, 19 is an outlier.											
406	For 1% significance level, 19 is an outlier.											
407												
408	**2. Data Value 3 is a Potential Outlier (Lower Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
409												
410	Test Statistic: 0.667											
411												
412	For 10% significance level, 3 is an outlier.											
413	For 5% significance level, 3 is an outlier.											
414	For 1% significance level, 3 is not an outlier.											
415												
416												
417	**Dixon's Outlier Test for Indeno(1,2,3-cd)pyrene**											
418												
419	Number of data = 14											
420	10% critical value: 0.492											
421	5% critical value: 0.546											
422	1% critical value: 0.641											
423												
424	**1. Data Value 1.2 is a Potential Outlier (Upper Tail)?**											
425												
426	Test Statistic: 0.901											
427												
428	For 10% significance level, 1.2 is an outlier.											
429	For 5% significance level, 1.2 is an outlier.											
430	For 1% significance level, 1.2 is an outlier.											
431												
432	**2. Data Value 0.094 is a Potential Outlier (Lower Tail)?**											
433												
434	Test Statistic: 0.490											
435												
436	For 10% significance level, 0.094 is not an outlier.											
437	For 5% significance level, 0.094 is not an outlier.											
438	For 1% significance level, 0.094 is not an outlier.											
439												
440												
441	**Dixon's Outlier Test for Naphthalene**											
442												
443	Number of data = 14											
444	10% critical value: 0.492											
445	5% critical value: 0.546											
446	1% critical value: 0.641											
447												
448	**1. Data Value 560 is a Potential Outlier (Upper Tail)?**											
449												
450	Test Statistic: 0.981											
451												
452	For 10% significance level, 560 is an outlier.											
453	For 5% significance level, 560 is an outlier.											
454	For 1% significance level, 560 is an outlier.											
455												
456	**2. Data Value 0.063 is a Potential Outlier (Lower Tail)?**											
457												
458	Test Statistic: 0.003											
459												
460	For 10% significance level, 0.063 is not an outlier.											
461	For 5% significance level, 0.063 is not an outlier.											
462	For 1% significance level, 0.063 is not an outlier.											
463												
464												
465	**Dixon's Outlier Test for Dieldrin**											
466												
467	Number of data = 8											
468	10% critical value: 0.479											
469	5% critical value: 0.554											
470	1% critical value: 0.683											
471												
472	**1. Data Value 0.12 is a Potential Outlier (Upper Tail)?**											
473												
474	Test Statistic: 0.500											
475												
476	For 10% significance level, 0.12 is an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
477	For 5% significance level, 0.12 is not an outlier.											
478	For 1% significance level, 0.12 is not an outlier.											
479												
480	**2. Data Value 0.017 is a Potential Outlier (Lower Tail)?**											
481												
482	Test Statistic: 0.892											
483												
484	For 10% significance level, 0.017 is an outlier.											
485	For 5% significance level, 0.017 is an outlier.											
486	For 1% significance level, 0.017 is an outlier.											
487												
488												
489	**Dixon's Outlier Test for Aluminum**											
490												
491	Number of data = 14											
492	10% critical value: 0.492											
493	5% critical value: 0.546											
494	1% critical value: 0.641											
495												
496	**1. Data Value 23300 is a Potential Outlier (Upper Tail)?**											
497												
498	Test Statistic: 0.887											
499												
500	For 10% significance level, 23300 is an outlier.											
501	For 5% significance level, 23300 is an outlier.											
502	For 1% significance level, 23300 is an outlier.											
503												
504	**2. Data Value 51.6 is a Potential Outlier (Lower Tail)?**											
505												
506	Test Statistic: 0.010											
507												
508	For 10% significance level, 51.6 is not an outlier.											
509	For 5% significance level, 51.6 is not an outlier.											
510	For 1% significance level, 51.6 is not an outlier.											
511												
512												
513	**Dixon's Outlier Test for Antimony**											
514												
515	Number of data = 14											
516	10% critical value: 0.492											
517	5% critical value: 0.546											
518	1% critical value: 0.641											
519												
520	**1. Data Value 5 is a Potential Outlier (Upper Tail)?**											
521												
522	Test Statistic: 0.000											
523												
524	For 10% significance level, 5 is not an outlier.											
525	For 5% significance level, 5 is not an outlier.											
526	For 1% significance level, 5 is not an outlier.											
527												
528	**2. Data Value 0.17 is a Potential Outlier (Lower Tail)?**											
529												
530	Test Statistic: 0.041											
531												
532	For 10% significance level, 0.17 is not an outlier.											
533	For 5% significance level, 0.17 is not an outlier.											
534	For 1% significance level, 0.17 is not an outlier.											
535												
536												
537	**Dixon's Outlier Test for Arsenic**											
538												
539	Number of data = 14											
540	10% critical value: 0.492											
541	5% critical value: 0.546											
542	1% critical value: 0.641											
543												
544	**1. Data Value 53.8 is a Potential Outlier (Upper Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
545												
546	Test Statistic: 0.915											
547												
548	For 10% significance level, 53.8 is an outlier.											
549	For 5% significance level, 53.8 is an outlier.											
550	For 1% significance level, 53.8 is an outlier.											
551												
552	**2. Data Value 1.8 is a Potential Outlier (Lower Tail)?**											
553												
554	Test Statistic: 0.354											
555												
556	For 10% significance level, 1.8 is not an outlier.											
557	For 5% significance level, 1.8 is not an outlier.											
558	For 1% significance level, 1.8 is not an outlier.											
559												
560												
561	**Dixon's Outlier Test for Barium**											
562												
563	Number of data = 14											
564	10% critical value: 0.492											
565	5% critical value: 0.546											
566	1% critical value: 0.641											
567												
568	**1. Data Value 302 is a Potential Outlier (Upper Tail)?**											
569												
570	Test Statistic: 0.663											
571												
572	For 10% significance level, 302 is an outlier.											
573	For 5% significance level, 302 is an outlier.											
574	For 1% significance level, 302 is an outlier.											
575												
576	**2. Data Value 12.1 is a Potential Outlier (Lower Tail)?**											
577												
578	Test Statistic: 0.064											
579												
580	For 10% significance level, 12.1 is not an outlier.											
581	For 5% significance level, 12.1 is not an outlier.											
582	For 1% significance level, 12.1 is not an outlier.											
583												
584												
585	**Dixon's Outlier Test for Chromium**											
586												
587	Number of data = 14											
588	10% critical value: 0.492											
589	5% critical value: 0.546											
590	1% critical value: 0.641											
591												
592	**1. Data Value 44.5 is a Potential Outlier (Upper Tail)?**											
593												
594	Test Statistic: 0.780											
595												
596	For 10% significance level, 44.5 is an outlier.											
597	For 5% significance level, 44.5 is an outlier.											
598	For 1% significance level, 44.5 is an outlier.											
599												
600	**2. Data Value 0.72 is a Potential Outlier (Lower Tail)?**											
601												
602	Test Statistic: 0.018											
603												
604	For 10% significance level, 0.72 is not an outlier.											
605	For 5% significance level, 0.72 is not an outlier.											
606	For 1% significance level, 0.72 is not an outlier.											
607												
608												
609	**Dixon's Outlier Test for Cobalt**											
610												
611	Number of data = 14											
612	10% critical value: 0.492											

	A	B	C	D	E	F	G	H	I	J	K	L
613	5% critical value: 0.546											
614	1% critical value: 0.641											
615												
616	**1. Data Value 30 is a Potential Outlier (Upper Tail)?**											
617												
618	Test Statistic: 0.846											
619												
620	For 10% significance level, 30 is an outlier.											
621	For 5% significance level, 30 is an outlier.											
622	For 1% significance level, 30 is an outlier.											
623												
624	**2. Data Value 0.27 is a Potential Outlier (Lower Tail)?**											
625												
626	Test Statistic: 0.064											
627												
628	For 10% significance level, 0.27 is not an outlier.											
629	For 5% significance level, 0.27 is not an outlier.											
630	For 1% significance level, 0.27 is not an outlier.											
631												
632												
633	**Dixon's Outlier Test for Iron**											
634												
635	Number of data = 14											
636	10% critical value: 0.492											
637	5% critical value: 0.546											
638	1% critical value: 0.641											
639												
640	**1. Data Value 39400 is a Potential Outlier (Upper Tail)?**											
641												
642	Test Statistic: 0.271											
643												
644	For 10% significance level, 39400 is not an outlier.											
645	For 5% significance level, 39400 is not an outlier.											
646	For 1% significance level, 39400 is not an outlier.											
647												
648	**2. Data Value 60.6 is a Potential Outlier (Lower Tail)?**											
649												
650	Test Statistic: 0.008											
651												
652	For 10% significance level, 60.6 is not an outlier.											
653	For 5% significance level, 60.6 is not an outlier.											
654	For 1% significance level, 60.6 is not an outlier.											
655												
656												
657	**Dixon's Outlier Test for Manganese**											
658												
659	Number of data = 14											
660	10% critical value: 0.492											
661	5% critical value: 0.546											
662	1% critical value: 0.641											
663												
664	**1. Data Value 642 is a Potential Outlier (Upper Tail)?**											
665												
666	Test Statistic: 0.421											
667												
668	For 10% significance level, 642 is not an outlier.											
669	For 5% significance level, 642 is not an outlier.											
670	For 1% significance level, 642 is not an outlier.											
671												
672	**2. Data Value 26.9 is a Potential Outlier (Lower Tail)?**											
673												
674	Test Statistic: 0.046											
675												
676	For 10% significance level, 26.9 is not an outlier.											
677	For 5% significance level, 26.9 is not an outlier.											
678	For 1% significance level, 26.9 is not an outlier.											
679												
680												

	A	B	C	D	E	F	G	H	I	J	K	L
681	**Dixon's Outlier Test for Mercury**											
682												
683	Number of data = 14											
684	10% critical value: 0.492											
685	5% critical value: 0.546											
686	1% critical value: 0.641											
687												
688	**1. Data Value 2.3 is a Potential Outlier (Upper Tail)?**											
689												
690	Test Statistic: 0.955											
691												
692	For 10% significance level, 2.3 is an outlier.											
693	For 5% significance level, 2.3 is an outlier.											
694	For 1% significance level, 2.3 is an outlier.											
695												
696	**2. Data Value 0.03 is a Potential Outlier (Lower Tail)?**											
697												
698	Test Statistic: 0.412											
699												
700	For 10% significance level, 0.03 is not an outlier.											
701	For 5% significance level, 0.03 is not an outlier.											
702	For 1% significance level, 0.03 is not an outlier.											
703												
704												
705	**Dixon's Outlier Test for Thallium**											
706												
707	Number of data = 14											
708	10% critical value: 0.492											
709	5% critical value: 0.546											
710	1% critical value: 0.641											
711												
712	**1. Data Value 5 is a Potential Outlier (Upper Tail)?**											
713												
714	Test Statistic: 0.000											
715												
716	For 10% significance level, 5 is not an outlier.											
717	For 5% significance level, 5 is not an outlier.											
718	For 1% significance level, 5 is not an outlier.											
719												
720	**2. Data Value 0.11 is a Potential Outlier (Lower Tail)?**											
721												
722	Test Statistic: 0.043											
723												
724	For 10% significance level, 0.11 is not an outlier.											
725	For 5% significance level, 0.11 is not an outlier.											
726	For 1% significance level, 0.11 is not an outlier.											
727												
728												
729	**Dixon's Outlier Test for Vanadium**											
730												
731	Number of data = 14											
732	10% critical value: 0.492											
733	5% critical value: 0.546											
734	1% critical value: 0.641											
735												
736	**1. Data Value 55.2 is a Potential Outlier (Upper Tail)?**											
737												
738	Test Statistic: 0.559											
739												
740	For 10% significance level, 55.2 is an outlier.											
741	For 5% significance level, 55.2 is an outlier.											
742	For 1% significance level, 55.2 is not an outlier.											
743												
744	**2. Data Value 0.36 is a Potential Outlier (Lower Tail)?**											
745												
746	Test Statistic: 0.034											
747												
748	For 10% significance level, 0.36 is not an outlier.											

	A	B	C	D	E	F	G	H	I	J	K	L
749	For 5% significance level, 0.36 is not an outlier.											
750	For 1% significance level, 0.36 is not an outlier.											
751												
752												
753	**Dixon's Outlier Test for Arsenic, Dissolved**											
754												
755	Number of data = 14											
756	10% critical value: 0.492											
757	5% critical value: 0.546											
758	1% critical value: 0.641											
759												
760	**1. Data Value 45.4 is a Potential Outlier (Upper Tail)?**											
761												
762	Test Statistic: 0.846											
763												
764	For 10% significance level, 45.4 is an outlier.											
765	For 5% significance level, 45.4 is an outlier.											
766	For 1% significance level, 45.4 is an outlier.											
767												
768	**2. Data Value 1.6 is a Potential Outlier (Lower Tail)?**											
769												
770	Test Statistic: 0.029											
771												
772	For 10% significance level, 1.6 is not an outlier.											
773	For 5% significance level, 1.6 is not an outlier.											
774	For 1% significance level, 1.6 is not an outlier.											
775												
776												
777	**Dixon's Outlier Test for Chromium, Dissolved**											
778												
779	Number of data = 14											
780	10% critical value: 0.492											
781	5% critical value: 0.546											
782	1% critical value: 0.641											
783												
784	**1. Data Value 15 is a Potential Outlier (Upper Tail)?**											
785												
786	Test Statistic: 0.934											
787												
788	For 10% significance level, 15 is an outlier.											
789	For 5% significance level, 15 is an outlier.											
790	For 1% significance level, 15 is an outlier.											
791												
792	**2. Data Value 0.5 is a Potential Outlier (Lower Tail)?**											
793												
794	Test Statistic: 0.136											
795												
796	For 10% significance level, 0.5 is not an outlier.											
797	For 5% significance level, 0.5 is not an outlier.											
798	For 1% significance level, 0.5 is not an outlier.											
799												
800												
801	**Dixon's Outlier Test for Cobalt, Dissolved**											
802												
803	Number of data = 14											
804	10% critical value: 0.492											
805	5% critical value: 0.546											
806	1% critical value: 0.641											
807												
808	**1. Data Value 30 is a Potential Outlier (Upper Tail)?**											
809												
810	Test Statistic: 0.000											
811												
812	For 10% significance level, 30 is not an outlier.											
813	For 5% significance level, 30 is not an outlier.											
814	For 1% significance level, 30 is not an outlier.											
815												
816	**2. Data Value 0.39 is a Potential Outlier (Lower Tail)?**											

	A	B	C	D	E	F	G	H	I	J	K	L
817												
818	Test Statistic: 0.006											
819												
820	For 10% significance level, 0.39 is not an outlier.											
821	For 5% significance level, 0.39 is not an outlier.											
822	For 1% significance level, 0.39 is not an outlier.											
823												
824												
825	**Dixon's Outlier Test for Iron, Dissolved**											
826												
827	Number of data = 14											
828	10% critical value: 0.492											
829	5% critical value: 0.546											
830	1% critical value: 0.641											
831												
832	**1. Data Value 28600 is a Potential Outlier (Upper Tail)?**											
833												
834	Test Statistic: 0.494											
835												
836	For 10% significance level, 28600 is an outlier.											
837	For 5% significance level, 28600 is not an outlier.											
838	For 1% significance level, 28600 is not an outlier.											
839												
840	**2. Data Value 18.7 is a Potential Outlier (Lower Tail)?**											
841												
842	Test Statistic: 0.001											
843												
844	For 10% significance level, 18.7 is not an outlier.											
845	For 5% significance level, 18.7 is not an outlier.											
846	For 1% significance level, 18.7 is not an outlier.											
847												
848												
849	**Dixon's Outlier Test for Manganese, Dissolved**											
850												
851	Number of data = 14											
852	10% critical value: 0.492											
853	5% critical value: 0.546											
854	1% critical value: 0.641											
855												
856	**1. Data Value 520 is a Potential Outlier (Upper Tail)?**											
857												
858	Test Statistic: 0.296											
859												
860	For 10% significance level, 520 is not an outlier.											
861	For 5% significance level, 520 is not an outlier.											
862	For 1% significance level, 520 is not an outlier.											
863												
864	**2. Data Value 24.7 is a Potential Outlier (Lower Tail)?**											
865												
866	Test Statistic: 0.034											
867												
868	For 10% significance level, 24.7 is not an outlier.											
869	For 5% significance level, 24.7 is not an outlier.											
870	For 1% significance level, 24.7 is not an outlier.											
871												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Shallow Aquifer Groundwater**							
2				**User Selected Options**								
3				From File	WorkSheet.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		1							
7												
8												
9			**Dixon's Outlier Test for lead**									
10												
11	Number of data = 14											
12	10% critical value: 0.492											
13	5% critical value: 0.546											
14	1% critical value: 0.641											
15												
16	**1. Data Value 18.6 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.872											
19												
20	For 10% significance level, 18.6 is an outlier.											
21	For 5% significance level, 18.6 is an outlier.											
22	For 1% significance level, 18.6 is an outlier.											
23												
24	**2. Data Value 1.6 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.412											
27												
28	For 10% significance level, 1.6 is not an outlier.											
29	For 5% significance level, 1.6 is not an outlier.											
30	For 1% significance level, 1.6 is not an outlier.											
31												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface Water - Upstream Pond**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9			**Dixon's Outlier Test for Benzo(a)pyrene**									
10												
11	Number of data = 8											
12	10% critical value: 0.479											
13	5% critical value: 0.554											
14	1% critical value: 0.683											
15												
16	**1. Data Value 0.24 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.800											
19												
20	For 10% significance level, 0.24 is an outlier.											
21	For 5% significance level, 0.24 is an outlier.											
22	For 1% significance level, 0.24 is an outlier.											
23												
24	**2. Data Value 0.073 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.921											
27												
28	For 10% significance level, 0.073 is an outlier.											
29	For 5% significance level, 0.073 is an outlier.											
30	For 1% significance level, 0.073 is an outlier.											
31												
32												
33			**Dixon's Outlier Test for Arsenic**									
34												
35	Number of data = 8											
36	10% critical value: 0.479											
37	5% critical value: 0.554											
38	1% critical value: 0.683											
39												
40	**1. Data Value 10.3 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.657											
43												
44	For 10% significance level, 10.3 is an outlier.											
45	For 5% significance level, 10.3 is an outlier.											
46	For 1% significance level, 10.3 is not an outlier.											
47												
48	**2. Data Value 1.7 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.400											
51												
52	For 10% significance level, 1.7 is not an outlier.											
53	For 5% significance level, 1.7 is not an outlier.											
54	For 1% significance level, 1.7 is not an outlier.											
55												
56												
57			**Dixon's Outlier Test for Iron**									
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	Number of data = 8											
60	10% critical value: 0.479											
61	5% critical value: 0.554											
62	1% critical value: 0.683											
63												
64	**1. Data Value 19000 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.938											
67												
68	For 10% significance level, 19000 is an outlier.											
69	For 5% significance level, 19000 is an outlier.											
70	For 1% significance level, 19000 is an outlier.											
71												
72	**2. Data Value 1070 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.179											
75												
76	For 10% significance level, 1070 is not an outlier.											
77	For 5% significance level, 1070 is not an outlier.											
78	For 1% significance level, 1070 is not an outlier.											
79												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface/Subsurface Sediment - Upstream Pond**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9			**Dixon's Outlier Test for Methylcyclohexane**									
10												
11	Number of data = 16											
12	10% critical value: 0.454											
13	5% critical value: 0.507											
14	1% critical value: 0.595											
15												
16	**1. Data Value 8 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.500											
19												
20	For 10% significance level, 8 is an outlier.											
21	For 5% significance level, 8 is not an outlier.											
22	For 1% significance level, 8 is not an outlier.											
23												
24	**2. Data Value 2 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.800											
27												
28	For 10% significance level, 2 is an outlier.											
29	For 5% significance level, 2 is an outlier.											
30	For 1% significance level, 2 is an outlier.											
31												
32												
33			**Rosner's Outlier Test for Benzo(a)anthracene**									
34												
35												
36				**Mean**	**242.7**							
37				**Standard Deviation**	**326.5**							
38				**Number of data**	**35**							
39				**Number of suspected outliers**	**5**							
40												
41				Potential	Obs.	Test	Critical	Critical				
42	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
43	1	242.7	321.8	1500	35	3.907	2.98	3.32				
44	2	205.8	246	1300	34	4.449	2.97	3.3				
45	3	172.6	154.4	590	33	2.703	2.95	3.29				
46	4	159.6	137.2	520	32	2.627	2.94	3.27				
47	5	147.9	122.4	440	31	2.387	2.92	3.25				
48												
49	For 5% significance level, there are 2 Potential Outliers											
50	Therefore, Potential Statistical Outliers are											
51	1500, 1300											
52												
53	For 1% Significance Level, there are 2 Potential Outliers											
54	Therefore, Potential Statistical Outliers are											
55	1500, 1300											
56												
57												
58			**Rosner's Outlier Test for Benzo(a)pyrene**									

	A	B	C	D	E	F	G	H	I	J	K	L
59												
60												
61			**Mean**	**272.4**								
62			**Standard Deviation**	**417.1**								
63			**Number of data**	**35**								
64			**Number of suspected outliers**	**5**								
65												
66				Potential	Obs.	Test	Critical	Critical				
67	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
68	1	272.4	411.1	2100	35	4.446	2.98	3.32				
69	2	218.6	274	1500	34	4.677	2.97	3.3				
70	3	179.8	156.6	520	33	2.172	2.95	3.29				
71	4	169.2	146.5	500	32	2.257	2.94	3.27				
72	5	158.5	135.7	440	30	2.074	2.92	3.25				
73												
74	For 5% significance level, there are 2 Potential Outliers											
75	Therefore, Potential Statistical Outliers are											
76	2100, 1500											
77												
78	For 1% Significance Level, there are 2 Potential Outliers											
79	Therefore, Potential Statistical Outliers are											
80	2100, 1500											
81												
82												
83	**Rosner's Outlier Test for Benzo(b)fluoranthene**											
84												
85												
86			**Mean**	**476**								
87			**Standard Deviation**	**828**								
88			**Number of data**	**35**								
89			**Number of suspected outliers**	**5**								
90												
91				Potential	Obs.	Test	Critical	Critical				
92	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
93	1	476	816.1	3900	35	4.196	2.98	3.32				
94	2	375.3	583.6	3300	34	5.011	2.97	3.3				
95	3	286.7	275.5	950	33	2.408	2.95	3.29				
96	4	265.9	252.4	910	32	2.552	2.94	3.27				
97	5	245.2	227	880	31	2.796	2.92	3.25				
98												
99	For 5% significance level, there are 2 Potential Outliers											
100	Therefore, Potential Statistical Outliers are											
101	3900, 3300											
102												
103	For 1% Significance Level, there are 2 Potential Outliers											
104	Therefore, Potential Statistical Outliers are											
105	3900, 3300											
106												
107												
108	**Dixon's Outlier Test for Carbazole**											
109												
110	Number of data = 24											
111	10% critical value: 0.367											
112	5% critical value: 0.413											
113	1% critical value: 0.497											
114												
115	**1. Data Value 1600 is a Potential Outlier (Upper Tail)?**											
116												

	A	B	C	D	E	F	G	H	I	J	K	L
117	Test Statistic: 0.627											
118												
119	For 10% significance level, 1600 is an outlier.											
120	For 5% significance level, 1600 is an outlier.											
121	For 1% significance level, 1600 is an outlier.											
122												
123	**2. Data Value 2.4 is a Potential Outlier (Lower Tail)?**											
124												
125	Test Statistic: 0.004											
126												
127	For 10% significance level, 2.4 is not an outlier.											
128	For 5% significance level, 2.4 is not an outlier.											
129	For 1% significance level, 2.4 is not an outlier.											
130												
131												
132	**Rosner's Outlier Test for Dibenz(a,h)anthracene**											
133												
134												
135			**Mean**	**228.3**								
136			**Standard Deviation**	**358.7**								
137			**Number of data**	**35**								
138			**Number of suspected outliers**	**5**								
139												
140				Potential	Obs.	Test	Critical	Critical				
141	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
142	1	228.3	353.5	1600	35	3.88	2.98	3.32				
143	2	187.9	271.7	1200	34	3.725	2.97	3.3				
144	3	157.3	207.8	660	33	2.42	2.95	3.29				
145	4	141.5	190.1	600	32	2.411	2.94	3.27				
146	5	126.8	173.6	550	31	2.439	2.92	3.25				
147												
148	For 5% significance level, there are 2 Potential Outliers											
149	Therefore, Potential Statistical Outliers are											
150	1600, 1200											
151												
152	For 1% Significance Level, there are 2 Potential Outliers											
153	Therefore, Potential Statistical Outliers are											
154	1600, 1200											
155												
156												
157	**Rosner's Outlier Test for Indeno(1,2,3-cd)pyrene**											
158												
159												
160			**Mean**	**296.2**								
161			**Standard Deviation**	**522.1**								
162			**Number of data**	**35**								
163			**Number of suspected outliers**	**5**								
164												
165				Potential	Obs.	Test	Critical	Critical				
166	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
167	1	296.2	514.6	2800	35	4.865	2.98	3.32				
168	2	222.6	292.1	1500	34	4.373	2.97	3.3				
169	3	183.9	188.3	680	33	2.635	2.95	3.29				
170	4	168.4	168.5	600	32	2.561	2.94	3.27				
171	5	154.5	151.5	550	31	2.611	2.92	3.25				
172												
173	For 5% significance level, there are 2 Potential Outliers											
174	Therefore, Potential Statistical Outliers are											

	A	B	C	D	E	F	G	H	I	J	K	L
175	2800, 1500											
176												
177	For 1% Significance Level, there are 2 Potential Outliers											
178	Therefore, Potential Statistical Outliers are											
179	2800, 1500											
180												
181												
182				**Rosner's Outlier Test for Aroclor-1254**								
183												
184												
185				**Mean**	**943.5**							
186				**Standard Deviation**	**3797**							
187				**Number of data**	**35**							
188				**Number of suspected outliers**	**5**							
189												
190				Potential	Obs.	Test	Critical	Critical				
191	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
192	1	943.5	3742	21000	35	5.359	2.98	3.32				
193	2	353.6	1518	8900	34	5.628	2.97	3.3				
194	3	94.61	161.3	620	33	3.257	2.95	3.29				
195	4	78.19	133	560	32	3.624	2.94	3.27				
196	5	62.65	101.4	510	31	4.412	2.92	3.25				
197												
198	For 5% significance level, there are 5 Potential Outliers											
199	Therefore, Potential Statistical Outliers are											
200	21000, 8900, 620, 560, 510											
201												
202	For 1% Significance Level, there are 5 Potential Outliers											
203	Therefore, Potential Statistical Outliers are											
204	21000, 8900, 620, 560, 510											
205												
206												
207				**Rosner's Outlier Test for Aroclor-1260**								
208												
209												
210				**Mean**	**492.3**							
211				**Standard Deviation**	**711.9**							
212				**Number of data**	**35**							
213				**Number of suspected outliers**	**5**							
214												
215				Potential	Obs.	Test	Critical	Critical				
216	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
217	1	492.3	701.6	2400	34	2.719	2.98	3.32				
218	2	436.2	639.2	2400	35	3.072	2.97	3.3				
219	3	376.7	545.2	2300	33	3.528	2.95	3.29				
220	4	316.6	428.7	1600	32	2.994	2.94	3.27				
221	5	275.2	365	1300	31	2.808	2.92	3.25				
222												
223	For 5% significance level, there are 4 Potential Outliers											
224	Therefore, Potential Statistical Outliers are											
225	2400, 2400, 2300, 1600											
226												
227	For 1% Significance Level, there are 3 Potential Outliers											
228	Therefore, Potential Statistical Outliers are											
229	2400, 2400, 2300											
230												
231												
232				**Dixon's Outlier Test for Dieldrin**								

	A	B	C	D	E	F	G	H	I	J	K	L
233												
234	Number of data = 24											
235	10% critical value: 0.367											
236	5% critical value: 0.413											
237	1% critical value: 0.497											
238												
239	**1. Data Value 1400 is a Potential Outlier (Upper Tail)?**											
240												
241	Test Statistic: 0.968											
242												
243	For 10% significance level, 1400 is an outlier.											
244	For 5% significance level, 1400 is an outlier.											
245	For 1% significance level, 1400 is an outlier.											
246												
247	**2. Data Value 1.7 is a Potential Outlier (Lower Tail)?**											
248												
249	Test Statistic: 0.015											
250												
251	For 10% significance level, 1.7 is not an outlier.											
252	For 5% significance level, 1.7 is not an outlier.											
253	For 1% significance level, 1.7 is not an outlier.											
254												
255												
256	**Dixon's Outlier Test for Heptachlor epoxide**											
257												
258	Number of data = 24											
259	10% critical value: 0.367											
260	5% critical value: 0.413											
261	1% critical value: 0.497											
262												
263	**1. Data Value 540 is a Potential Outlier (Upper Tail)?**											
264												
265	Test Statistic: 0.991											
266												
267	For 10% significance level, 540 is an outlier.											
268	For 5% significance level, 540 is an outlier.											
269	For 1% significance level, 540 is an outlier.											
270												
271	**2. Data Value 0.71 is a Potential Outlier (Lower Tail)?**											
272												
273	Test Statistic: 0.218											
274												
275	For 10% significance level, 0.71 is not an outlier.											
276	For 5% significance level, 0.71 is not an outlier.											
277	For 1% significance level, 0.71 is not an outlier.											
278												
279												
280	**Rosner's Outlier Test for Arsenic**											
281												
282												
283	**Mean**			**14.57**								
284	**Standard Deviation**			**19.56**								
285	**Number of data**			**35**								
286	**Number of suspected outliers**			**5**								
287												
288				Potential	Obs.	Test	Critical	Critical				
289	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
290	1	14.57	19.28	111	35	5.001	2.98	3.32				

	A	B	C	D	E	F	G	H	I	J	K	L
291	2	11.73	10.21	43.6	34	3.122	2.97	3.3				
292	3	10.77	8.646	42.2	33	3.635	2.95	3.29				
293	4	9.787	6.656	26.6	32	2.526	2.94	3.27				
294	5	9.245	6.004	20.1	31	1.808	2.92	3.25				
295												
296	For 5% significance level, there are 3 Potential Outliers											
297	Therefore, Potential Statistical Outliers are											
298	111, 43.6, 42.2											
299												
300	For 1% Significance Level, there are 3 Potential Outliers											
301	Therefore, Potential Statistical Outliers are											
302	111, 43.6, 42.2											
303												
304												
305	**Rosner's Outlier Test for Chromium**											
306												
307												
308			**Mean**	**23.13**								
309			**Standard Deviation**	**14.02**								
310			**Number of data**	**35**								
311			**Number of suspected outliers**	**5**								
312												
313				Potential	Obs.	Test	Critical	Critical				
314	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
315	1	23.13	13.82	57	35	2.45	2.98	3.32				
316	2	22.14	12.92	49.7	34	2.134	2.97	3.3				
317	3	21.3	12.15	49	33	2.28	2.95	3.29				
318	4	20.43	11.26	43.1	32	2.013	2.94	3.27				
319	5	19.7	10.65	42.1	31	2.104	2.92	3.25				
320												
321	For 5% Significance Level, there is no Potential Outlier											
322												
323	For 1% Significance Level, there is no Potential Outlier											
324												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface Water Drainage Channel to Upstream Pond**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9			**Dixon's Outlier Test for Arsenic**									
10												
11	Number of data = 5											
12	10% critical value: 0.557											
13	5% critical value: 0.642											
14	1% critical value: 0.78											
15												
16	**1. Data Value 58 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.940											
19												
20	For 10% significance level, 58 is an outlier.											
21	For 5% significance level, 58 is an outlier.											
22	For 1% significance level, 58 is an outlier.											
23												
24	**2. Data Value 1.6 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.060											
27												
28	For 10% significance level, 1.6 is not an outlier.											
29	For 5% significance level, 1.6 is not an outlier.											
30	For 1% significance level, 1.6 is not an outlier.											
31												
32												
33			**Dixon's Outlier Test for Iron**									
34												
35	Number of data = 5											
36	10% critical value: 0.557											
37	5% critical value: 0.642											
38	1% critical value: 0.78											
39												
40	**1. Data Value 30300 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.951											
43												
44	For 10% significance level, 30300 is an outlier.											
45	For 5% significance level, 30300 is an outlier.											
46	For 1% significance level, 30300 is an outlier.											
47												
48	**2. Data Value 339 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.003											
51												
52	For 10% significance level, 339 is not an outlier.											
53	For 5% significance level, 339 is not an outlier.											
54	For 1% significance level, 339 is not an outlier.											
55												

	A	B	C	D	E	F	G	H	I	J	K	L
1					**Outlier Tests for Selected Variables - Surface Sediment Drainage Channel to Upstream Pond**							
2				**User Selected Options**								
3				From File	data manip for ProUCL input.wst							
4				Full Precision	OFF							
5			Test for Suspected Outliers with Dixon test		1							
6			Test for Suspected Outliers with Rosner test		5							
7												
8												
9			**Dixon's Outlier Test for Benzo(a)pyrene**									
10												
11	Number of data = 13											
12	10% critical value: 0.467											
13	5% critical value: 0.521											
14	1% critical value: 0.615											
15												
16	**1. Data Value 380 is a Potential Outlier (Upper Tail)?**											
17												
18	Test Statistic: 0.668											
19												
20	For 10% significance level, 380 is an outlier.											
21	For 5% significance level, 380 is an outlier.											
22	For 1% significance level, 380 is an outlier.											
23												
24	**2. Data Value 0.12 is a Potential Outlier (Lower Tail)?**											
25												
26	Test Statistic: 0.045											
27												
28	For 10% significance level, 0.12 is not an outlier.											
29	For 5% significance level, 0.12 is not an outlier.											
30	For 1% significance level, 0.12 is not an outlier.											
31												
32												
33			**Dixon's Outlier Test for Carbazole**									
34												
35	Number of data = 10											
36	10% critical value: 0.409											
37	5% critical value: 0.477											
38	1% critical value: 0.597											
39												
40	**1. Data Value 26 is a Potential Outlier (Upper Tail)?**											
41												
42	Test Statistic: 0.000											
43												
44	For 10% significance level, 26 is not an outlier.											
45	For 5% significance level, 26 is not an outlier.											
46	For 1% significance level, 26 is not an outlier.											
47												
48	**2. Data Value 6 is a Potential Outlier (Lower Tail)?**											
49												
50	Test Statistic: 0.025											
51												
52	For 10% significance level, 6 is not an outlier.											
53	For 5% significance level, 6 is not an outlier.											
54	For 1% significance level, 6 is not an outlier.											
55												
56												
57			**Dixon's Outlier Test for Arsenic**									
58												

	A	B	C	D	E	F	G	H	I	J	K	L
59	Number of data = 13											
60	10% critical value: 0.467											
61	5% critical value: 0.521											
62	1% critical value: 0.615											
63												
64	**1. Data Value 13.2 is a Potential Outlier (Upper Tail)?**											
65												
66	Test Statistic: 0.393											
67												
68	For 10% significance level, 13.2 is not an outlier.											
69	For 5% significance level, 13.2 is not an outlier.											
70	For 1% significance level, 13.2 is not an outlier.											
71												
72	**2. Data Value 2.3 is a Potential Outlier (Lower Tail)?**											
73												
74	Test Statistic: 0.049											
75												
76	For 10% significance level, 2.3 is not an outlier.											
77	For 5% significance level, 2.3 is not an outlier.											
78	For 1% significance level, 2.3 is not an outlier.											
79												
80												
81	**Dixon's Outlier Test for Chromium**											
82												
83	Number of data = 13											
84	10% critical value: 0.467											
85	5% critical value: 0.521											
86	1% critical value: 0.615											
87												
88	**1. Data Value 71.8 is a Potential Outlier (Upper Tail)?**											
89												
90	Test Statistic: 0.848											
91												
92	For 10% significance level, 71.8 is an outlier.											
93	For 5% significance level, 71.8 is an outlier.											
94	For 1% significance level, 71.8 is an outlier.											
95												
96	**2. Data Value 9.4 is a Potential Outlier (Lower Tail)?**											
97												
98	Test Statistic: 0.067											
99												
100	For 10% significance level, 9.4 is not an outlier.											
101	For 5% significance level, 9.4 is not an outlier.											
102	For 1% significance level, 9.4 is not an outlier.											
103												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - Soil* Fenced Area YP/S4								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Acenaphthylene											
10												
11						General Statistics						
12						Number of Valid Data	9				Number of Detected Data	6
13						Number of Distinct Detected Data	6				Number of Non-Detect Data	3
14											Percent Non-Detects	33.33%
15												
16						Raw Statistics					Log-transformed Statistics	
17						Minimum Detected	3				Minimum Detected	1.099
18						Maximum Detected	4100				Maximum Detected	8.319
19						Mean of Detected	703.3				Mean of Detected	3.761
20						SD of Detected	1664				SD of Detected	2.426
21						Minimum Non-Detect	21				Minimum Non-Detect	3.045
22						Maximum Non-Detect	330				Maximum Non-Detect	5.799
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	8
25	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
26	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	88.89%
27												
28						Warning: There are only 6 Detected Values in this data						
29						Note: It should be noted that even though bootstrap may be performed on this data set						
30						the resulting calculations may not be reliable enough to draw conclusions						
31												
32						It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.						
33												
34												
35						UCL Statistics						
36						Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only	
37						Shapiro Wilk Test Statistic	0.505				Shapiro Wilk Test Statistic	0.839
38						5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value	0.788
39						Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level	
40												
41						Assuming Normal Distribution					Assuming Lognormal Distribution	
42						DL/2 Substitution Method					DL/2 Substitution Method	
43						Mean	490.2				Mean	3.644
44						SD	1355				SD	2.064
45						95% DL/2 (t) UCL	1330				95% H-Stat (DL/2) UCL	23467
46												
47						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method	
48						MLE method failed to converge properly					Mean in Log Scale	3.351
49											SD in Log Scale	2.025
50											Mean in Original Scale	473.3
51											SD in Original Scale	1360
52											95% t UCL	1316
53											95% Percentile Bootstrap UCL	1379
54											95% BCA Bootstrap UCL	1832
55											95% H-UCL	13859
56												
57						Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only	
58						k star (bias corrected)	0.238				Data appear Lognormal at 5% Significance Level	
59						Theta Star	2957					

	A	B	C	D	E	F	G	H	I	J	K	L
60					nu star	2.855						
61												
62					A-D Test Statistic	1.065	Nonparametric Statistics					
63					5% A-D Critical Value	0.783				Kaplan-Meier (KM) Method		
64					K-S Test Statistic	0.783					Mean	474.6
65					5% K-S Critical Value	0.36					SD	1282
66	Data not Gamma Distributed at 5% Significance Level										SE of Mean	468.1
67											95% KM (t) UCL	1345
68	Assuming Gamma Distribution										95% KM (z) UCL	1245
69			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	1317
70					Minimum	0.000001					95% KM (bootstrap t) UCL	57720
71					Maximum	4100					95% KM (BCA) UCL	1383
72					Mean	468.9					95% KM (Percentile Bootstrap) UCL	1379
73					Median	18					95% KM (Chebyshev) UCL	2515
74					SD	1362					97.5% KM (Chebyshev) UCL	3398
75					k star	0.14					99% KM (Chebyshev) UCL	5132
76					Theta star	3353						
77					Nu star	2.517	Potential UCLs to Use					
78					AppChi2	0.245					99% KM (Chebyshev) UCL	5132
79					95% Gamma Approximate UCL (Use when n >= 40)	4817						
80					95% Adjusted Gamma UCL (Use when n < 40)	7532						
81	Warning: Recommended UCL exceeds the maximum observation											
82	Note: DL/2 is not a recommended method.											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
86	For additional insight, the user may want to consult a statistician.											
87												
88												
89	Benzo(a)anthracene											
90												
91	General Statistics											
92					Number of Valid Observations	9					Number of Distinct Observations	9
93												
94	Raw Statistics						Log-transformed Statistics					
95					Minimum	92					Minimum of Log Data	4.522
96					Maximum	180000					Maximum of Log Data	12.1
97					Mean	20816					Mean of log Data	7.011
98					Geometric Mean	1108					SD of log Data	2.204
99					Median	1100						
100					SD	59698						
101					Std. Error of Mean	19899						
102					Coefficient of Variation	2.868						
103					Skewness	2.999						
104												
105												
106	Warning: There are only 9 Values in this data											
107	Note: It should be noted that even though bootstrap methods may be performed on this data set,											
108	the resulting calculations may not be reliable enough to draw conclusions											
109												
110	The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.											
111												
112	Relevant UCL Statistics											
113	Normal Distribution Test						Lognormal Distribution Test					
114					Shapiro Wilk Test Statistic	0.4					Shapiro Wilk Test Statistic	0.84
115					Shapiro Wilk Critical Value	0.829					Shapiro Wilk Critical Value	0.829
116	Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
117												
118	Assuming Normal Distribution						Assuming Lognormal Distribution					

	A	B	C	D	E	F	G	H	I	J	K	L
119					95% Student's-t UCL	57819					95% H-UCL	1624264
120				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	28555
121					95% Adjusted-CLT UCL (Chen-1995)	74805					97.5% Chebyshev (MVUE) UCL	37908
122					95% Modified-t UCL (Johnson-1978)	61135					99% Chebyshev (MVUE) UCL	56281
123												
124				Gamma Distribution Test					Data Distribution			
125					k star (bias corrected)	0.236			Data appear Lognormal at 5% Significance Level			
126					Theta Star	88112						
127					MLE of Mean	20816						
128					MLE of Standard Deviation	42827						
129					nu star	4.252						
130					Approximate Chi Square Value (.05)	0.824			Nonparametric Statistics			
131					Adjusted Level of Significance	0.0231					95% CLT UCL	53547
132					Adjusted Chi Square Value	0.558					95% Jackknife UCL	57819
133											95% Standard Bootstrap UCL	51438
134					Anderson-Darling Test Statistic	1.654					95% Bootstrap-t UCL	2188954
135					Anderson-Darling 5% Critical Value	0.829					95% Hall's Bootstrap UCL	1014827
136					Kolmogorov-Smirnov Test Statistic	0.454					95% Percentile Bootstrap UCL	60482
137					Kolmogorov-Smirnov 5% Critical Value	0.305					95% BCA Bootstrap UCL	80434
138				Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	107555
139											97.5% Chebyshev(Mean, Sd) UCL	145087
140				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	218811
141					95% Approximate Gamma UCL (Use when n >= 40)	107441						
142					95% Adjusted Gamma UCL (Use when n < 40)	158570						
143												
144				Potential UCL to Use							Use 99% Chebyshev (Mean, Sd) UCL	218811
145					Recommended UCL exceeds the maximum observation							
146												
147				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
148				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
149				and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.								
150												
151												
152	Benzo(a)pyrene											
153												
154					General Statistics							
155					Number of Valid Observations	9					Number of Distinct Observations	8
156												
157				Raw Statistics					Log-transformed Statistics			
158					Minimum	79					Minimum of Log Data	4.369
159					Maximum	130000					Maximum of Log Data	11.78
160					Mean	15051					Mean of log Data	6.723
161					Geometric Mean	831.7					SD of log Data	2.177
162					Median	950						
163					SD	43109						
164					Std. Error of Mean	14370						
165					Coefficient of Variation	2.864						
166					Skewness	2.999						
167												
168												
169					Warning: There are only 9 Values in this data							
170					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
171					the resulting calculations may not be reliable enough to draw conclusions							
172												
173					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
174												
175					Relevant UCL Statistics							
176				Normal Distribution Test					Lognormal Distribution Test			
177					Shapiro Wilk Test Statistic	0.4					Shapiro Wilk Test Statistic	0.827

	A	B	C	D	E	F	G	H	I	J	K	L
178					Shapiro Wilk Critical Value	0.829					Shapiro Wilk Critical Value	0.829
179				Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level			
180												
181				Assuming Normal Distribution					Assuming Lognormal Distribution			
182					95% Student's-t UCL	41771					95% H-UCL	1027954
183				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	20481
184					95% Adjusted-CLT UCL (Chen-1995)	54037					97.5% Chebyshev (MVUE) UCL	27175
185					95% Modified-t UCL (Johnson-1978)	44166					99% Chebyshev (MVUE) UCL	40324
186												
187				Gamma Distribution Test					Data Distribution			
188					k star (bias corrected)	0.238			Data do not follow a Discernable Distribution (0.05)			
189					Theta Star	63229						
190					MLE of Mean	15051						
191					MLE of Standard Deviation	30848						
192					nu star	4.285						
193					Approximate Chi Square Value (.05)	0.837			Nonparametric Statistics			
194					Adjusted Level of Significance	0.0231					95% CLT UCL	38686
195					Adjusted Chi Square Value	0.568					95% Jackknife UCL	41771
196											95% Standard Bootstrap UCL	36847
197					Anderson-Darling Test Statistic	1.681					95% Bootstrap-t UCL	1521142
198					Anderson-Darling 5% Critical Value	0.828					95% Hall's Bootstrap UCL	824630
199					Kolmogorov-Smirnov Test Statistic	0.456					95% Percentile Bootstrap UCL	43680
200					Kolmogorov-Smirnov 5% Critical Value	0.305					95% BCA Bootstrap UCL	58018
201				Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	77686
202											97.5% Chebyshev(Mean, Sd) UCL	104789
203				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	158026
204					95% Approximate Gamma UCL (Use when n >= 40)	77021						
205					95% Adjusted Gamma UCL (Use when n < 40)	113455						
206												
207				Potential UCL to Use							Use 95% Hall's Bootstrap UCL	824630
208					Recommended UCL exceeds the maximum observation							
209					In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL							
210												
211					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
212					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
213					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
214												
215												
216	Benzo(b)fluoranthene											
217												
218					General Statistics							
219					Number of Valid Observations	9					Number of Distinct Observations	9
220												
221				Raw Statistics					Log-transformed Statistics			
222					Minimum	160					Minimum of Log Data	5.075
223					Maximum	200000					Maximum of Log Data	12.21
224					Mean	23208					Mean of log Data	7.262
225					Geometric Mean	1425					SD of log Data	2.094
226					Median	1400						
227					SD	66301						
228					Std. Error of Mean	22100						
229					Coefficient of Variation	2.857						
230					Skewness	2.999						
231												
232												
233					Warning: There are only 9 Values in this data							
234					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
235					the resulting calculations may not be reliable enough to draw conclusions							
236												

	A	B	C	D	E	F	G	H	I	J	K	L
237	The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.											
238												
239	Relevant UCL Statistics											
240	Normal Distribution Test						Lognormal Distribution Test					
241					Shapiro Wilk Test Statistic	0.401				Shapiro Wilk Test Statistic		0.812
242					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
243	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
244												
245	Assuming Normal Distribution						Assuming Lognormal Distribution					
246					95% Student's-t UCL	64305				95% H-UCL		1045198
247	95% UCLs (Adjusted for Skewness)									95% Chebyshev (MVUE) UCL		30460
248					95% Adjusted-CLT UCL (Chen-1995)	83169				97.5% Chebyshev (MVUE) UCL		40345
249					95% Modified-t UCL (Johnson-1978)	67987				99% Chebyshev (MVUE) UCL		59760
250												
251	Gamma Distribution Test						Data Distribution					
252					k star (bias corrected)	0.243	Data do not follow a Discernable Distribution (0.05)					
253					Theta Star	95374						
254					MLE of Mean	23208						
255					MLE of Standard Deviation	47047						
256					nu star	4.38						
257					Approximate Chi Square Value (.05)	0.877	Nonparametric Statistics					
258					Adjusted Level of Significance	0.0231				95% CLT UCL		59560
259					Adjusted Chi Square Value	0.599				95% Jackknife UCL		64305
260										95% Standard Bootstrap UCL		58165
261					Anderson-Darling Test Statistic	1.74				95% Bootstrap-t UCL		2387223
262					Anderson-Darling 5% Critical Value	0.825				95% Hall's Bootstrap UCL		1156872
263					Kolmogorov-Smirnov Test Statistic	0.458				95% Percentile Bootstrap UCL		67328
264					Kolmogorov-Smirnov 5% Critical Value	0.304				95% BCA Bootstrap UCL		89426
265	Data not Gamma Distributed at 5% Significance Level									95% Chebyshev(Mean, Sd) UCL		119541
266										97.5% Chebyshev(Mean, Sd) UCL		161225
267	Assuming Gamma Distribution									99% Chebyshev(Mean, Sd) UCL		243105
268					95% Approximate Gamma UCL (Use when n >= 40)	115864						
269					95% Adjusted Gamma UCL (Use when n < 40)	169724						
270												
271	Potential UCL to Use									Use 95% Hall's Bootstrap UCL		1156872
272	Recommended UCL exceeds the maximum observation											
273	In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL											
274												
275	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
276	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
277	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
278												
279												
280	Benzo(k)fluoranthene											
281												
282	General Statistics											
283					Number of Valid Observations	9				Number of Distinct Observations		9
284												
285	Raw Statistics						Log-transformed Statistics					
286					Minimum	58				Minimum of Log Data		4.06
287					Maximum	81000				Maximum of Log Data		11.3
288					Mean	9331				Mean of log Data		6.168
289					Geometric Mean	477.3				SD of log Data		2.166
290					Median	560						
291					SD	26877						
292					Std. Error of Mean	8959						
293					Coefficient of Variation	2.88						
294					Skewness	2.999						
295												

	A	B	C	D	E	F	G	H	I	J	K	L
296												
297	Warning: There are only 9 Values in this data											
298	Note: It should be noted that even though bootstrap methods may be performed on this data set,											
299	the resulting calculations may not be reliable enough to draw conclusions											
300												
301	The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.											
302												
303	Relevant UCL Statistics											
304	Normal Distribution Test						Lognormal Distribution Test					
305					Shapiro Wilk Test Statistic	0.399				Shapiro Wilk Test Statistic		0.792
306					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
307	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
308												
309	Assuming Normal Distribution						Assuming Lognormal Distribution					
310					95% Student's-t UCL	25991				95% H-UCL		550364
311	95% UCLs (Adjusted for Skewness)									95% Chebyshev (MVUE) UCL		11538
312					95% Adjusted-CLT UCL (Chen-1995)	33638				97.5% Chebyshev (MVUE) UCL		15306
313					95% Modified-t UCL (Johnson-1978)	27484				99% Chebyshev (MVUE) UCL		22708
314												
315	Gamma Distribution Test						Data Distribution					
316					k star (bias corrected)	0.234	Data do not follow a Discernable Distribution (0.05)					
317					Theta Star	39814						
318					MLE of Mean	9331						
319					MLE of Standard Deviation	19274						
320					nu star	4.219						
321					Approximate Chi Square Value (.05)	0.81	Nonparametric Statistics					
322					Adjusted Level of Significance	0.0231				95% CLT UCL		24067
323					Adjusted Chi Square Value	0.548				95% Jackknife UCL		25991
324										95% Standard Bootstrap UCL		23441
325					Anderson-Darling Test Statistic	1.788				95% Bootstrap-t UCL		1037947
326					Anderson-Darling 5% Critical Value	0.83				95% Hall's Bootstrap UCL		658940
327					Kolmogorov-Smirnov Test Statistic	0.47				95% Percentile Bootstrap UCL		27229
328					Kolmogorov-Smirnov 5% Critical Value	0.305				95% BCA Bootstrap UCL		36172
329	Data not Gamma Distributed at 5% Significance Level									95% Chebyshev(Mean, Sd) UCL		48382
330										97.5% Chebyshev(Mean, Sd) UCL		65280
331	Assuming Gamma Distribution									99% Chebyshev(Mean, Sd) UCL		98472
332					95% Approximate Gamma UCL (Use when n >= 40)	48603						
333					95% Adjusted Gamma UCL (Use when n < 40)	71876						
334												
335	Potential UCL to Use									Use 95% Hall's Bootstrap UCL		658940
336	Recommended UCL exceeds the maximum observation											
337	In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL											
338												
339	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
340	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
341	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
342												
343												
344	Carbazole											
345												
346	General Statistics											
347					Number of Valid Data	8				Number of Detected Data		7
348					Number of Distinct Detected Data	7				Number of Non-Detect Data		1
349										Percent Non-Detects		12.50%
350												
351	Raw Statistics						Log-transformed Statistics					
352					Minimum Detected	90				Minimum Detected		4.5
353					Maximum Detected	120000				Maximum Detected		11.7
354					Mean of Detected	17397				Mean of Detected		6.384

	A	B	C	D	E	F	G	H	I	J	K	L
355					SD of Detected	45244					SD of Detected	2.425
356					Minimum Non-Detect	130					Minimum Non-Detect	4.868
357					Maximum Non-Detect	130					Maximum Non-Detect	4.868
358												
359												
360					Warning: There are only 7 Detected Values in this data							
361					Note: It should be noted that even though bootstrap may be performed on this data set							
362					the resulting calculations may not be reliable enough to draw conclusions							
363												
364					It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.							
365												
366												
367					UCL Statistics							
368				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
369					Shapiro Wilk Test Statistic	0.457					Shapiro Wilk Test Statistic	0.701
370					5% Shapiro Wilk Critical Value	0.803					5% Shapiro Wilk Critical Value	0.803
371				Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level			
372												
373				Assuming Normal Distribution					Assuming Lognormal Distribution			
374					DL/2 Substitution Method						DL/2 Substitution Method	
375					Mean	15231					Mean	6.108
376					SD	42334					SD	2.377
377					95% DL/2 (t) UCL	43587					95% H-Stat (DL/2) UCL	4922205
378												
379					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
380					Mean	6275					Mean in Log Scale	5.988
381					SD	47655					SD in Log Scale	2.509
382					95% MLE (t) UCL	38196					Mean in Original Scale	15226
383					95% MLE (Tiku) UCL	38343					SD in Original Scale	42336
384											95% t UCL	43584
385											95% Percentile Bootstrap UCL	45115
386											95% BCA Bootstrap UCL	60101
387											95% H UCL	12361411
388												
389				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
390					k star (bias corrected)	0.218			Data do not follow a Discernable Distribution (0.05)			
391					Theta Star	79717						
392					nu star	3.055						
393												
394					A-D Test Statistic	1.586			Nonparametric Statistics			
395					5% A-D Critical Value	0.815					Kaplan-Meier (KM) Method	
396					K-S Test Statistic	0.815					Mean	15234
397					5% K-S Critical Value	0.341					SD	39598
398				Data not Gamma Distributed at 5% Significance Level							SE of Mean	15122
399											95% KM (t) UCL	43883
400				Assuming Gamma Distribution							95% KM (z) UCL	40107
401					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	43581
402					Minimum	0.000001					95% KM (bootstrap t) UCL	5846523
403					Maximum	120000					95% KM (BCA) UCL	45156
404					Mean	15223					95% KM (Percentile Bootstrap) UCL	45139
405					Median	220					95% KM (Chebyshev) UCL	81148
406					SD	42337					97.5% KM (Chebyshev) UCL	109670
407					k star	0.168					99% KM (Chebyshev) UCL	165694
408					Theta star	90709						
409					Nu star	2.685			Potential UCLs to Use			
410					AppChi2	0.286					99% KM (Chebyshev) UCL	165694
411					95% Gamma Approximate UCL (Use when n >= 40)	143126						
412					95% Adjusted Gamma UCL (Use when n < 40)	248027						
413					Warning: Recommended UCL exceeds the maximum observation							

	A	B	C	D	E	F	G	H	I	J	K	L
414	Note: DL/2 is not a recommended method.											
415												
416	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
417	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
418	For additional insight, the user may want to consult a statistician.											
419												
420												
421	Chrysene											
422												
423	General Statistics											
424					Number of Valid Observations	9				Number of Distinct Observations		7
425												
426	Raw Statistics						Log-transformed Statistics					
427					Minimum	120				Minimum of Log Data		4.787
428					Maximum	210000				Maximum of Log Data		12.25
429					Mean	24200				Mean of log Data		7.114
430					Geometric Mean	1229				SD of log Data		2.198
431					Median	1400						
432					SD	69678						
433					Std. Error of Mean	23226						
434					Coefficient of Variation	2.879						
435					Skewness	2.999						
436												
437												
438	Warning: There are only 9 Values in this data											
439	Note: It should be noted that even though bootstrap methods may be performed on this data set,											
440	the resulting calculations may not be reliable enough to draw conclusions											
441												
442	The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.											
443												
444	Relevant UCL Statistics											
445	Normal Distribution Test						Lognormal Distribution Test					
446					Shapiro Wilk Test Statistic	0.399				Shapiro Wilk Test Statistic		0.811
447					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
448	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
449												
450	Assuming Normal Distribution						Assuming Lognormal Distribution					
451					95% Student's-t UCL	67390				95% H-UCL		1732519
452	95% UCLs (Adjusted for Skewness)									95% Chebyshev (MVUE) UCL		31334
453					95% Adjusted-CLT UCL (Chen-1995)	87216				97.5% Chebyshev (MVUE) UCL		41592
454					95% Modified-t UCL (Johnson-1978)	71260				99% Chebyshev (MVUE) UCL		61743
455												
456	Gamma Distribution Test						Data Distribution					
457					k star (bias corrected)	0.234	Data do not follow a Discernable Distribution (0.05)					
458					Theta Star	103415						
459					MLE of Mean	24200						
460					MLE of Standard Deviation	50026						
461					nu star	4.212						
462					Approximate Chi Square Value (.05)	0.807	Nonparametric Statistics					
463					Adjusted Level of Significance	0.0231				95% CLT UCL		62403
464					Adjusted Chi Square Value	0.546				95% Jackknife UCL		67390
465										95% Standard Bootstrap UCL		60624
466					Anderson-Darling Test Statistic	1.743				95% Bootstrap-t UCL		2892211
467					Anderson-Darling 5% Critical Value	0.83				95% Hall's Bootstrap UCL		1464659
468					Kolmogorov-Smirnov Test Statistic	0.471				95% Percentile Bootstrap UCL		70589
469					Kolmogorov-Smirnov 5% Critical Value	0.305				95% BCA Bootstrap UCL		93762
470	Data not Gamma Distributed at 5% Significance Level									95% Chebyshev(Mean, Sd) UCL		125440
471										97.5% Chebyshev(Mean, Sd) UCL		169247
472	Assuming Gamma Distribution									99% Chebyshev(Mean, Sd) UCL		255296

	A	B	C	D	E	F	G	H	I	J	K	L
473			95% Approximate Gamma UCL (Use when n >= 40)			126272						
474			95% Adjusted Gamma UCL (Use when n < 40)			186809						
475												
476			Potential UCL to Use							Use 95% Hall's Bootstrap UCL		1464659
477			Recommended UCL exceeds the maximum observation									
478			In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL									
479												
480			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
481			These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)									
482			and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.									
483												
484												
485	Dibenz(a,h)anthracene											
486												
487			General Statistics									
488			Number of Valid Data			9				Number of Detected Data		8
489			Number of Distinct Detected Data			8				Number of Non-Detect Data		1
490										Percent Non-Detects		11.11%
491												
492			Raw Statistics							Log-transformed Statistics		
493			Minimum Detected			17				Minimum Detected		2.833
494			Maximum Detected			22000				Maximum Detected		9.999
495			Mean of Detected			2849				Mean of Detected		5.062
496			SD of Detected			7738				SD of Detected		2.215
497			Minimum Non-Detect			330				Minimum Non-Detect		5.799
498			Maximum Non-Detect			330				Maximum Non-Detect		5.799
499												
500												
501			Warning: There are only 8 Detected Values in this data									
502			Note: It should be noted that even though bootstrap may be performed on this data set									
503			the resulting calculations may not be reliable enough to draw conclusions									
504												
505			It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.									
506												
507												
508			UCL Statistics									
509			Normal Distribution Test with Detected Values Only							Lognormal Distribution Test with Detected Values Only		
510			Shapiro Wilk Test Statistic			0.428				Shapiro Wilk Test Statistic		0.819
511			5% Shapiro Wilk Critical Value			0.818				5% Shapiro Wilk Critical Value		0.818
512			Data not Normal at 5% Significance Level							Data appear Lognormal at 5% Significance Level		
513												
514			Assuming Normal Distribution							Assuming Lognormal Distribution		
515			DL/2 Substitution Method							DL/2 Substitution Method		
516			Mean			2551				Mean		5.066
517			SD			7294				SD		2.072
518			95% DL/2 (t) UCL			7072				95% H-Stat (DL/2) UCL		101764
519												
520			Maximum Likelihood Estimate(MLE) Method			N/A				Log ROS Method		
521			MLE method failed to converge properly							Mean in Log Scale		5.014
522										SD in Log Scale		2.076
523										Mean in Original Scale		2544
524										SD in Original Scale		7296
525										95% t UCL		7067
526										95% Percentile Bootstrap UCL		7392
527										95% BCA Bootstrap UCL		9843
528										95% H-UCL		99455
529												
530			Gamma Distribution Test with Detected Values Only							Data Distribution Test with Detected Values Only		
531			k star (bias corrected)			0.237				Data appear Lognormal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
532					Theta Star	12014						
533					nu star	3.794						
534												
535					A-D Test Statistic	1.504	Nonparametric Statistics					
536					5% A-D Critical Value	0.818				Kaplan-Meier (KM) Method		
537					K-S Test Statistic	0.818				Mean		2545
538					5% K-S Critical Value	0.32				SD		6879
539	Data not Gamma Distributed at 5% Significance Level									SE of Mean		2451
540										95% KM (t) UCL		7103
541	Assuming Gamma Distribution									95% KM (z) UCL		6577
542			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		7068
543					Minimum	0.000001				95% KM (bootstrap t) UCL		272099
544					Maximum	22000				95% KM (BCA) UCL		7425
545					Mean	2533				95% KM (Percentile Bootstrap) UCL		7387
546					Median	110				95% KM (Chebyshev) UCL		13230
547					SD	7301				97.5% KM (Chebyshev) UCL		17853
548					k star	0.179				99% KM (Chebyshev) UCL		26935
549					Theta star	14184						
550					Nu star	3.214	Potential UCLs to Use					
551					AppChi2	0.439				99% KM (Chebyshev) UCL		26935
552			95% Gamma Approximate UCL (Use when n >= 40)			18562						
553			95% Adjusted Gamma UCL (Use when n < 40)			29160						
554	Warning: Recommended UCL exceeds the maximum observation											
555	Note: DL/2 is not a recommended method.											
556												
557	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
558	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
559	For additional insight, the user may want to consult a statistician.											
560												
561												
562	Dibenzofuran											
563												
564	General Statistics											
565					Number of Valid Data	8				Number of Detected Data		4
566					Number of Distinct Detected Data	4				Number of Non-Detect Data		4
567										Percent Non-Detects		50.00%
568												
569	Raw Statistics						Log-transformed Statistics					
570					Minimum Detected	120				Minimum Detected		4.787
571					Maximum Detected	19000				Maximum Detected		9.852
572					Mean of Detected	4963				Mean of Detected		6.609
573					SD of Detected	9359				SD of Detected		2.225
574					Minimum Non-Detect	130				Minimum Non-Detect		4.868
575					Maximum Non-Detect	380				Maximum Non-Detect		5.94
576												
577	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		6
578	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
579	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		75.00%
580												
581	Warning: There are only 4 Distinct Detected Values in this data											
582	Note: It should be noted that even though bootstrap may be performed on this data set											
583	the resulting calculations may not be reliable enough to draw conclusions											
584												
585	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
586												
587												
588	UCL Statistics											
589	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
590					Shapiro Wilk Test Statistic	0.641				Shapiro Wilk Test Statistic		0.822

	A	B	C	D	E	F	G	H	I	J	K	L
591					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
592					Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level	
593												
594					Assuming Normal Distribution						Assuming Lognormal Distribution	
595					DL/2 Substitution Method						DL/2 Substitution Method	
596					Mean	2558					Mean	5.777
597					SD	6645					SD	1.74
598					95% DL/2 (t) UCL	7008					95% H-Stat (DL/2) UCL	51222
599												
600					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
601					MLE method failed to converge properly						Mean in Log Scale	5.557
602											SD in Log Scale	1.852
603											Mean in Original Scale	2528
604											SD in Original Scale	6657
605											95% t UCL	6987
606											95% Percentile Bootstrap UCL	7193
607											95% BCA Bootstrap UCL	7319
608											95% H-UCL	78735
609												
610					Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only	
611					k star (bias corrected)	0.255					Data Follow Appr. Gamma Distribution at 5% Significance Level	
612					Theta Star	19461						
613					nu star	2.04						
614												
615					A-D Test Statistic	0.691					Nonparametric Statistics	
616					5% A-D Critical Value	0.698					Kaplan-Meier (KM) Method	
617					K-S Test Statistic	0.698					Mean	2556
618					5% K-S Critical Value	0.416					SD	6216
619					Data follow Appr. Gamma Distribution at 5% Significance Level						SE of Mean	2538
620											95% KM (t) UCL	7364
621					Assuming Gamma Distribution						95% KM (z) UCL	6730
622					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	6942
623					Minimum	0.000001					95% KM (bootstrap t) UCL	176296
624					Maximum	19000					95% KM (BCA) UCL	19000
625					Mean	2481					95% KM (Percentile Bootstrap) UCL	7344
626					Median	60					95% KM (Chebyshev) UCL	13618
627					SD	6676					97.5% KM (Chebyshev) UCL	18405
628					k star	0.129					99% KM (Chebyshev) UCL	27808
629					Theta star	19174						
630					Nu star	2.071					Potential UCLs to Use	
631					AppChi2	0.161					95% KM (t) UCL	7364
632					95% Gamma Approximate UCL (Use when n >= 40)	32008						
633					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
634	Note: DL/2 is not a recommended method.											
635												
636					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
637					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
638					For additional insight, the user may want to consult a statistician.							
639												
640												
641	Fluoranthene											
642												
643					General Statistics							
644					Number of Valid Observations	9					Number of Distinct Observations	9
645												
646					Raw Statistics						Log-transformed Statistics	
647					Minimum	75					Minimum of Log Data	4.317
648					Maximum	500000					Maximum of Log Data	13.12
649					Mean	57625					Mean of log Data	7.801

	A	B	C	D	E	F	G	H	I	J	K	L
650					Geometric Mean	2442					SD of log Data	2.441
651					Median	2400						
652					SD	165901						
653					Std. Error of Mean	55300						
654					Coefficient of Variation	2.879						
655					Skewness	2.999						
656												
657												
658					Warning: There are only 9 Values in this data							
659					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
660					the resulting calculations may not be reliable enough to draw conclusions							
661												
662					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
663												
664					Relevant UCL Statistics							
665					Normal Distribution Test					Lognormal Distribution Test		
666					Shapiro Wilk Test Statistic	0.4				Shapiro Wilk Test Statistic		0.897
667					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
668					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
669												
670					Assuming Normal Distribution					Assuming Lognormal Distribution		
671					95% Student's-t UCL	160458				95% H-UCL		17954992
672					95% UCLs (Adjusted for Skewness)					95% Chebyshev (MVUE) UCL		94691
673					95% Adjusted-CLT UCL (Chen-1995)	207661				97.5% Chebyshev (MVUE) UCL		126226
674					95% Modified-t UCL (Johnson-1978)	169673				99% Chebyshev (MVUE) UCL		188173
675												
676					Gamma Distribution Test					Data Distribution		
677					k star (bias corrected)	0.226				Data appear Lognormal at 5% Significance Level		
678					Theta Star	254866						
679					MLE of Mean	57625						
680					MLE of Standard Deviation	121189						
681					nu star	4.07						
682					Approximate Chi Square Value (.05)	0.749				Nonparametric Statistics		
683					Adjusted Level of Significance	0.0231				95% CLT UCL		148586
684					Adjusted Chi Square Value	0.502				95% Jackknife UCL		160458
685										95% Standard Bootstrap UCL		143681
686					Anderson-Darling Test Statistic	1.48				95% Bootstrap-t UCL		6455297
687					Anderson-Darling 5% Critical Value	0.835				95% Hall's Bootstrap UCL		2848626
688					Kolmogorov-Smirnov Test Statistic	0.434				95% Percentile Bootstrap UCL		167697
689					Kolmogorov-Smirnov 5% Critical Value	0.306				95% BCA Bootstrap UCL		223483
690					Data not Gamma Distributed at 5% Significance Level					95% Chebyshev(Mean, Sd) UCL		298673
691										97.5% Chebyshev(Mean, Sd) UCL		402975
692					Assuming Gamma Distribution					99% Chebyshev(Mean, Sd) UCL		607855
693					95% Approximate Gamma UCL (Use when n >= 40)	312921						
694					95% Adjusted Gamma UCL (Use when n < 40)	466972						
695												
696					Potential UCL to Use					Use 99% Chebyshev (Mean, Sd) UCL		607855
697					Recommended UCL exceeds the maximum observation							
698												
699					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
700					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
701					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
702												
703												
704	Indeno(1,2,3-cd)pyrene											
705												
706					General Statistics							
707					Number of Valid Observations	9				Number of Distinct Observations		9
708												

	A	B	C	D	E	F	G	H	I	J	K	L
709					Raw Statistics					Log-transformed Statistics		
710					Minimum	42				Minimum of Log Data		3.738
711					Maximum	69000				Maximum of Log Data		11.14
712					Mean	8229				Mean of log Data		6.509
713					Geometric Mean	671.4				SD of log Data		2.107
714					Median	610						
715					SD	22794						
716					Std. Error of Mean	7598						
717					Coefficient of Variation	2.77						
718					Skewness	2.997						
719												
720												
721					Warning: There are only 9 Values in this data							
722					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
723					the resulting calculations may not be reliable enough to draw conclusions							
724												
725					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
726												
727					Relevant UCL Statistics							
728					Normal Distribution Test					Lognormal Distribution Test		
729					Shapiro Wilk Test Statistic	0.41				Shapiro Wilk Test Statistic		0.895
730					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
731					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
732												
733					Assuming Normal Distribution					Assuming Lognormal Distribution		
734					95% Student's-t UCL	22358				95% H-UCL		533748
735					95% UCLs (Adjusted for Skewness)					95% Chebyshev (MVUE) UCL		14675
736					95% Adjusted-CLT UCL (Chen-1995)	28838				97.5% Chebyshev (MVUE) UCL		19443
737					95% Modified-t UCL (Johnson-1978)	23623				99% Chebyshev (MVUE) UCL		28808
738												
739					Gamma Distribution Test					Data Distribution		
740					k star (bias corrected)	0.26				Data appear Lognormal at 5% Significance Level		
741					Theta Star	31682						
742					MLE of Mean	8229						
743					MLE of Standard Deviation	16147						
744					nu star	4.675						
745					Approximate Chi Square Value (.05)	1.005				Nonparametric Statistics		
746					Adjusted Level of Significance	0.0231				95% CLT UCL		20727
747					Adjusted Chi Square Value	0.698				95% Jackknife UCL		22358
748										95% Standard Bootstrap UCL		20068
749					Anderson-Darling Test Statistic	1.396				95% Bootstrap-t UCL		432608
750					Anderson-Darling 5% Critical Value	0.815				95% Hall's Bootstrap UCL		209502
751					Kolmogorov-Smirnov Test Statistic	0.419				95% Percentile Bootstrap UCL		23393
752					Kolmogorov-Smirnov 5% Critical Value	0.303				95% BCA Bootstrap UCL		31018
753					Data not Gamma Distributed at 5% Significance Level					95% Chebyshev(Mean, Sd) UCL		41349
754										97.5% Chebyshev(Mean, Sd) UCL		55680
755					Assuming Gamma Distribution					99% Chebyshev(Mean, Sd) UCL		83830
756					95% Approximate Gamma UCL (Use when n >= 40)	38272						
757					95% Adjusted Gamma UCL (Use when n < 40)	55149						
758												
759					Potential UCL to Use					Use 99% Chebyshev (Mean, Sd) UCL		83830
760					Recommended UCL exceeds the maximum observation							
761												
762					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
763					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
764					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
765												
766												
767	Naphthalene											

	A	B	C	D	E	F	G	H	I	J	K	L
768												
769						General Statistics						
770					Number of Valid Data	9					Number of Detected Data	7
771					Number of Distinct Detected Data	7					Number of Non-Detect Data	2
772											Percent Non-Detects	22.22%
773												
774					Raw Statistics						Log-transformed Statistics	
775					Minimum Detected	6.6					Minimum Detected	1.887
776					Maximum Detected	26000					Maximum Detected	10.17
777					Mean of Detected	3769					Mean of Detected	4.461
778					SD of Detected	9803					SD of Detected	2.751
779					Minimum Non-Detect	32					Minimum Non-Detect	3.466
780					Maximum Non-Detect	330					Maximum Non-Detect	5.799
781												
782	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	8
783	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
784	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	88.89%
785												
786					Warning: There are only 7 Detected Values in this data							
787					Note: It should be noted that even though bootstrap may be performed on this data set							
788					the resulting calculations may not be reliable enough to draw conclusions							
789												
790					It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.							
791												
792												
793						UCL Statistics						
794					Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only	
795					Shapiro Wilk Test Statistic	0.459					Shapiro Wilk Test Statistic	0.813
796					5% Shapiro Wilk Critical Value	0.803					5% Shapiro Wilk Critical Value	0.803
797					Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level	
798												
799					Assuming Normal Distribution						Assuming Lognormal Distribution	
800					DL/2 Substitution Method						DL/2 Substitution Method	
801					Mean	2952					Mean	4.345
802					SD	8643					SD	2.464
803					95% DL/2 (t) UCL	8309					95% H-Stat (DL/2) UCL	668756
804												
805					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
806					MLE method failed to converge properly						Mean in Log Scale	4.2
807											SD in Log Scale	2.449
808											Mean in Original Scale	2938
809											SD in Original Scale	8648
810											95% t UCL	8299
811											95% Percentile Bootstrap UCL	8688
812											95% BCA Bootstrap UCL	11580
813											95% H-UCL	518157
814												
815					Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only	
816					k star (bias corrected)	0.207					Data appear Lognormal at 5% Significance Level	
817					Theta Star	18205						
818					nu star	2.899						
819												
820					A-D Test Statistic	1.301					Nonparametric Statistics	
821					5% A-D Critical Value	0.823					Kaplan-Meier (KM) Method	
822					K-S Test Statistic	0.823					Mean	2940
823					5% K-S Critical Value	0.342					SD	8153
824					Data not Gamma Distributed at 5% Significance Level						SE of Mean	2935
825											95% KM (t) UCL	8399
826					Assuming Gamma Distribution						95% KM (z) UCL	7769

	A	B	C	D	E	F	G	H	I	J	K	L
827					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	8301
828					Minimum	0.000001					95% KM (bootstrap t) UCL	1263346
829					Maximum	26000					95% KM (BCA) UCL	8690
830					Mean	2932					95% KM (Percentile Bootstrap) UCL	8686
831					Median	28					95% KM (Chebyshev) UCL	15736
832					SD	8651					97.5% KM (Chebyshev) UCL	21272
833					k star	0.145					99% KM (Chebyshev) UCL	32148
834					Theta star	20230						
835					Nu star	2.608					Potential UCLs to Use	
836					AppChi2	0.267					99% KM (Chebyshev) UCL	32148
837					95% Gamma Approximate UCL (Use when n >= 40)	28690						
838					95% Adjusted Gamma UCL (Use when n < 40)	45208						
839					Warning: Recommended UCL exceeds the maximum observation							
840	Note: DL/2 is not a recommended method.											
841												
842					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
843					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
844					For additional insight, the user may want to consult a statistician.							
845												
846												
847	Pyrene											
848												
849					General Statistics							
850					Number of Valid Observations	9					Number of Distinct Observations	9
851												
852					Raw Statistics						Log-transformed Statistics	
853					Minimum	79					Minimum of Log Data	4.369
854					Maximum	390000					Maximum of Log Data	12.87
855					Mean	45092					Mean of log Data	7.67
856					Geometric Mean	2143					SD of log Data	2.365
857					Median	2600						
858					SD	129349						
859					Std. Error of Mean	43116						
860					Coefficient of Variation	2.869						
861					Skewness	2.999						
862												
863												
864					Warning: There are only 9 Values in this data							
865					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
866					the resulting calculations may not be reliable enough to draw conclusions							
867												
868					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
869												
870					Relevant UCL Statistics							
871					Normal Distribution Test						Lognormal Distribution Test	
872					Shapiro Wilk Test Statistic	0.401					Shapiro Wilk Test Statistic	0.886
873					Shapiro Wilk Critical Value	0.829					Shapiro Wilk Critical Value	0.829
874					Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level	
875												
876					Assuming Normal Distribution						Assuming Lognormal Distribution	
877					95% Student's-t UCL	125269					95% H-UCL	9248756
878					95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL	72852
879					95% Adjusted-CLT UCL (Chen-1995)	162071					97.5% Chebyshev (MVUE) UCL	96999
880					95% Modified-t UCL (Johnson-1978)	132453					99% Chebyshev (MVUE) UCL	144429
881												
882					Gamma Distribution Test						Data Distribution	
883					k star (bias corrected)	0.231					Data appear Lognormal at 5% Significance Level	
884					Theta Star	195194						
885					MLE of Mean	45092						

	A	B	C	D	E	F	G	H	I	J	K	L
886					MLE of Standard Deviation	93818						
887					nu star	4.158						
888					Approximate Chi Square Value (.05)	0.785			Nonparametric Statistics			
889					Adjusted Level of Significance	0.0231					95% CLT UCL	116012
890					Adjusted Chi Square Value	0.529					95% Jackknife UCL	125269
891											95% Standard Bootstrap UCL	111089
892					Anderson-Darling Test Statistic	1.514					95% Bootstrap-t UCL	4697324
893					Anderson-Darling 5% Critical Value	0.832					95% Hall's Bootstrap UCL	2251166
894					Kolmogorov-Smirnov Test Statistic	0.448					95% Percentile Bootstrap UCL	131235
895					Kolmogorov-Smirnov 5% Critical Value	0.305					95% BCA Bootstrap UCL	132157
896			Data not Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL	233031
897											97.5% Chebyshev(Mean, Sd) UCL	314353
898			Assuming Gamma Distribution								99% Chebyshev(Mean, Sd) UCL	474093
899			95% Approximate Gamma UCL (Use when n >= 40)			238802						
900			95% Adjusted Gamma UCL (Use when n < 40)			354442						
901												
902			Potential UCL to Use								Use 99% Chebyshev (Mean, Sd) UCL	474093
903					Recommended UCL exceeds the maximum observation							
904												
905					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
906					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
907					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
908												
909												
910	Dieldrin											
911												
912					General Statistics							
913				Number of Valid Data		8				Number of Detected Data		1
914				Number of Distinct Detected Data		1				Number of Non-Detect Data		7
915										Percent Non-Detects		87.50%
916												
917					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
918					It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).							
919												
920					The data set for variable Dieldrin was not processed!							
921												
922												
923												
924	gamma-BHC (Lindane)											
925												
926					General Statistics							
927				Number of Valid Data		8				Number of Detected Data		4
928				Number of Distinct Detected Data		4				Number of Non-Detect Data		4
929										Percent Non-Detects		50.00%
930												
931				Raw Statistics					Log-transformed Statistics			
932				Minimum Detected		4.1				Minimum Detected		1.411
933				Maximum Detected		860				Maximum Detected		6.757
934				Mean of Detected		218.9				Mean of Detected		2.918
935				SD of Detected		427.4				SD of Detected		2.566
936				Minimum Non-Detect		1.7				Minimum Non-Detect		0.531
937				Maximum Non-Detect		13				Maximum Non-Detect		2.565
938												
939	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		7
940	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
941	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		87.50%
942												
943					Warning: There are only 4 Distinct Detected Values in this data							
944					Note: It should be noted that even though bootstrap may be performed on this data set							

	A	B	C	D	E	F	G	H	I	J	K	L
945	the resulting calculations may not be reliable enough to draw conclusions											
946												
947	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
948												
949												
950	UCL Statistics											
951	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
952					Shapiro Wilk Test Statistic	0.632				Shapiro Wilk Test Statistic		0.696
953					5% Shapiro Wilk Critical Value	0.748				5% Shapiro Wilk Critical Value		0.748
954	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
955												
956	Assuming Normal Distribution						Assuming Lognormal Distribution					
957					DL/2 Substitution Method					DL/2 Substitution Method		
958					Mean	111.3				Mean		1.9
959					SD	302.5				SD		2.137
960					95% DL/2 (t) UCL	314				95% H-Stat (DL/2) UCL		12712
961												
962					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
963	MLE method failed to converge properly									Mean in Log Scale		0.879
964										SD in Log Scale		3.02
965										Mean in Original Scale		110.1
966										SD in Original Scale		303
967										95% t UCL		313.1
968										95% Percentile Bootstrap UCL		324.2
969										95% BCA Bootstrap UCL		430.7
970										95% H-UCL		7158982
971												
972	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
973					k star (bias corrected)	0.237	Data do not follow a Discernable Distribution (0.05)					
974					Theta Star	923.1						
975					nu star	1.897						
976												
977					A-D Test Statistic	0.842	Nonparametric Statistics					
978					5% A-D Critical Value	0.709				Kaplan-Meier (KM) Method		
979					K-S Test Statistic	0.709				Mean		111.7
980					5% K-S Critical Value	0.419				SD		282.8
981	Data not Gamma Distributed at 5% Significance Level									SE of Mean		115.5
982										95% KM (t) UCL		330.4
983	Assuming Gamma Distribution									95% KM (z) UCL		301.6
984					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		313.9
985					Minimum	0.000001				95% KM (bootstrap t) UCL		49604
986					Maximum	860				95% KM (BCA) UCL		860
987					Mean	109.5				95% KM (Percentile Bootstrap) UCL		325.9
988					Median	2.05				95% KM (Chebyshev) UCL		615
989					SD	303.3				97.5% KM (Chebyshev) UCL		832.8
990					k star	0.135				99% KM (Chebyshev) UCL		1261
991					Theta star	813.4						
992					Nu star	2.153	Potential UCLs to Use					
993					AppChi2	0.173				99% KM (Chebyshev) UCL		1261
994					95% Gamma Approximate UCL (Use when n >= 40)	1360						
995					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
996	Warning: Recommended UCL exceeds the maximum observation											
997	Note: DL/2 is not a recommended method.											
998												
999	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1000	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1001	For additional insight, the user may want to consult a statistician.											
1002												
1003												

	A	B	C	D	E	F	G	H	I	J	K	L
1004	Aluminum											
1005												
1006					General Statistics							
1007					Number of Valid Observations	9				Number of Distinct Observations		9
1008												
1009				Raw Statistics						Log-transformed Statistics		
1010					Minimum	5330				Minimum of Log Data		8.581
1011					Maximum	12600				Maximum of Log Data		9.441
1012					Mean	9843				Mean of log Data		9.167
1013					Geometric Mean	9574				SD of log Data		0.263
1014					Median	10600						
1015					SD	2226						
1016					Std. Error of Mean	742.1						
1017					Coefficient of Variation	0.226						
1018					Skewness	-1.048						
1019												
1020												
1021					Warning: There are only 9 Values in this data							
1022					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
1023					the resulting calculations may not be reliable enough to draw conclusions							
1024												
1025					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
1026												
1027					Relevant UCL Statistics							
1028				Normal Distribution Test						Lognormal Distribution Test		
1029					Shapiro Wilk Test Statistic	0.911				Shapiro Wilk Test Statistic		0.845
1030					Shapiro Wilk Critical Value	0.829				Shapiro Wilk Critical Value		0.829
1031				Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
1032												
1033				Assuming Normal Distribution						Assuming Lognormal Distribution		
1034					95% Student's-t UCL	11223				95% H-UCL		11909
1035				95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL		13667
1036					95% Adjusted-CLT UCL (Chen-1995)	10787				97.5% Chebyshev (MVUE) UCL		15309
1037					95% Modified-t UCL (Johnson-1978)	11180				99% Chebyshev (MVUE) UCL		18534
1038												
1039				Gamma Distribution Test						Data Distribution		
1040					k star (bias corrected)	12.21				Data appear Normal at 5% Significance Level		
1041					Theta Star	806.1						
1042					MLE of Mean	9843						
1043					MLE of Standard Deviation	2817						
1044					nu star	219.8						
1045					Approximate Chi Square Value (.05)	186.5				Nonparametric Statistics		
1046					Adjusted Level of Significance	0.0231				95% CLT UCL		11064
1047					Adjusted Chi Square Value	180				95% Jackknife UCL		11223
1048										95% Standard Bootstrap UCL		10993
1049					Anderson-Darling Test Statistic	0.582				95% Bootstrap-t UCL		11017
1050					Anderson-Darling 5% Critical Value	0.721				95% Hall's Bootstrap UCL		10845
1051					Kolmogorov-Smirnov Test Statistic	0.274				95% Percentile Bootstrap UCL		10922
1052					Kolmogorov-Smirnov 5% Critical Value	0.279				95% BCA Bootstrap UCL		10843
1053				Data appear Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL		13078
1054										97.5% Chebyshev(Mean, Sd) UCL		14477
1055				Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL		17227
1056					95% Approximate Gamma UCL (Use when n >= 40)	11602						
1057					95% Adjusted Gamma UCL (Use when n < 40)	12019						
1058												
1059				Potential UCL to Use						Use 95% Student's-t UCL		11223
1060												
1061				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1062				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								

	A	B	C	D	E	F	G	H	I	J	K	L
1063	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
1064												
1065	Note: For highly negative-skewed data, confidence limits											
1066	(e.g., Chen, Johnson, Lognormal, and Gamma) may not be											
1067	reliable. Chen's and Johnson's methods provide											
1068	adjustments for positvely skewed data sets.											
1069												
1070												
1071	Arsenic											
1072												
1073	General Statistics											
1074					Number of Valid Observations	9			Number of Distinct Observations			8
1075												
1076	Raw Statistics						Log-transformed Statistics					
1077					Minimum	2.4			Minimum of Log Data			0.875
1078					Maximum	7.3			Maximum of Log Data			1.988
1079					Mean	3.823			Mean of log Data			1.276
1080					Geometric Mean	3.581			SD of log Data			0.373
1081					Median	3.7						
1082					SD	1.576						
1083					Std. Error of Mean	0.525						
1084					Coefficient of Variation	0.412						
1085					Skewness	1.435						
1086												
1087												
1088	Warning: There are only 9 Values in this data											
1089	Note: It should be noted that even though bootstrap methods may be performed on this data set,											
1090	the resulting calculations may not be reliable enough to draw conclusions											
1091												
1092	The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.											
1093												
1094	Relevant UCL Statistics											
1095	Normal Distribution Test						Lognormal Distribution Test					
1096					Shapiro Wilk Test Statistic	0.849			Shapiro Wilk Test Statistic			0.915
1097					Shapiro Wilk Critical Value	0.829			Shapiro Wilk Critical Value			0.829
1098	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1099												
1100	Assuming Normal Distribution						Assuming Lognormal Distribution					
1101					95% Student's-t UCL	4.8			95% H-UCL			5.061
1102	95% UCLs (Adjusted for Skewness)								95% Chebyshev (MVUE) UCL			5.886
1103					95% Adjusted-CLT UCL (Chen-1995)	4.956			97.5% Chebyshev (MVUE) UCL			6.786
1104					95% Modified-t UCL (Johnson-1978)	4.842			99% Chebyshev (MVUE) UCL			8.553
1105												
1106	Gamma Distribution Test						Data Distribution					
1107					k star (bias corrected)	5.269	Data appear Normal at 5% Significance Level					
1108					Theta Star	0.726						
1109					MLE of Mean	3.823						
1110					MLE of Standard Deviation	1.666						
1111					nu star	94.84						
1112					Approximate Chi Square Value (.05)	73.38	Nonparametric Statistics					
1113					Adjusted Level of Significance	0.0231			95% CLT UCL			4.687
1114					Adjusted Chi Square Value	69.4			95% Jackknife UCL			4.8
1115									95% Standard Bootstrap UCL			4.648
1116					Anderson-Darling Test Statistic	0.404			95% Bootstrap-t UCL			5.341
1117					Anderson-Darling 5% Critical Value	0.722			95% Hall's Bootstrap UCL			5.681
1118					Kolmogorov-Smirnov Test Statistic	0.204			95% Percentile Bootstrap UCL			4.702
1119					Kolmogorov-Smirnov 5% Critical Value	0.28			95% BCA Bootstrap UCL			4.923
1120	Data appear Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL			6.113
1121									97.5% Chebyshev(Mean, Sd) UCL			7.104

	A	B	C	D	E	F	G	H	I	J	K	L
1122				Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL		9.051
1123			95% Approximate Gamma UCL (Use when n >= 40)			4.942						
1124			95% Adjusted Gamma UCL (Use when n < 40)			5.224						
1125												
1126				Potential UCL to Use						Use 95% Student's-t UCL		4.8
1127												
1128				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1129				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
1130				and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.								
1131												
1132												
1133	Chromium (hexavalent)											
1134												
1135				General Statistics								
1136				Number of Valid Observations		1				Number of Distinct Observations		1
1137												
1138												
1139				Warning: This data set only has 1 observations!								
1140				Data set is too small to compute reliable and meaningful statistics and estimates!								
1141				The data set for variable Chromium (hexavalent) was not processed!								
1142												
1143				It is suggested to collect at least 8 to 10 observations before using these statistical methods!								
1144				If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.								
1145												
1146												
1147												
1148	Chromium											
1149												
1150				General Statistics								
1151				Number of Valid Observations		9				Number of Distinct Observations		8
1152												
1153				Raw Statistics						Log-transformed Statistics		
1154				Minimum		10.9				Minimum of Log Data		2.389
1155				Maximum		24.9				Maximum of Log Data		3.215
1156				Mean		17.08				Mean of log Data		2.807
1157				Geometric Mean		16.56				SD of log Data		0.265
1158				Median		16						
1159				SD		4.512						
1160				Std. Error of Mean		1.504						
1161				Coefficient of Variation		0.264						
1162				Skewness		0.515						
1163												
1164												
1165				Warning: There are only 9 Values in this data								
1166				Note: It should be noted that even though bootstrap methods may be performed on this data set,								
1167				the resulting calculations may not be reliable enough to draw conclusions								
1168												
1169				The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.								
1170												
1171				Relevant UCL Statistics								
1172				Normal Distribution Test						Lognormal Distribution Test		
1173				Shapiro Wilk Test Statistic		0.931				Shapiro Wilk Test Statistic		0.945
1174				Shapiro Wilk Critical Value		0.829				Shapiro Wilk Critical Value		0.829
1175				Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
1176												
1177				Assuming Normal Distribution						Assuming Lognormal Distribution		
1178				95% Student's-t UCL		19.87				95% H-UCL		20.63
1179				95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL		23.68
1180				95% Adjusted-CLT UCL (Chen-1995)		19.83				97.5% Chebyshev (MVUE) UCL		26.54

	A	B	C	D	E	F	G	H	I	J	K	L
1181					95% Modified-t UCL (Johnson-1978)	19.92					99% Chebyshev (MVUE) UCL	32.15
1182												
1183					Gamma Distribution Test					Data Distribution		
1184					k star (bias corrected)	10.95				Data appear Normal at 5% Significance Level		
1185					Theta Star	1.56						
1186					MLE of Mean	17.08						
1187					MLE of Standard Deviation	5.162						
1188					nu star	197						
1189					Approximate Chi Square Value (.05)	165.5				Nonparametric Statistics		
1190					Adjusted Level of Significance	0.0231					95% CLT UCL	19.55
1191					Adjusted Chi Square Value	159.5					95% Jackknife UCL	19.87
1192											95% Standard Bootstrap UCL	19.42
1193					Anderson-Darling Test Statistic	0.334					95% Bootstrap-t UCL	20.68
1194					Anderson-Darling 5% Critical Value	0.721					95% Hall's Bootstrap UCL	21.89
1195					Kolmogorov-Smirnov Test Statistic	0.179					95% Percentile Bootstrap UCL	19.5
1196					Kolmogorov-Smirnov 5% Critical Value	0.279					95% BCA Bootstrap UCL	19.46
1197					Data appear Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL	23.63
1198											97.5% Chebyshev(Mean, Sd) UCL	26.47
1199					Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL	32.04
1200					95% Approximate Gamma UCL (Use when n >= 40)	20.32						
1201					95% Adjusted Gamma UCL (Use when n < 40)	21.1						
1202												
1203					Potential UCL to Use						Use 95% Student's-t UCL	19.87
1204												
1205					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1206					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
1207					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
1208												
1209												
1210	Cobalt											
1211												
1212					General Statistics							
1213					Number of Valid Observations	9					Number of Distinct Observations	9
1214												
1215					Raw Statistics					Log-transformed Statistics		
1216					Minimum	1.5					Minimum of Log Data	0.405
1217					Maximum	4.9					Maximum of Log Data	1.589
1218					Mean	3.158					Mean of log Data	1.101
1219					Geometric Mean	3.008					SD of log Data	0.341
1220					Median	2.9						
1221					SD	1.009						
1222					Std. Error of Mean	0.336						
1223					Coefficient of Variation	0.32						
1224					Skewness	0.37						
1225												
1226												
1227					Warning: There are only 9 Values in this data							
1228					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
1229					the resulting calculations may not be reliable enough to draw conclusions							
1230												
1231					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
1232												
1233					Relevant UCL Statistics							
1234					Normal Distribution Test					Lognormal Distribution Test		
1235					Shapiro Wilk Test Statistic	0.942					Shapiro Wilk Test Statistic	0.927
1236					Shapiro Wilk Critical Value	0.829					Shapiro Wilk Critical Value	0.829
1237					Data appear Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
1238												
1239					Assuming Normal Distribution					Assuming Lognormal Distribution		

	A	B	C	D	E	F	G	H	I	J	K	L
1240					95% Student's-t UCL	3.783					95% H-UCL	4.085
1241				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	4.745
1242					95% Adjusted-CLT UCL (Chen-1995)	3.755					97.5% Chebyshev (MVUE) UCL	5.429
1243					95% Modified-t UCL (Johnson-1978)	3.79					99% Chebyshev (MVUE) UCL	6.771
1244												
1245				Gamma Distribution Test					Data Distribution			
1246					k star (bias corrected)	7.031			Data appear Normal at 5% Significance Level			
1247					Theta Star	0.449						
1248					MLE of Mean	3.158						
1249					MLE of Standard Deviation	1.191						
1250					nu star	126.5						
1251					Approximate Chi Square Value (.05)	101.6			Nonparametric Statistics			
1252					Adjusted Level of Significance	0.0231					95% CLT UCL	3.711
1253					Adjusted Chi Square Value	96.85					95% Jackknife UCL	3.783
1254											95% Standard Bootstrap UCL	3.68
1255					Anderson-Darling Test Statistic	0.348					95% Bootstrap-t UCL	3.924
1256					Anderson-Darling 5% Critical Value	0.722					95% Hall's Bootstrap UCL	4.277
1257					Kolmogorov-Smirnov Test Statistic	0.196					95% Percentile Bootstrap UCL	3.7
1258					Kolmogorov-Smirnov 5% Critical Value	0.279					95% BCA Bootstrap UCL	3.747
1259				Data appear Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	4.624
1260											97.5% Chebyshev(Mean, Sd) UCL	5.259
1261				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	6.505
1262					95% Approximate Gamma UCL (Use when n >= 40)	3.935						
1263					95% Adjusted Gamma UCL (Use when n < 40)	4.126						
1264												
1265				Potential UCL to Use							Use 95% Student's-t UCL	3.783
1266												
1267				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1268				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
1269				and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.								
1270												
1271												
1272	Iron											
1273												
1274				General Statistics								
1275					Number of Valid Observations	9					Number of Distinct Observations	9
1276												
1277				Raw Statistics					Log-transformed Statistics			
1278					Minimum	8040					Minimum of Log Data	8.992
1279					Maximum	19400					Maximum of Log Data	9.873
1280					Mean	13688					Mean of log Data	9.483
1281					Geometric Mean	13133					SD of log Data	0.307
1282					Median	12300						
1283					SD	4153						
1284					Std. Error of Mean	1384						
1285					Coefficient of Variation	0.303						
1286					Skewness	0.358						
1287												
1288												
1289				Warning: There are only 9 Values in this data								
1290				Note: It should be noted that even though bootstrap methods may be performed on this data set,								
1291				the resulting calculations may not be reliable enough to draw conclusions								
1292												
1293				The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.								
1294												
1295				Relevant UCL Statistics								
1296				Normal Distribution Test					Lognormal Distribution Test			
1297					Shapiro Wilk Test Statistic	0.898					Shapiro Wilk Test Statistic	0.928
1298					Shapiro Wilk Critical Value	0.829					Shapiro Wilk Critical Value	0.829

	A	B	C	D	E	F	G	H	I	J	K	L
1299	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1300												
1301	Assuming Normal Distribution						Assuming Lognormal Distribution					
1302					95% Student's-t UCL	16262					95% H-UCL	17133
1303	95% UCLs (Adjusted for Skewness)										95% Chebyshev (MVUE) UCL	19828
1304					95% Adjusted-CLT UCL (Chen-1995)	16142					97.5% Chebyshev (MVUE) UCL	22484
1305					95% Modified-t UCL (Johnson-1978)	16290					99% Chebyshev (MVUE) UCL	27700
1306												
1307	Gamma Distribution Test						Data Distribution					
1308					k star (bias corrected)	8.233	Data appear Normal at 5% Significance Level					
1309					Theta Star	1663						
1310					MLE of Mean	13688						
1311					MLE of Standard Deviation	4770						
1312					nu star	148.2						
1313					Approximate Chi Square Value (.05)	121.1	Nonparametric Statistics					
1314					Adjusted Level of Significance	0.0231					95% CLT UCL	15965
1315					Adjusted Chi Square Value	115.9					95% Jackknife UCL	16262
1316											95% Standard Bootstrap UCL	15865
1317					Anderson-Darling Test Statistic	0.4					95% Bootstrap-t UCL	16491
1318					Anderson-Darling 5% Critical Value	0.722					95% Hall's Bootstrap UCL	15671
1319					Kolmogorov-Smirnov Test Statistic	0.21					95% Percentile Bootstrap UCL	15904
1320					Kolmogorov-Smirnov 5% Critical Value	0.279					95% BCA Bootstrap UCL	15822
1321	Data appear Gamma Distributed at 5% Significance Level										95% Chebyshev(Mean, Sd) UCL	19723
1322											97.5% Chebyshev(Mean, Sd) UCL	22334
1323	Assuming Gamma Distribution										99% Chebyshev(Mean, Sd) UCL	27463
1324					95% Approximate Gamma UCL (Use when n >= 40)	16756						
1325					95% Adjusted Gamma UCL (Use when n < 40)	17504						
1326												
1327	Potential UCL to Use										Use 95% Student's-t UCL	16262
1328												
1329	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1330	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1331	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
1332												
1333												
1334	Lead											
1335												
1336	General Statistics											
1337					Number of Valid Data	18					Number of Detected Data	16
1338					Number of Distinct Detected Data	8					Number of Non-Detect Data	2
1339											Percent Non-Detects	11.11%
1340												
1341	Raw Statistics						Log-transformed Statistics					
1342					Minimum Detected	9.4					Minimum Detected	2.241
1343					Maximum Detected	793					Maximum Detected	6.676
1344					Mean of Detected	116.7					Mean of Detected	3.308
1345					SD of Detected	264.3					SD of Detected	1.427
1346					Minimum Non-Detect	13.6					Minimum Non-Detect	2.61
1347					Maximum Non-Detect	13.6					Maximum Non-Detect	2.61
1348												
1349												
1350	UCL Statistics											
1351	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1352					Shapiro Wilk Test Statistic	0.434					Shapiro Wilk Test Statistic	0.716
1353					5% Shapiro Wilk Critical Value	0.887					5% Shapiro Wilk Critical Value	0.887
1354	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
1355												
1356	Assuming Normal Distribution						Assuming Lognormal Distribution					
1357					DL/2 Substitution Method						DL/2 Substitution Method	

	A	B	C	D	E	F	G	H	I	J	K	L
1358					Mean	104.5					Mean	3.154
1359					SD	250.8					SD	1.414
1360					95% DL/2 (t) UCL	207.3					95% H-Stat (DL/2) UCL	196.8
1361												
1362					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1363					**MLE yields a negative mean**						Mean in Log Scale	3.177
1364											SD in Log Scale	1.399
1365											Mean in Original Scale	104.7
1366											SD in Original Scale	250.7
1367											95% t UCL	207.5
1368											95% Percentile Bootstrap UCL	194.1
1369											95% BCA Bootstrap UCL	234.7
1370											95% H-UCL	193.2
1371												
1372					**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**	
1373					k star (bias corrected)	0.404					**Data do not follow a Discernable Distribution (0.05)**	
1374					Theta Star	289						
1375					nu star	12.92						
1376												
1377					A-D Test Statistic	2.987					**Nonparametric Statistics**	
1378					5% A-D Critical Value	0.808					Kaplan-Meier (KM) Method	
1379					K-S Test Statistic	0.808					Mean	104.8
1380					5% K-S Critical Value	0.229					SD	243.6
1381					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	59.29
1382											95% KM (t) UCL	207.9
1383					**Assuming Gamma Distribution**						95% KM (z) UCL	202.3
1384					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	207.6
1385					Minimum	0.000001					95% KM (bootstrap t) UCL	1981
1386					Maximum	793					95% KM (BCA) UCL	230.6
1387					Mean	103.7					95% KM (Percentile Bootstrap) UCL	192.7
1388					Median	14.9					95% KM (Chebyshev) UCL	363.2
1389					SD	251.1					97.5% KM (Chebyshev) UCL	475.1
1390					k star	0.223					99% KM (Chebyshev) UCL	694.8
1391					Theta star	464.6						
1392					Nu star	8.038					**Potential UCLs to Use**	
1393					AppChi2	2.757					97.5% KM (Chebyshev) UCL	475.1
1394					95% Gamma Approximate UCL (Use when n >= 40)	302.4						
1395					95% Adjusted Gamma UCL (Use when n < 40)	337.8						
1396	**Note: DL/2 is not a recommended method.**											
1397												
1398					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
1399					**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**							
1400					**For additional insight, the user may want to consult a statistician.**							
1401												
1402												
1403	**Manganese**											
1404												
1405					**General Statistics**							
1406					Number of Valid Observations	18					Number of Distinct Observations	9
1407												
1408					**Raw Statistics**						**Log-transformed Statistics**	
1409					Minimum	46.8					Minimum of Log Data	3.846
1410					Maximum	315					Maximum of Log Data	5.753
1411					Mean	153.1					Mean of log Data	4.807
1412					Geometric Mean	122.4					SD of log Data	0.711
1413					Median	125						
1414					SD	98.62						
1415					Std. Error of Mean	23.25						
1416					Coefficient of Variation	0.644						

	A	B	C	D	E	F	G	H	I	J	K	L
1417					Skewness	0.441						
1418												
1419												
1420						Relevant UCL Statistics						
1421				Normal Distribution Test						Lognormal Distribution Test		
1422					Shapiro Wilk Test Statistic	0.862					Shapiro Wilk Test Statistic	0.886
1423					Shapiro Wilk Critical Value	0.897					Shapiro Wilk Critical Value	0.897
1424				Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level		
1425												
1426				Assuming Normal Distribution						Assuming Lognormal Distribution		
1427					95% Student's-t UCL	193.5					95% H-UCL	232.4
1428				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	275.5
1429					95% Adjusted-CLT UCL (Chen-1995)	193.9					97.5% Chebyshev (MVUE) UCL	327.6
1430					95% Modified-t UCL (Johnson-1978)	193.9					99% Chebyshev (MVUE) UCL	430.1
1431												
1432				Gamma Distribution Test						Data Distribution		
1433					k star (bias corrected)	2.026				Data Follow Appr. Gamma Distribution at 5% Significance Level		
1434					Theta Star	75.57						
1435					MLE of Mean	153.1						
1436					MLE of Standard Deviation	107.6						
1437					nu star	72.92						
1438					Approximate Chi Square Value (.05)	54.26				Nonparametric Statistics		
1439					Adjusted Level of Significance	0.0357					95% CLT UCL	191.3
1440					Adjusted Chi Square Value	52.72					95% Jackknife UCL	193.5
1441											95% Standard Bootstrap UCL	191.1
1442					Anderson-Darling Test Statistic	0.802					95% Bootstrap-t UCL	196.1
1443					Anderson-Darling 5% Critical Value	0.75					95% Hall's Bootstrap UCL	191.8
1444					Kolmogorov-Smirnov Test Statistic	0.188					95% Percentile Bootstrap UCL	191.1
1445					Kolmogorov-Smirnov 5% Critical Value	0.206					95% BCA Bootstrap UCL	191.6
1446				Data follow Appr. Gamma Distribution at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	254.4
1447											97.5% Chebyshev(Mean, Sd) UCL	298.3
1448				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	384.4
1449					95% Approximate Gamma UCL (Use when n >= 40)	205.7						
1450					95% Adjusted Gamma UCL (Use when n < 40)	211.8						
1451												
1452				Potential UCL to Use							Use 95% Approximate Gamma UCL	205.7
1453												
1454												
1455												
1456												
1457												

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG8								
2			User Selected Options									
3			From File	WorkSheet.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	carbazole											
10												
11						General Statistics						
12						Number of Valid Data	41			Number of Detected Data		20
13						Number of Distinct Detected Data	19			Number of Non-Detect Data		21
14										Percent Non-Detects		51.22%
15												
16				Raw Statistics						Log-transformed Statistics		
17						Minimum Detected	2.1			Minimum Detected		0.742
18						Maximum Detected	120000			Maximum Detected		11.7
19						Mean of Detected	6099			Mean of Detected		3.655
20						SD of Detected	26810			SD of Detected		2.683
21						Minimum Non-Detect	18			Minimum Non-Detect		2.89
22						Maximum Non-Detect	17000			Maximum Non-Detect		9.741
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		40
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		97.56%
27												
28						UCL Statistics						
29				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
30						Shapiro Wilk Test Statistic	0.24			Shapiro Wilk Test Statistic		0.853
31						5% Shapiro Wilk Critical Value	0.905			5% Shapiro Wilk Critical Value		0.905
32				Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level		
33												
34				Assuming Normal Distribution						Assuming Lognormal Distribution		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	3580			Mean		4.168
37						SD	18708			SD		2.661
38						95% DL/2 (t) UCL	8500			95% H-Stat (DL/2) UCL		15491
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41				MLE method failed to converge properly						Mean in Log Scale		2.903
42										SD in Log Scale		2.087
43										Mean in Original Scale		2981
44										SD in Original Scale		18733
45										95% t UCL		7907
46										95% Percentile Bootstrap UCL		8836
47										95% BCA Bootstrap UCL		14660
48										95% H-UCL		557.5
49												
50				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
51						k star (bias corrected)	0.162			Data do not follow a Discernable Distribution (0.05)		
52						Theta Star	37596					
53						nu star	6.489					
54												
55						A-D Test Statistic	3.926			Nonparametric Statistics		
56						5% A-D Critical Value	0.908			Kaplan-Meier (KM) Method		
57						K-S Test Statistic	0.908			Mean		2992
58						5% K-S Critical Value	0.216			SD		18501
59				Data not Gamma Distributed at 5% Significance Level						SE of Mean		2964

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% KM (t) UCL	7983
61				**Assuming Gamma Distribution**							95% KM (z) UCL	7868
62				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	7917
63					Minimum	0.000001					95% KM (bootstrap t) UCL	654829
64					Maximum	120000					95% KM (BCA) UCL	8854
65					Mean	2975					95% KM (Percentile Bootstrap) UCL	8835
66					Median	0.000001					95% KM (Chebyshev) UCL	15914
67					SD	18733					97.5% KM (Chebyshev) UCL	21505
68					k star	0.0758					99% KM (Chebyshev) UCL	32488
69					Theta star	39237						
70					Nu star	6.218			**Potential UCLs to Use**			
71					AppChi2	1.752					99% KM (Chebyshev) UCL	32488
72				95% Gamma Approximate UCL (Use when n >= 40)		10558						
73				95% Adjusted Gamma UCL (Use when n < 40)		11094						
74	**Note: DL/2 is not a recommended method.**											
75												
76	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
77	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
78	**For additional insight, the user may want to consult a statistician.**											
79												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG9								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Benzo(a)anthracene											
10												
11						General Statistics						
12						Number of Valid Data	25			Number of Detected Data		22
13						Number of Distinct Detected Data	19			Number of Non-Detect Data		3
14										Percent Non-Detects		12.00%
15												
16						Raw Statistics				Log-transformed Statistics		
17						Minimum Detected	10			Minimum Detected		2.303
18						Maximum Detected	8800			Maximum Detected		9.083
19						Mean of Detected	758.5			Mean of Detected		4.658
20						SD of Detected	1865			SD of Detected		2.144
21						Minimum Non-Detect	380			Minimum Non-Detect		5.94
22						Maximum Non-Detect	2600			Maximum Non-Detect		7.863
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		24
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		96.00%
27												
28						UCL Statistics						
29						Normal Distribution Test with Detected Values Only				Lognormal Distribution Test with Detected Values Only		
30						Shapiro Wilk Test Statistic	0.421			Shapiro Wilk Test Statistic		0.844
31						5% Shapiro Wilk Critical Value	0.911			5% Shapiro Wilk Critical Value		0.911
32						Data not Normal at 5% Significance Level				Data not Lognormal at 5% Significance Level		
33												
34						Assuming Normal Distribution				Assuming Lognormal Distribution		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	735.1			Mean		4.807
37						SD	1755			SD		2.072
38						95% DL/2 (t) UCL	1336			95% H-Stat (DL/2) UCL		5918
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41						MLE method failed to converge properly				Mean in Log Scale		4.565
42										SD in Log Scale		2.026
43										Mean in Original Scale		673.8
44										SD in Original Scale		1760
45										95% t UCL		1276
46										95% Percentile Bootstrap UCL		1351
47										95% BCA Bootstrap UCL		1710
48										95% H-UCL		3946
49												
50						Gamma Distribution Test with Detected Values Only				Data Distribution Test with Detected Values Only		
51						k star (bias corrected)	0.326			Data do not follow a Discernable Distribution (0.05)		
52						Theta Star	2329					
53						nu star	14.33					
54												
55						A-D Test Statistic	1.729			Nonparametric Statistics		
56						5% A-D Critical Value	0.838			Kaplan-Meier (KM) Method		
57						K-S Test Statistic	0.838			Mean		685.9
58						5% K-S Critical Value	0.2			SD		1724
59						Data not Gamma Distributed at 5% Significance Level				SE of Mean		353.5

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% KM (t) UCL	1291
61				Assuming Gamma Distribution							95% KM (z) UCL	1267
62					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1289
63					Minimum	0.000001					95% KM (bootstrap t) UCL	2491
64					Maximum	8800					95% KM (BCA) UCL	1370
65					Mean	669.3					95% KM (Percentile Bootstrap) UCL	1324
66					Median	26					95% KM (Chebyshev) UCL	2227
67					SD	1762					97.5% KM (Chebyshev) UCL	2894
68					k star	0.217					99% KM (Chebyshev) UCL	4204
69					Theta star	3084						
70					Nu star	10.85			Potential UCLs to Use			
71					AppChi2	4.481					99% KM (Chebyshev) UCL	4204
72				95% Gamma Approximate UCL (Use when n >= 40)		1621						
73				95% Adjusted Gamma UCL (Use when n < 40)		1728						
74	Note: DL/2 is not a recommended method.											
75												
76	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
77	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
78	For additional insight, the user may want to consult a statistician.											
79												
80												
81	Benzo(a)pyrene											
82												
83					General Statistics							
84					Number of Valid Data	25					Number of Detected Data	22
85					Number of Distinct Detected Data	20					Number of Non-Detect Data	3
86											Percent Non-Detects	12.00%
87												
88				Raw Statistics						Log-transformed Statistics		
89					Minimum Detected	4.4					Minimum Detected	1.482
90					Maximum Detected	7000					Maximum Detected	8.854
91					Mean of Detected	665.6					Mean of Detected	4.37
92					SD of Detected	1527					SD of Detected	2.306
93					Minimum Non-Detect	380					Minimum Non-Detect	5.94
94					Maximum Non-Detect	2600					Maximum Non-Detect	7.863
95												
96	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	24
97	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
98	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	96.00%
99												
100					UCL Statistics							
101				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
102					Shapiro Wilk Test Statistic	0.477					Shapiro Wilk Test Statistic	0.882
103					5% Shapiro Wilk Critical Value	0.911					5% Shapiro Wilk Critical Value	0.911
104				Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level		
105												
106				Assuming Normal Distribution						Assuming Lognormal Distribution		
107					DL/2 Substitution Method						DL/2 Substitution Method	
108					Mean	653.3					Mean	4.554
109					SD	1440					SD	2.239
110					95% DL/2 (t) UCL	1146					95% H-Stat (DL/2) UCL	8560
111												
112					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
113				MLE method failed to converge properly							Mean in Log Scale	4.28
114											SD in Log Scale	2.175
115											Mean in Original Scale	590.5
116											SD in Original Scale	1443
117											95% t UCL	1084
118											95% Percentile Bootstrap UCL	1131

	A	B	C	D	E	F	G	H	I	J	K	L
119											95% BCA Bootstrap UCL	1403
120											95% H-UCL	5094
121												
122			Gamma Distribution Test with Detected Values Only				Data Distribution Test with Detected Values Only					
123					k star (bias corrected)	0.307	Data do not follow a Discernable Distribution (0.05)					
124					Theta Star	2170						
125					nu star	13.5						
126												
127					A-D Test Statistic	1.456	Nonparametric Statistics					
128					5% A-D Critical Value	0.843					Kaplan-Meier (KM) Method	
129					K-S Test Statistic	0.843					Mean	604.3
130					5% K-S Critical Value	0.201					SD	1414
131			Data not Gamma Distributed at 5% Significance Level								SE of Mean	290.5
132											95% KM (t) UCL	1101
133			Assuming Gamma Distribution								95% KM (z) UCL	1082
134					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1100
135					Minimum	0.000001					95% KM (bootstrap t) UCL	2076
136					Maximum	7000					95% KM (BCA) UCL	1180
137					Mean	586.6					95% KM (Percentile Bootstrap) UCL	1124
138					Median	20					95% KM (Chebyshev) UCL	1871
139					SD	1445					97.5% KM (Chebyshev) UCL	2419
140					k star	0.21					99% KM (Chebyshev) UCL	3495
141					Theta star	2795						
142					Nu star	10.49	Potential UCLs to Use					
143					AppChi2	4.252					99% KM (Chebyshev) UCL	3495
144					95% Gamma Approximate UCL (Use when n >= 40)	1447						
145					95% Adjusted Gamma UCL (Use when n < 40)	1545						
146	Note: DL/2 is not a recommended method.											
147												
148			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
149			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
150			For additional insight, the user may want to consult a statistician.									
151												
152												
153	Benzo(b)fluoranthene											
154												
155					General Statistics							
156					Number of Valid Data	25					Number of Detected Data	22
157					Number of Distinct Detected Data	21					Number of Non-Detect Data	3
158											Percent Non-Detects	12.00%
159												
160			Raw Statistics				Log-transformed Statistics					
161					Minimum Detected	10					Minimum Detected	2.303
162					Maximum Detected	6800					Maximum Detected	8.825
163					Mean of Detected	775.5					Mean of Detected	5.045
164					SD of Detected	1491					SD of Detected	2.012
165					Minimum Non-Detect	18					Minimum Non-Detect	2.89
166					Maximum Non-Detect	380					Maximum Non-Detect	5.94
167												
168	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	16
169	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	9
170	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	64.00%
171												
172					UCL Statistics							
173			Normal Distribution Test with Detected Values Only				Lognormal Distribution Test with Detected Values Only					
174					Shapiro Wilk Test Statistic	0.55					Shapiro Wilk Test Statistic	0.905
175					5% Shapiro Wilk Critical Value	0.911					5% Shapiro Wilk Critical Value	0.911
176			Data not Normal at 5% Significance Level				Data not Lognormal at 5% Significance Level					
177												

	A	B	C	D	E	F	G	H	I	J	K	L
178				Assuming Normal Distribution					Assuming Lognormal Distribution			
179					DL/2 Substitution Method						DL/2 Substitution Method	
180					Mean	690.8					Mean	4.833
181					SD	1415					SD	2.032
182					95% DL/2 (t) UCL	1175					95% H-Stat (DL/2) UCL	5262
183												
184					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
185				MLE yields a negative mean							Mean in Log Scale	4.753
186											SD in Log Scale	2.071
187											Mean in Original Scale	684.7
188											SD in Original Scale	1417
189											95% t UCL	1170
190											95% Percentile Bootstrap UCL	1153
191											95% BCA Bootstrap UCL	1387
192											95% H-UCL	5582
193												
194				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
195					k star (bias corrected)	0.383			Data do not follow a Discernable Distribution (0.05)			
196					Theta Star	2027						
197					nu star	16.83						
198												
199					A-D Test Statistic	1.047			Nonparametric Statistics			
200					5% A-D Critical Value	0.824					Kaplan-Meier (KM) Method	
201					K-S Test Statistic	0.824					Mean	685.9
202					5% K-S Critical Value	0.198					SD	1388
203				Data not Gamma Distributed at 5% Significance Level							SE of Mean	284.2
204											95% KM (t) UCL	1172
205				Assuming Gamma Distribution							95% KM (z) UCL	1153
206					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1171
207					Minimum	0.000001					95% KM (bootstrap t) UCL	1773
208					Maximum	6800					95% KM (BCA) UCL	1211
209					Mean	682.4					95% KM (Percentile Bootstrap) UCL	1199
210					Median	40					95% KM (Chebyshev) UCL	1925
211					SD	1418					97.5% KM (Chebyshev) UCL	2460
212					k star	0.2					99% KM (Chebyshev) UCL	3513
213					Theta star	3411						
214					Nu star	10			Potential UCLs to Use			
215					AppChi2	3.943					99% KM (Chebyshev) UCL	3513
216					95% Gamma Approximate UCL (Use when n >= 40)	1731						
217					95% Adjusted Gamma UCL (Use when n < 40)	1851						
218	Note: DL/2 is not a recommended method.											
219												
220				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
221				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
222				For additional insight, the user may want to consult a statistician.								
223												
224												
225	Benzo(k)fluoranthene											
226												
227					General Statistics							
228					Number of Valid Data	25					Number of Detected Data	19
229					Number of Distinct Detected Data	19					Number of Non-Detect Data	6
230											Percent Non-Detects	24.00%
231												
232				Raw Statistics					Log-transformed Statistics			
233					Minimum Detected	3.7					Minimum Detected	1.308
234					Maximum Detected	6800					Maximum Detected	8.825
235					Mean of Detected	625.4					Mean of Detected	4.437
236					SD of Detected	1553					SD of Detected	2.269

	A	B	C	D	E	F	G	H	I	J	K	L
237					Minimum Non-Detect	21					Minimum Non-Detect	3.045
238					Maximum Non-Detect	380					Maximum Non-Detect	5.94
239												
240	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	19
241	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	6
242	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	76.00%
243												
244					UCL Statistics							
245				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
246					Shapiro Wilk Test Statistic	0.431					Shapiro Wilk Test Statistic	0.926
247					5% Shapiro Wilk Critical Value	0.901					5% Shapiro Wilk Critical Value	0.901
248				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
249												
250				Assuming Normal Distribution					Assuming Lognormal Distribution			
251					DL/2 Substitution Method						DL/2 Substitution Method	
252					Mean	485.2					Mean	4.066
253					SD	1369					SD	2.143
254					95% DL/2 (t) UCL	953.6					95% H-Stat (DL/2) UCL	3656
255												
256					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
257				MLE yields a negative mean							Mean in Log Scale	3.949
258											SD in Log Scale	2.17
259											Mean in Original Scale	478.3
260											SD in Original Scale	1371
261											95% t UCL	947.4
262											95% Percentile Bootstrap UCL	990.9
263											95% BCA Bootstrap UCL	1309
264											95% H-UCL	3598
265												
266				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
267					k star (bias corrected)	0.32			Data Follow Appr. Gamma Distribution at 5% Significance Level			
268					Theta Star	1957						
269					nu star	12.15						
270												
271					A-D Test Statistic	0.841			Nonparametric Statistics			
272					5% A-D Critical Value	0.835					Kaplan-Meier (KM) Method	
273					K-S Test Statistic	0.835					Mean	479
274					5% K-S Critical Value	0.214					SD	1343
275				Data follow Appr. Gamma Distribution at 5% Significance Level							SE of Mean	276
276											95% KM (t) UCL	951.2
277				Assuming Gamma Distribution							95% KM (z) UCL	933
278					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	948.1
279					Minimum	0.000001					95% KM (bootstrap t) UCL	2550
280					Maximum	6800					95% KM (BCA) UCL	969.6
281					Mean	475.3					95% KM (Percentile Bootstrap) UCL	986.3
282					Median	9.3					95% KM (Chebyshev) UCL	1682
283					SD	1372					97.5% KM (Chebyshev) UCL	2203
284					k star	0.14					99% KM (Chebyshev) UCL	3225
285					Theta star	3399						
286					Nu star	6.992			Potential UCLs to Use			
287					AppChi2	2.166					95% KM (Chebyshev) UCL	1682
288					95% Gamma Approximate UCL (Use when n >= 40)	1534						
289					95% Adjusted Gamma UCL (Use when n < 40)	1672						
290	Note: DL/2 is not a recommended method.											
291												
292	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
293	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
294	For additional insight, the user may want to consult a statistician.											
295												

	A	B	C	D	E	F	G	H	I	J	K	L
296												
297	Carbazole											
298												
299						General Statistics						
300					Number of Valid Data	18				Number of Detected Data		12
301					Number of Distinct Detected Data	11				Number of Non-Detect Data		6
302										Percent Non-Detects		33.33%
303												
304				Raw Statistics						Log-transformed Statistics		
305					Minimum Detected	2.1				Minimum Detected		0.742
306					Maximum Detected	250				Maximum Detected		5.521
307					Mean of Detected	47.23				Mean of Detected		2.33
308					SD of Detected	84.57				SD of Detected		1.741
309					Minimum Non-Detect	22				Minimum Non-Detect		3.091
310					Maximum Non-Detect	5500				Maximum Non-Detect		8.613
311												
312	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		18
313	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
314	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
315												
316						UCL Statistics						
317				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
318					Shapiro Wilk Test Statistic	0.607				Shapiro Wilk Test Statistic		0.778
319					5% Shapiro Wilk Critical Value	0.859				5% Shapiro Wilk Critical Value		0.859
320				Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level		
321												
322				Assuming Normal Distribution						Assuming Lognormal Distribution		
323					DL/2 Substitution Method					DL/2 Substitution Method		
324					Mean	387.1				Mean		3.532
325					SD	787.4				SD		2.507
326					95% DL/2 (t) UCL	709.9				95% H-Stat (DL/2) UCL		19263
327												
328					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
329				MLE method failed to converge properly						Mean in Log Scale		2.276
330										SD in Log Scale		1.407
331										Mean in Original Scale		34.44
332										SD in Original Scale		70.53
333										95% t UCL		63.36
334										95% Percentile Bootstrap UCL		64.2
335										95% BCA Bootstrap UCL		76.13
336										95% H-UCL		80.16
337												
338				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
339					k star (bias corrected)	0.376				Data do not follow a Discernable Distribution (0.05)		
340					Theta Star	125.7						
341					nu star	9.02						
342												
343					A-D Test Statistic	1.625				Nonparametric Statistics		
344					5% A-D Critical Value	0.799				Kaplan-Meier (KM) Method		
345					K-S Test Statistic	0.799				Mean		43.99
346					5% K-S Critical Value	0.261				SD		78.61
347				Data not Gamma Distributed at 5% Significance Level						SE of Mean		22.77
348										95% KM (t) UCL		83.61
349				Assuming Gamma Distribution						95% KM (z) UCL		81.45
350					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		83.93
351					Minimum	0.000001				95% KM (bootstrap t) UCL		191.8
352					Maximum	250				95% KM (BCA) UCL		85.77
353					Mean	36.26				95% KM (Percentile Bootstrap) UCL		83.81
354					Median	11.4				95% KM (Chebyshev) UCL		143.3

	A	B	C	D	E	F	G	H	I	J	K	L
355					SD	69.98				97.5% KM (Chebyshev) UCL		186.2
356					k star	0.317				99% KM (Chebyshev) UCL		270.6
357					Theta star	114.4						
358					Nu star	11.41			Potential UCLs to Use			
359					AppChi2	4.843				99% KM (Chebyshev) UCL		270.6
360			95% Gamma Approximate UCL (Use when n >= 40)			85.45						
361			95% Adjusted Gamma UCL (Use when n < 40)			93.24						
362					Warning: Recommended UCL exceeds the maximum observation							
363	Note: DL/2 is not a recommended method.											
364												
365				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
366				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
367				For additional insight, the user may want to consult a statistician.								
368												
369												
370	Dibenz(a,h)anthracene											
371												
372					General Statistics							
373					Number of Valid Data	25				Number of Detected Data		15
374					Number of Distinct Detected Data	14				Number of Non-Detect Data		10
375										Percent Non-Detects		40.00%
376												
377				Raw Statistics					Log-transformed Statistics			
378					Minimum Detected	3.6				Minimum Detected		1.281
379					Maximum Detected	1400				Maximum Detected		7.244
380					Mean of Detected	151.3				Mean of Detected		3.423
381					SD of Detected	352.5				SD of Detected		1.889
382					Minimum Non-Detect	21				Minimum Non-Detect		3.045
383					Maximum Non-Detect	5500				Maximum Non-Detect		8.613
384												
385	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		25
386	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
387	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
388												
389					UCL Statistics							
390				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
391					Shapiro Wilk Test Statistic	0.445				Shapiro Wilk Test Statistic		0.902
392					5% Shapiro Wilk Critical Value	0.881				5% Shapiro Wilk Critical Value		0.881
393				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
394												
395				Assuming Normal Distribution					Assuming Lognormal Distribution			
396					DL/2 Substitution Method					DL/2 Substitution Method		
397					Mean	312.6				Mean		3.835
398					SD	647.8				SD		2.088
399					95% DL/2 (t) UCL	534.2				95% H-Stat (DL/2) UCL		2371
400												
401					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
402				MLE method failed to converge properly						Mean in Log Scale		3.024
403										SD in Log Scale		1.577
404										Mean in Original Scale		96.08
405										SD in Original Scale		278
406										95% t UCL		191.2
407										95% Percentile Bootstrap UCL		200.7
408										95% BCA Bootstrap UCL		270.1
409										95% H-UCL		207.3
410												
411				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
412					k star (bias corrected)	0.373			Data Follow Appr. Gamma Distribution at 5% Significance Level			
413					Theta Star	405.8						

	A	B	C	D	E	F	G	H	I	J	K	L
414					nu star	11.19						
415												
416					A-D Test Statistic	0.901			**Nonparametric Statistics**			
417					5% A-D Critical Value	0.812				Kaplan-Meier (KM) Method		
418					K-S Test Statistic	0.812					Mean	108.9
419					5% K-S Critical Value	0.237					SD	288.8
420	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	63.9
421											95% KM (t) UCL	218.2
422			**Assuming Gamma Distribution**								95% KM (z) UCL	214
423			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	217.3
424					Minimum	0.000001					95% KM (bootstrap t) UCL	532.9
425					Maximum	1400					95% KM (BCA) UCL	223.2
426					Mean	91.81					95% KM (Percentile Bootstrap) UCL	223.8
427					Median	8.478					95% KM (Chebyshev) UCL	387.4
428					SD	279.3					97.5% KM (Chebyshev) UCL	508
429					k star	0.14					99% KM (Chebyshev) UCL	744.7
430					Theta star	654.2						
431					Nu star	7.017			**Potential UCLs to Use**			
432					AppChi2	2.18					95% KM (BCA) UCL	223.2
433				95% Gamma Approximate UCL (Use when n >= 40)		295.5						
434				95% Adjusted Gamma UCL (Use when n < 40)		322						
435	**Note: DL/2 is not a recommended method.**											
436												
437	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
438	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
439	**For additional insight, the user may want to consult a statistician.**											
440												
441												
442	**Indeno(1,2,3-cd)pyrene**											
443												
444					**General Statistics**							
445					Number of Valid Data	25					Number of Detected Data	20
446					Number of Distinct Detected Data	20					Number of Non-Detect Data	5
447											Percent Non-Detects	20.00%
448												
449					**Raw Statistics**				**Log-transformed Statistics**			
450					Minimum Detected	9.8					Minimum Detected	2.282
451					Maximum Detected	3400					Maximum Detected	8.132
452					Mean of Detected	425.9					Mean of Detected	4.655
453					SD of Detected	785.3					SD of Detected	1.826
454					Minimum Non-Detect	18					Minimum Non-Detect	2.89
455					Maximum Non-Detect	2600					Maximum Non-Detect	7.863
456												
457	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	24
458	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
459	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	96.00%
460												
461					**UCL Statistics**							
462	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
463					Shapiro Wilk Test Statistic	0.575					Shapiro Wilk Test Statistic	0.915
464					5% Shapiro Wilk Critical Value	0.905					5% Shapiro Wilk Critical Value	0.905
465	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
466												
467			**Assuming Normal Distribution**						**Assuming Lognormal Distribution**			
468					DL/2 Substitution Method						DL/2 Substitution Method	
469					Mean	401.6					Mean	4.498
470					SD	737.1					SD	1.892
471					95% DL/2 (t) UCL	653.8					95% H-Stat (DL/2) UCL	2337
472												

	A	B	C	D	E	F	G	H	I	J	K	L
473					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
474					**MLE method failed to converge properly**						Mean in Log Scale	4.324
475											SD in Log Scale	1.798
476											Mean in Original Scale	346.3
477											SD in Original Scale	717.5
478											95% t UCL	591.8
479											95% Percentile Bootstrap UCL	600.2
480											95% BCA Bootstrap UCL	736.2
481											95% H-UCL	1452
482												
483					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
484					k star (bias corrected)	0.424				**Data appear Lognormal at 5% Significance Level**		
485					Theta Star	1004						
486					nu star	16.97						
487												
488					A-D Test Statistic	0.904				**Nonparametric Statistics**		
489					5% A-D Critical Value	0.811					Kaplan-Meier (KM) Method	
490					K-S Test Statistic	0.811					Mean	354.3
491					5% K-S Critical Value	0.206					SD	703.9
492					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	145.2
493											95% KM (t) UCL	602.7
494					**Assuming Gamma Distribution**						95% KM (z) UCL	593.1
495					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	601.5
496					Minimum	0.000001					95% KM (bootstrap t) UCL	968.9
497					Maximum	3400					95% KM (BCA) UCL	621.3
498					Mean	343.8					95% KM (Percentile Bootstrap) UCL	615.6
499					Median	33					95% KM (Chebyshev) UCL	987.2
500					SD	718.7					97.5% KM (Chebyshev) UCL	1261
501					k star	0.185					99% KM (Chebyshev) UCL	1799
502					Theta star	1857						
503					Nu star	9.256				**Potential UCLs to Use**		
504					AppChi2	3.483					99% KM (Chebyshev) UCL	1799
505					95% Gamma Approximate UCL (Use when n >= 40)	913.7						
506					95% Adjusted Gamma UCL (Use when n < 40)	980.8						
507	**Note: DL/2 is not a recommended method.**											
508												
509					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
510					**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**							
511					**For additional insight, the user may want to consult a statistician.**							
512												
513												
514	**Aldrin**											
515												
516					**General Statistics**							
517					Number of Valid Data	18					Number of Detected Data	1
518					Number of Distinct Detected Data	1					Number of Non-Detect Data	17
519											Percent Non-Detects	94.44%
520												
521					**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**							
522					**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**							
523												
524					**The data set for variable Aldrin was not processed!**							
525												
526												
527												
528	**Aroclor-1242**											
529												
530					**General Statistics**							
531					Number of Valid Data	25					Number of Detected Data	1

	A	B	C	D	E	F	G	H	I	J	K	L
532					Number of Distinct Detected Data	1					Number of Non-Detect Data	24
533											Percent Non-Detects	96.00%
534												
535	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
536	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
537												
538	The data set for variable Aroclor-1242 was not processed!											
539												
540												
541												
542	Aroclor-1260											
543												
544	General Statistics											
545					Number of Valid Data	25					Number of Detected Data	10
546					Number of Distinct Detected Data	9					Number of Non-Detect Data	15
547											Percent Non-Detects	60.00%
548												
549	Raw Statistics						Log-transformed Statistics					
550					Minimum Detected	19					Minimum Detected	2.944
551					Maximum Detected	2700					Maximum Detected	7.901
552					Mean of Detected	371.4					Mean of Detected	4.507
553					SD of Detected	836.4					SD of Detected	1.503
554					Minimum Non-Detect	8.9					Minimum Non-Detect	2.186
555					Maximum Non-Detect	23					Maximum Non-Detect	3.135
556												
557	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	16
558	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	9
559	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	64.00%
560												
561	UCL Statistics											
562	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
563					Shapiro Wilk Test Statistic	0.481					Shapiro Wilk Test Statistic	0.806
564					5% Shapiro Wilk Critical Value	0.842					5% Shapiro Wilk Critical Value	0.842
565	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
566												
567	Assuming Normal Distribution						Assuming Lognormal Distribution					
568					DL/2 Substitution Method						DL/2 Substitution Method	
569					Mean	153.6					Mean	3.04
570					SD	543.4					SD	1.558
571					95% DL/2 (t) UCL	339.5					95% H-Stat (DL/2) UCL	199.8
572												
573					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
574	MLE yields a negative mean										Mean in Log Scale	1.939
575											SD in Log Scale	2.452
576											Mean in Original Scale	149.7
577											SD in Original Scale	544.5
578											95% t UCL	336
579											95% Percentile Bootstrap UCL	349.6
580											95% BCA Bootstrap UCL	475.3
581											95% H-UCL	1492
582												
583	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
584					k star (bias corrected)	0.386	Data do not follow a Discernable Distribution (0.05)					
585					Theta Star	961.1						
586					nu star	7.729						
587												
588					A-D Test Statistic	1.573	Nonparametric Statistics					
589					5% A-D Critical Value	0.785					Kaplan-Meier (KM) Method	
590					K-S Test Statistic	0.785					Mean	160

	A	B	C	D	E	F	G	H	I	J	K	L
591					5% K-S Critical Value	0.282					SD	530.7
592			Data not Gamma Distributed at 5% Significance Level								SE of Mean	111.9
593											95% KM (t) UCL	351.4
594			Assuming Gamma Distribution								95% KM (z) UCL	344
595				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	338.2
596					Minimum	0.000001					95% KM (bootstrap t) UCL	4154
597					Maximum	2700					95% KM (BCA) UCL	378.3
598					Mean	148.6					95% KM (Percentile Bootstrap) UCL	363.4
599					Median	0.000001					95% KM (Chebyshev) UCL	647.6
600					SD	544.8					97.5% KM (Chebyshev) UCL	858.7
601					k star	0.0912					99% KM (Chebyshev) UCL	1273
602					Theta star	1629						
603					Nu star	4.56			Potential UCLs to Use			
604					AppChi2	0.954					97.5% KM (Chebyshev) UCL	858.7
605				95% Gamma Approximate UCL (Use when n >= 40)		709.7						
606				95% Adjusted Gamma UCL (Use when n < 40)		797						
607	Note: DL/2 is not a recommended method.											
608												
609			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
610			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
611			For additional insight, the user may want to consult a statistician.									
612												
613												
614	Aluminum											
615												
616			General Statistics									
617				Number of Valid Observations		25				Number of Distinct Observations		24
618												
619			Raw Statistics				Log-transformed Statistics					
620					Minimum	3960				Minimum of Log Data		8.284
621					Maximum	29400				Maximum of Log Data		10.29
622					Mean	9669				Mean of log Data		9.047
623					Geometric Mean	8497				SD of log Data		0.495
624					Median	8030						
625					SD	5760						
626					Std. Error of Mean	1152						
627					Coefficient of Variation	0.596						
628					Skewness	2.043						
629												
630			Relevant UCL Statistics									
631			Normal Distribution Test				Lognormal Distribution Test					
632					Shapiro Wilk Test Statistic	0.794				Shapiro Wilk Test Statistic		0.957
633					Shapiro Wilk Critical Value	0.918				Shapiro Wilk Critical Value		0.918
634			Data not Normal at 5% Significance Level				Data appear Lognormal at 5% Significance Level					
635												
636			Assuming Normal Distribution				Assuming Lognormal Distribution					
637					95% Student's-t UCL	11640					95% H-UCL	11701
638			95% UCLs (Adjusted for Skewness)								95% Chebyshev (MVUE) UCL	13840
639					95% Adjusted-CLT UCL (Chen-1995)	12067					97.5% Chebyshev (MVUE) UCL	15695
640					95% Modified-t UCL (Johnson-1978)	11718					99% Chebyshev (MVUE) UCL	19339
641												
642			Gamma Distribution Test				Data Distribution					
643					k star (bias corrected)	3.571	Data appear Gamma Distributed at 5% Significance Level					
644					Theta Star	2707						
645					MLE of Mean	9669						
646					MLE of Standard Deviation	5116						
647					nu star	178.6						
648					Approximate Chi Square Value (.05)	148.7	Nonparametric Statistics					
649					Adjusted Level of Significance	0.0395					95% CLT UCL	11564

	A	B	C	D	E	F	G	H	I	J	K	L
650					Adjusted Chi Square Value	146.8					95% Jackknife UCL	11640
651											95% Standard Bootstrap UCL	11569
652					Anderson-Darling Test Statistic	0.662					95% Bootstrap-t UCL	12637
653					Anderson-Darling 5% Critical Value	0.749					95% Hall's Bootstrap UCL	13182
654					Kolmogorov-Smirnov Test Statistic	0.148					95% Percentile Bootstrap UCL	11724
655					Kolmogorov-Smirnov 5% Critical Value	0.175					95% BCA Bootstrap UCL	12008
656					**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	14690
657											97.5% Chebyshev(Mean, Sd) UCL	16863
658					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	21131
659				95% Approximate Gamma UCL (Use when n >= 40)		11614						
660				95% Adjusted Gamma UCL (Use when n < 40)		11761						
661												
662					**Potential UCL to Use**						Use 95% Approximate Gamma UCL	11614
663												
664					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
665					**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**							
666					**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**							
667												
668												
669	**Arsenic**											
670												
671					**General Statistics**							
672					Number of Valid Observations	25					Number of Distinct Observations	20
673												
674					**Raw Statistics**						**Log-transformed Statistics**	
675					Minimum	1					Minimum of Log Data	0
676					Maximum	346					Maximum of Log Data	5.846
677					Mean	17.05					Mean of log Data	1.261
678					Geometric Mean	3.53					SD of log Data	1.091
679					Median	3						
680					SD	68.56						
681					Std. Error of Mean	13.71						
682					Coefficient of Variation	4.021						
683					Skewness	4.994						
684												
685					**Relevant UCL Statistics**							
686					**Normal Distribution Test**						**Lognormal Distribution Test**	
687					Shapiro Wilk Test Statistic	0.226					Shapiro Wilk Test Statistic	0.668
688					Shapiro Wilk Critical Value	0.918					Shapiro Wilk Critical Value	0.918
689					**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
690												
691					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
692					95% Student's-t UCL	40.51					95% H-UCL	11.45
693					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	12.96
694					95% Adjusted-CLT UCL (Chen-1995)	54.23					97.5% Chebyshev (MVUE) UCL	15.9
695					95% Modified-t UCL (Johnson-1978)	42.79					99% Chebyshev (MVUE) UCL	21.66
696												
697					**Gamma Distribution Test**						**Data Distribution**	
698					k star (bias corrected)	0.392					**Data do not follow a Discernable Distribution (0.05)**	
699					Theta Star	43.47						
700					MLE of Mean	17.05						
701					MLE of Standard Deviation	27.22						
702					nu star	19.61						
703					Approximate Chi Square Value (.05)	10.56					**Nonparametric Statistics**	
704					Adjusted Level of Significance	0.0395					95% CLT UCL	39.6
705					Adjusted Chi Square Value	10.11					95% Jackknife UCL	40.51
706											95% Standard Bootstrap UCL	39.22
707					Anderson-Darling Test Statistic	6.214					95% Bootstrap-t UCL	695.5
708					Anderson-Darling 5% Critical Value	0.826					95% Hall's Bootstrap UCL	303.6

	A	B	C	D	E	F	G	H	I	J	K	L
709					Kolmogorov-Smirnov Test Statistic	0.407					95% Percentile Bootstrap UCL	44.52
710					Kolmogorov-Smirnov 5% Critical Value	0.187					95% BCA Bootstrap UCL	58.42
711					**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	76.81
712											97.5% Chebyshev(Mean, Sd) UCL	102.7
713					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	153.5
714					95% Approximate Gamma UCL (Use when n >= 40)	31.65						
715					95% Adjusted Gamma UCL (Use when n < 40)	33.06						
716												
717					**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL	76.81
718												
719	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
720	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
721	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
722												
723												
724	**Chromium**											
725												
726					**General Statistics**							
727					Number of Valid Observations	27					Number of Distinct Observations	27
728												
729					**Raw Statistics**		**Log-transformed Statistics**					
730					Minimum	5.8					Minimum of Log Data	1.758
731					Maximum	63					Maximum of Log Data	4.143
732					Mean	18.93					Mean of log Data	2.719
733					Geometric Mean	15.16					SD of log Data	0.642
734					Median	13.1						
735					SD	14.88						
736					Std. Error of Mean	2.864						
737					Coefficient of Variation	0.786						
738					Skewness	1.867						
739												
740					**Relevant UCL Statistics**							
741					**Normal Distribution Test**		**Lognormal Distribution Test**					
742					Shapiro Wilk Test Statistic	0.76					Shapiro Wilk Test Statistic	0.942
743					Shapiro Wilk Critical Value	0.923					Shapiro Wilk Critical Value	0.923
744					**Data not Normal at 5% Significance Level**		**Data appear Lognormal at 5% Significance Level**					
745												
746					**Assuming Normal Distribution**		**Assuming Lognormal Distribution**					
747					95% Student's-t UCL	23.82					95% H-UCL	24.28
748					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	29.08
749					95% Adjusted-CLT UCL (Chen-1995)	24.74					97.5% Chebyshev (MVUE) UCL	33.67
750					95% Modified-t UCL (Johnson-1978)	23.99					99% Chebyshev (MVUE) UCL	42.69
751												
752					**Gamma Distribution Test**		**Data Distribution**					
753					k star (bias corrected)	2.162	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
754					Theta Star	8.757						
755					MLE of Mean	18.93						
756					MLE of Standard Deviation	12.87						
757					nu star	116.7						
758					Approximate Chi Square Value (.05)	92.79	**Nonparametric Statistics**					
759					Adjusted Level of Significance	0.0401					95% CLT UCL	23.64
760					Adjusted Chi Square Value	91.42					95% Jackknife UCL	23.82
761											95% Standard Bootstrap UCL	23.41
762					Anderson-Darling Test Statistic	0.973					95% Bootstrap-t UCL	26.54
763					Anderson-Darling 5% Critical Value	0.755					95% Hall's Bootstrap UCL	25.12
764					Kolmogorov-Smirnov Test Statistic	0.153					95% Percentile Bootstrap UCL	23.85
765					Kolmogorov-Smirnov 5% Critical Value	0.17					95% BCA Bootstrap UCL	24.33
766					**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	31.41
767											97.5% Chebyshev(Mean, Sd) UCL	36.82

	A	B	C	D	E	F	G	H	I	J	K	L
768				Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL		47.43
769			95% Approximate Gamma UCL (Use when n >= 40)			23.81						
770			95% Adjusted Gamma UCL (Use when n < 40)			24.17						
771												
772				Potential UCL to Use						Use 95% Approximate Gamma UCL		23.81
773												
774												
775												
776												
777												
778												
779	Cobalt											
780												
781						General Statistics						
782					Number of Valid Data	25				Number of Detected Data		24
783					Number of Distinct Detected Data	20				Number of Non-Detect Data		1
784										Percent Non-Detects		4.00%
785												
786				Raw Statistics						Log-transformed Statistics		
787					Minimum Detected	0.72				Minimum Detected		-0.329
788					Maximum Detected	11.5				Maximum Detected		2.442
789					Mean of Detected	3.153				Mean of Detected		0.94
790					SD of Detected	2.429				SD of Detected		0.642
791					Minimum Non-Detect	1.4				Minimum Non-Detect		0.336
792					Maximum Non-Detect	1.4				Maximum Non-Detect		0.336
793												
794												
795						UCL Statistics						
796				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
797					Shapiro Wilk Test Statistic	0.732				Shapiro Wilk Test Statistic		0.957
798					5% Shapiro Wilk Critical Value	0.916				5% Shapiro Wilk Critical Value		0.916
799				Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
800												
801				Assuming Normal Distribution						Assuming Lognormal Distribution		
802					DL/2 Substitution Method					DL/2 Substitution Method		
803					Mean	3.054				Mean		0.888
804					SD	2.428				SD		0.68
805					95% DL/2 (t) UCL	3.885				95% H-Stat (DL/2) UCL		4.111
806												
807					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
808					Mean	2.807				Mean in Log Scale		0.903
809					SD	2.71				SD in Log Scale		0.655
810					95% MLE (t) UCL	3.735				Mean in Original Scale		3.067
811					95% MLE (Tiku) UCL	3.732				SD in Original Scale		2.416
812										95% t UCL		3.894
813										95% Percentile Bootstrap UCL		3.871
814										95% BCA Bootstrap UCL		4.182
815										95% H UCL		4.048
816												
817				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
818					k star (bias corrected)	2.263				Data appear Gamma Distributed at 5% Significance Level		
819					Theta Star	1.393						
820					nu star	108.6						
821												
822					A-D Test Statistic	0.749				Nonparametric Statistics		
823					5% A-D Critical Value	0.753				Kaplan-Meier (KM) Method		
824					K-S Test Statistic	0.753				Mean		3.065
825					5% K-S Critical Value	0.18				SD		2.369
826				Data appear Gamma Distributed at 5% Significance Level						SE of Mean		0.484

	A	B	C	D	E	F	G	H	I	J	K	L
827											95% KM (t) UCL	3.893
828				Assuming Gamma Distribution							95% KM (z) UCL	3.861
829					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	3.893
830					Minimum	0.226					95% KM (bootstrap t) UCL	4.527
831					Maximum	11.5					95% KM (BCA) UCL	3.892
832					Mean	3.035					95% KM (Percentile Bootstrap) UCL	3.902
833					Median	2.4					95% KM (Chebyshev) UCL	5.175
834					SD	2.449					97.5% KM (Chebyshev) UCL	6.088
835					k star	1.803					99% KM (Chebyshev) UCL	7.882
836					Theta star	1.683						
837					Nu star	90.17			Potential UCLs to Use			
838					AppChi2	69.27					95% KM (BCA) UCL	3.892
839					95% Gamma Approximate UCL (Use when n >= 40)	3.951						
840					95% Adjusted Gamma UCL (Use when n < 40)	4.024						
841	Note: DL/2 is not a recommended method.											
842												
843	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
844	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
845	For additional insight, the user may want to consult a statistician.											
846												
847												
848	Iron											
849												
850					General Statistics							
851					Number of Valid Observations	25					Number of Distinct Observations	25
852												
853					Raw Statistics				Log-transformed Statistics			
854					Minimum	3450					Minimum of Log Data	8.146
855					Maximum	116000					Maximum of Log Data	11.66
856					Mean	18845					Mean of log Data	9.424
857					Geometric Mean	12387					SD of log Data	0.816
858					Median	9740						
859					SD	24594						
860					Std. Error of Mean	4919						
861					Coefficient of Variation	1.305						
862					Skewness	3.089						
863												
864					Relevant UCL Statistics							
865					Normal Distribution Test				Lognormal Distribution Test			
866					Shapiro Wilk Test Statistic	0.566					Shapiro Wilk Test Statistic	0.897
867					Shapiro Wilk Critical Value	0.918					Shapiro Wilk Critical Value	0.918
868					Data not Normal at 5% Significance Level				Data not Lognormal at 5% Significance Level			
869												
870					Assuming Normal Distribution				Assuming Lognormal Distribution			
871					95% Student's-t UCL	27260					95% H-UCL	25249
872					95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL	30276
873					95% Adjusted-CLT UCL (Chen-1995)	30183					97.5% Chebyshev (MVUE) UCL	36023
874					95% Modified-t UCL (Johnson-1978)	27767					99% Chebyshev (MVUE) UCL	47314
875												
876					Gamma Distribution Test				Data Distribution			
877					k star (bias corrected)	1.2			Data do not follow a Discernable Distribution (0.05)			
878					Theta Star	15700						
879					MLE of Mean	18845						
880					MLE of Standard Deviation	17201						
881					nu star	60.01						
882					Approximate Chi Square Value (.05)	43.2			Nonparametric Statistics			
883					Adjusted Level of Significance	0.0395					95% CLT UCL	26936
884					Adjusted Chi Square Value	42.23					95% Jackknife UCL	27260
885											95% Standard Bootstrap UCL	26697

	A	B	C	D	E	F	G	H	I	J	K	L
886					Anderson-Darling Test Statistic	2.056					95% Bootstrap-t UCL	37514
887					Anderson-Darling 5% Critical Value	0.765					95% Hall's Bootstrap UCL	47253
888					Kolmogorov-Smirnov Test Statistic	0.243					95% Percentile Bootstrap UCL	27666
889					Kolmogorov-Smirnov 5% Critical Value	0.178					95% BCA Bootstrap UCL	31587
890					**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	40285
891											97.5% Chebyshev(Mean, Sd) UCL	49563
892					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	67786
893					95% Approximate Gamma UCL (Use when n >= 40)	26179						
894					95% Adjusted Gamma UCL (Use when n < 40)	26783						
895												
896					**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL	40285
897												
898					**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**							
899					**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**							
900					**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**							
901												
902												
903	**Manganese**											
904												
905					**General Statistics**							
906					Number of Valid Observations	25					Number of Distinct Observations	25
907												
908					**Raw Statistics**						**Log-transformed Statistics**	
909					Minimum	19.1					Minimum of Log Data	2.95
910					Maximum	511					Maximum of Log Data	6.236
911					Mean	112.3					Mean of log Data	4.316
912					Geometric Mean	74.91					SD of log Data	0.904
913					Median	70.2						
914					SD	114.5						
915					Std. Error of Mean	22.9						
916					Coefficient of Variation	1.019						
917					Skewness	2.108						
918												
919					**Relevant UCL Statistics**							
920					**Normal Distribution Test**						**Lognormal Distribution Test**	
921					Shapiro Wilk Test Statistic	0.761					Shapiro Wilk Test Statistic	0.953
922					Shapiro Wilk Critical Value	0.918					Shapiro Wilk Critical Value	0.918
923					**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**	
924												
925					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
926					95% Student's-t UCL	151.5					95% H-UCL	174.6
927					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	207.1
928					95% Adjusted-CLT UCL (Chen-1995)	160.3					97.5% Chebyshev (MVUE) UCL	249
929					95% Modified-t UCL (Johnson-1978)	153.1					99% Chebyshev (MVUE) UCL	331.4
930												
931					**Gamma Distribution Test**						**Data Distribution**	
932					k star (bias corrected)	1.238					**Data appear Gamma Distributed at 5% Significance Level**	
933					Theta Star	90.74						
934					MLE of Mean	112.3						
935					MLE of Standard Deviation	101						
936					nu star	61.9						
937					Approximate Chi Square Value (.05)	44.8					**Nonparametric Statistics**	
938					Adjusted Level of Significance	0.0395					95% CLT UCL	150
939					Adjusted Chi Square Value	43.81					95% Jackknife UCL	151.5
940											95% Standard Bootstrap UCL	148.6
941					Anderson-Darling Test Statistic	0.675					95% Bootstrap-t UCL	173.3
942					Anderson-Darling 5% Critical Value	0.764					95% Hall's Bootstrap UCL	182.9
943					Kolmogorov-Smirnov Test Statistic	0.152					95% Percentile Bootstrap UCL	151.5
944					Kolmogorov-Smirnov 5% Critical Value	0.178					95% BCA Bootstrap UCL	161.8

	A	B	C	D	E	F	G	H	I	J	K	L
945	Data appear Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL					212.1
946							97.5% Chebyshev(Mean, Sd) UCL					255.3
947	Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL					340.2
948	95% Approximate Gamma UCL (Use when n >= 40)					155.2						
949	95% Adjusted Gamma UCL (Use when n < 40)					158.7						
950												
951	Potential UCL to Use						Use 95% Approximate Gamma UCL					155.2
952												
953	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
954	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
955	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
956												
957												
958	Thallium											
959												
960	General Statistics											
961	Number of Valid Data					25	Number of Detected Data					2
962	Number of Distinct Detected Data					2	Number of Non-Detect Data					23
963							Percent Non-Detects					92.00%
964												
965	Raw Statistics						Log-transformed Statistics					
966	Minimum Detected					0.47	Minimum Detected					-0.755
967	Maximum Detected					1.1	Maximum Detected					0.0953
968	Mean of Detected					0.785	Mean of Detected					-0.33
969	SD of Detected					0.445	SD of Detected					0.601
970	Minimum Non-Detect					0.07	Minimum Non-Detect					-2.659
971	Maximum Non-Detect					2	Maximum Non-Detect					0.693
972												
973	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					25
974	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
975	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
976												
977	Warning: Data set has only 2 Distinct Detected Values.											
978	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
979	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
980												
981	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
982												
983	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
984	Those methods will return a 'N/A' value on your output display!											
985												
986	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
987	However, results obtained using 4 to 9 distinct values may not be reliable.											
988	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
989												
990												
991	UCL Statistics											
992	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
993	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
994	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
995	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
996												
997	Assuming Normal Distribution						Assuming Lognormal Distribution					
998	DL/2 Substitution Method						DL/2 Substitution Method					
999	Mean					0.236	Mean					-1.993
1000	SD					0.284	SD					1.041
1001	95% DL/2 (t) UCL					0.334	95% H-Stat (DL/2) UCL					0.403
1002												
1003	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					

	A	B	C	D	E	F	G	H	I	J	K	L
1004				MLE method failed to converge properly							Mean in Log Scale	N/A
1005											SD in Log Scale	N/A
1006											Mean in Original Scale	N/A
1007											SD in Original Scale	N/A
1008											95% t UCL	N/A
1009											95% Percentile Bootstrap UCL	N/A
1010											95% BCA Bootstrap UCL	N/A
1011											95% H-UCL	N/A
1012												
1013				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
1014					k star (bias corrected)	N/A				Data do not follow a Discernable Distribution (0.05)		
1015					Theta Star	N/A						
1016					nu star	N/A						
1017												
1018					A-D Test Statistic	N/A				Nonparametric Statistics		
1019					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
1020					K-S Test Statistic	N/A					Mean	0.496
1021					5% K-S Critical Value	N/A					SD	0.126
1022				Data not Gamma Distributed at 5% Significance Level							SE of Mean	0.0363
1023											95% KM (t) UCL	0.558
1024				Assuming Gamma Distribution							95% KM (z) UCL	0.556
1025					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.91
1026					Minimum	N/A					95% KM (bootstrap t) UCL	0.498
1027					Maximum	N/A					95% KM (BCA) UCL	1.1
1028					Mean	N/A					95% KM (Percentile Bootstrap) UCL	1.1
1029					Median	N/A					95% KM (Chebyshev) UCL	0.655
1030					SD	N/A					97.5% KM (Chebyshev) UCL	0.723
1031					k star	N/A					99% KM (Chebyshev) UCL	0.858
1032					Theta star	N/A						
1033					Nu star	N/A				Potential UCLs to Use		
1034					AppChi2	N/A					95% KM (t) UCL	0.558
1035					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (% Bootstrap) UCL	1.1
1036					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1037	Note: DL/2 is not a recommended method.											
1038												
1039				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1040				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1041				For additional insight, the user may want to consult a statistician.								
1042												
1043												
1044	Vanadium											
1045												
1046						General Statistics						
1047					Number of Valid Observations	25					Number of Distinct Observations	24
1048												
1049				Raw Statistics						Log-transformed Statistics		
1050					Minimum	8.6					Minimum of Log Data	2.152
1051					Maximum	63.6					Maximum of Log Data	4.153
1052					Mean	22.27					Mean of log Data	2.977
1053					Geometric Mean	19.63					SD of log Data	0.492
1054					Median	18.8						
1055					SD	12.78						
1056					Std. Error of Mean	2.557						
1057					Coefficient of Variation	0.574						
1058					Skewness	1.767						
1059												
1060						Relevant UCL Statistics						
1061				Normal Distribution Test						Lognormal Distribution Test		
1062					Shapiro Wilk Test Statistic	0.822					Shapiro Wilk Test Statistic	0.964

	A	B	C	D	E	F	G	H	I	J	K	L
1063					Shapiro Wilk Critical Value	0.918					Shapiro Wilk Critical Value	0.918
1064				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
1065												
1066				Assuming Normal Distribution					Assuming Lognormal Distribution			
1067					95% Student's-t UCL	26.64					95% H-UCL	26.95
1068				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	31.86
1069					95% Adjusted-CLT UCL (Chen-1995)	27.44					97.5% Chebyshev (MVUE) UCL	36.11
1070					95% Modified-t UCL (Johnson-1978)	26.79					99% Chebyshev (MVUE) UCL	44.46
1071												
1072				Gamma Distribution Test					Data Distribution			
1073					k star (bias corrected)	3.662			Data appear Gamma Distributed at 5% Significance Level			
1074					Theta Star	6.08						
1075					MLE of Mean	22.27						
1076					MLE of Standard Deviation	11.64						
1077					nu star	183.1						
1078					Approximate Chi Square Value (.05)	152.8			Nonparametric Statistics			
1079					Adjusted Level of Significance	0.0395					95% CLT UCL	26.47
1080					Adjusted Chi Square Value	150.9					95% Jackknife UCL	26.64
1081											95% Standard Bootstrap UCL	26.38
1082					Anderson-Darling Test Statistic	0.672					95% Bootstrap-t UCL	28.25
1083					Anderson-Darling 5% Critical Value	0.748					95% Hall's Bootstrap UCL	28.58
1084					Kolmogorov-Smirnov Test Statistic	0.157					95% Percentile Bootstrap UCL	26.5
1085					Kolmogorov-Smirnov 5% Critical Value	0.175					95% BCA Bootstrap UCL	27.55
1086				Data appear Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	33.41
1087											97.5% Chebyshev(Mean, Sd) UCL	38.24
1088				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	47.71
1089					95% Approximate Gamma UCL (Use when n >= 40)	26.68						
1090					95% Adjusted Gamma UCL (Use when n < 40)	27.02						
1091												
1092				Potential UCL to Use							Use 95% Approximate Gamma UCL	26.68
1093												
1094				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1095				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
1096				and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.								
1097												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG10								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	1,4-Dichlorobenzene											
10												
11						General Statistics						
12						Number of Valid Data	14			Number of Detected Data		1
13						Number of Distinct Detected Data	1			Number of Non-Detect Data		13
14										Percent Non-Detects		92.86%
15												
16						Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!						
17						It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).						
18												
19						The data set for variable 1,4-Dichlorobenzene was not processed!						
20												
21												
22												
23	Benzene											
24												
25						General Statistics						
26						Number of Valid Data	14			Number of Detected Data		1
27						Number of Distinct Detected Data	1			Number of Non-Detect Data		13
28										Percent Non-Detects		92.86%
29												
30						Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!						
31						It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).						
32												
33						The data set for variable Benzene was not processed!						
34												
35												
36												
37	Ethylbenzene											
38												
39						General Statistics						
40						Number of Valid Data	14			Number of Detected Data		2
41						Number of Distinct Detected Data	2			Number of Non-Detect Data		12
42										Percent Non-Detects		85.71%
43												
44						Raw Statistics				Log-transformed Statistics		
45						Minimum Detected	0.2			Minimum Detected		-1.609
46						Maximum Detected	10			Maximum Detected		2.303
47						Mean of Detected	5.1			Mean of Detected		0.347
48						SD of Detected	6.93			SD of Detected		2.766
49						Minimum Non-Detect	0.5			Minimum Non-Detect		-0.693
50						Maximum Non-Detect	1			Maximum Non-Detect		0
51												
52						Note: Data have multiple DLs - Use of KM Method is recommended				Number treated as Non-Detect		13
53						For all methods (except KM, DL/2, and ROS Methods),				Number treated as Detected		1
54						Observations < Largest ND are treated as NDs				Single DL Non-Detect Percentage		92.86%
55												
56						Warning: Data set has only 2 Distinct Detected Values.						
57						This may not be adequate enough to compute meaningful and reliable test statistics and estimates.						
58						The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).						
59												

	A	B	C	D	E	F	G	H	I	J	K	L
60	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
61												
62	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
63	Those methods will return a 'N/A' value on your output display!											
64												
65	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
66	However, results obtained using 4 to 9 distinct values may not be reliable.											
67	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
68												
69												
70	UCL Statistics											
71	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
72					Shapiro Wilk Test Statistic	N/A				Shapiro Wilk Test Statistic		N/A
73					5% Shapiro Wilk Critical Value	N/A				5% Shapiro Wilk Critical Value		N/A
74	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
75												
76	Assuming Normal Distribution						Assuming Lognormal Distribution					
77					DL/2 Substitution Method					DL/2 Substitution Method		
78					Mean	1.05				Mean		-0.842
79					SD	2.579				SD		0.976
80					95% DL/2 (t) UCL	2.271				95% H-Stat (DL/2) UCL		1.462
81												
82					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
83	MLE method failed to converge properly									Mean in Log Scale		N/A
84										SD in Log Scale		N/A
85										Mean in Original Scale		N/A
86										SD in Original Scale		N/A
87										95% t UCL		N/A
88										95% Percentile Bootstrap UCL		N/A
89										95% BCA Bootstrap UCL		N/A
90										95% H-UCL		N/A
91												
92	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
93					k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)					
94					Theta Star	N/A						
95					nu star	N/A						
96												
97					A-D Test Statistic	N/A	Nonparametric Statistics					
98					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
99					K-S Test Statistic	N/A				Mean		0.9
100					5% K-S Critical Value	N/A				SD		2.524
101	Data not Gamma Distributed at 5% Significance Level									SE of Mean		0.954
102										95% KM (t) UCL		2.589
103	Assuming Gamma Distribution									95% KM (z) UCL		2.469
104					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		7.522
105					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
106					Maximum	N/A				95% KM (BCA) UCL		10
107					Mean	N/A				95% KM (Percentile Bootstrap) UCL		10
108					Median	N/A				95% KM (Chebyshev) UCL		5.058
109					SD	N/A				97.5% KM (Chebyshev) UCL		6.857
110					k star	N/A				99% KM (Chebyshev) UCL		10.39
111					Theta star	N/A						
112					Nu star	N/A	Potential UCLs to Use					
113					AppChi2	N/A				99% KM (Chebyshev) UCL		10.39
114					95% Gamma Approximate UCL (Use when n >= 40)	N/A						
115					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
116	Warning: Recommended UCL exceeds the maximum observation											
117	Note: DL/2 is not a recommended method.											
118												

	A	B	C	D	E	F	G	H	I	J	K	L
119	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	For additional insight, the user may want to consult a statistician.											
122												
123												
124	m- and p-Xylene											
125												
126	General Statistics											
127					Number of Valid Data	14			Number of Detected Data			2
128					Number of Distinct Detected Data	2			Number of Non-Detect Data			12
129									Percent Non-Detects			85.71%
130												
131	Raw Statistics						Log-transformed Statistics					
132					Minimum Detected	1			Minimum Detected			0
133					Maximum Detected	20			Maximum Detected			2.996
134					Mean of Detected	10.5			Mean of Detected			1.498
135					SD of Detected	13.44			SD of Detected			2.118
136					Minimum Non-Detect	1			Minimum Non-Detect			0
137					Maximum Non-Detect	2			Maximum Non-Detect			0.693
138												
139	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			13
140	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
141	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			92.86%
142												
143	Warning: Data set has only 2 Distinct Detected Values.											
144	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
145	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
146												
147	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
148												
149	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
150	Those methods will return a 'N/A' value on your output display!											
151												
152	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
153	However, results obtained using 4 to 9 distinct values may not be reliable.											
154	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
155												
156												
157	UCL Statistics											
158	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
159					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
160					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
161	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
162												
163	Assuming Normal Distribution						Assuming Lognormal Distribution					
164					DL/2 Substitution Method				DL/2 Substitution Method			
165					Mean	2.143			Mean			-0.0831
166					SD	5.146			SD			0.951
167					95% DL/2 (t) UCL	4.578			95% H-Stat (DL/2) UCL			2.959
168												
169					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
170	MLE method failed to converge properly								Mean in Log Scale			N/A
171									SD in Log Scale			N/A
172									Mean in Original Scale			N/A
173									SD in Original Scale			N/A
174									95% t UCL			N/A
175									95% Percentile Bootstrap UCL			N/A
176									95% BCA Bootstrap UCL			N/A
177									95% H-UCL			N/A

	A	B	C	D	E	F	G	H	I	J	K	L
178												
179				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
180					k star (bias corrected)	N/A			Data do not follow a Discernable Distribution (0.05)			
181					Theta Star	N/A						
182					nu star	N/A						
183												
184					A-D Test Statistic	N/A			Nonparametric Statistics			
185					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
186					K-S Test Statistic	N/A				Mean		2.357
187					5% K-S Critical Value	N/A				SD		4.893
188				Data not Gamma Distributed at 5% Significance Level						SE of Mean		1.849
189										95% KM (t) UCL		5.632
190				Assuming Gamma Distribution						95% KM (z) UCL		5.399
191				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		N/A
192					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
193					Maximum	N/A				95% KM (BCA) UCL		N/A
194					Mean	N/A				95% KM (Percentile Bootstrap) UCL		N/A
195					Median	N/A				95% KM (Chebyshev) UCL		10.42
196					SD	N/A				97.5% KM (Chebyshev) UCL		13.91
197					k star	N/A				99% KM (Chebyshev) UCL		20.76
198					Theta star	N/A						
199					Nu star	N/A			Potential UCLs to Use			
200					AppChi2	N/A				99% KM (Chebyshev) UCL		20.76
201				95% Gamma Approximate UCL (Use when n >= 40)		N/A						
202				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
203				Warning: Recommended UCL exceeds the maximum observation								
204	Note: DL/2 is not a recommended method.											
205												
206				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
207				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
208				For additional insight, the user may want to consult a statistician.								
209												
210												
211	Methylcyclohexane											
212												
213					General Statistics							
214					Number of Valid Data	14				Number of Detected Data		1
215					Number of Distinct Detected Data	1				Number of Non-Detect Data		13
216										Percent Non-Detects		92.86%
217												
218				Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!								
219				It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).								
220												
221				The data set for variable Methylcyclohexane was not processed!								
222												
223												
224												
225	Trichloroethene											
226												
227					General Statistics							
228					Number of Valid Data	14				Number of Detected Data		1
229					Number of Distinct Detected Data	1				Number of Non-Detect Data		13
230										Percent Non-Detects		92.86%
231												
232				Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!								
233				It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).								
234												
235				The data set for variable Trichloroethene was not processed!								
236												

	A	B	C	D	E	F	G	H	I	J	K	L
237												
238												
239	Xylene, total											
240												
241						General Statistics						
242					Number of Valid Data	14				Number of Detected Data		2
243					Number of Distinct Detected Data	2				Number of Non-Detect Data		12
244										Percent Non-Detects		85.71%
245												
246					Raw Statistics					Log-transformed Statistics		
247					Minimum Detected	2				Minimum Detected		0.693
248					Maximum Detected	25				Maximum Detected		3.219
249					Mean of Detected	13.5				Mean of Detected		1.956
250					SD of Detected	16.26				SD of Detected		1.786
251					Minimum Non-Detect	1.5				Minimum Non-Detect		0.405
252					Maximum Non-Detect	3				Maximum Non-Detect		1.099
253												
254	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		13
255	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
256	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.86%
257												
258	Warning: Data set has only 2 Distinct Detected Values.											
259	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
260	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
261												
262	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
263												
264	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
265	Those methods will return a 'N/A' value on your output display!											
266												
267	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
268	However, results obtained using 4 to 9 distinct values may not be reliable.											
269	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
270												
271												
272						UCL Statistics						
273					Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only		
274					Shapiro Wilk Test Statistic	N/A				Shapiro Wilk Test Statistic		N/A
275					5% Shapiro Wilk Critical Value	N/A				5% Shapiro Wilk Critical Value		N/A
276					Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level		
277												
278					Assuming Normal Distribution					Assuming Lognormal Distribution		
279					DL/2 Substitution Method					DL/2 Substitution Method		
280					Mean	2.893				Mean		0.33
281					SD	6.377				SD		0.912
282					95% DL/2 (t) UCL	5.911				95% H-Stat (DL/2) UCL		4.117
283												
284					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
285					MLE method failed to converge properly					Mean in Log Scale		N/A
286										SD in Log Scale		N/A
287										Mean in Original Scale		N/A
288										SD in Original Scale		N/A
289										95% t UCL		N/A
290										95% Percentile Bootstrap UCL		N/A
291										95% BCA Bootstrap UCL		N/A
292										95% H-UCL		N/A
293												
294					Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only		
295					k star (bias corrected)	N/A				Data do not follow a Discernable Distribution (0.05)		

	A	B	C	D	E	F	G	H	I	J	K	L
296					Theta Star	N/A						
297					nu star	N/A						
298												
299					A-D Test Statistic	N/A			**Nonparametric Statistics**			
300					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
301					K-S Test Statistic	N/A					Mean	3.643
302					5% K-S Critical Value	N/A					SD	5.923
303			**Data not Gamma Distributed at 5% Significance Level**								SE of Mean	2.239
304											95% KM (t) UCL	7.608
305			**Assuming Gamma Distribution**								95% KM (z) UCL	7.325
306			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	19.18
307					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
308					Maximum	N/A					95% KM (BCA) UCL	N/A
309					Mean	N/A					95% KM (Percentile Bootstrap) UCL	25
310					Median	N/A					95% KM (Chebyshev) UCL	13.4
311					SD	N/A					97.5% KM (Chebyshev) UCL	17.62
312					k star	N/A					99% KM (Chebyshev) UCL	25.92
313					Theta star	N/A						
314					Nu star	N/A			**Potential UCLs to Use**			
315					AppChi2	N/A					97.5% KM (Chebyshev) UCL	17.62
316					95% Gamma Approximate UCL (Use when n >= 40)	N/A						
317					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
318	**Note: DL/2 is not a recommended method.**											
319												
320			**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**									
321			**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**									
322			**For additional insight, the user may want to consult a statistician.**									
323												
324												
325	**1,1-Biphenyl**											
326												
327					**General Statistics**							
328					Number of Valid Data	8					Number of Detected Data	1
329					Number of Distinct Detected Data	1					Number of Non-Detect Data	7
330											Percent Non-Detects	87.50%
331												
332			**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**									
333			**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**									
334												
335			**The data set for variable 1,1-Biphenyl was not processed!**									
336												
337												
338												
339	**2,4-Dimethylphenol**											
340												
341					**General Statistics**							
342					Number of Valid Data	8					Number of Detected Data	1
343					Number of Distinct Detected Data	1					Number of Non-Detect Data	7
344											Percent Non-Detects	87.50%
345												
346			**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**									
347			**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**									
348												
349			**The data set for variable 2,4-Dimethylphenol was not processed!**									
350												
351												
352												
353	**2-Methylnaphthalene**											
354												

	A	B	C	D	E	F	G	H	I	J	K	L
355						General Statistics						
356					Number of Valid Data	14					Number of Detected Data	3
357					Number of Distinct Detected Data	3					Number of Non-Detect Data	11
358											Percent Non-Detects	78.57%
359												
360				Raw Statistics						Log-transformed Statistics		
361					Minimum Detected	1.5					Minimum Detected	0.405
362					Maximum Detected	32					Maximum Detected	3.466
363					Mean of Detected	12.27					Mean of Detected	1.688
364					SD of Detected	17.11					SD of Detected	1.589
365					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
366					Maximum Non-Detect	0.3					Maximum Non-Detect	-1.204
367												
368	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	11
369	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
370	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	78.57%
371												
372					Warning: There are only 3 Distinct Detected Values in this data set							
373					The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.							
374					Those methods will return a 'N/A' value on your output display!							
375												
376					It is necessary to have 4 or more Distinct Values for bootstrap methods.							
377					However, results obtained using 4 to 9 distinct values may not be reliable.							
378					It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.							
379												
380												
381						UCL Statistics						
382				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
383					Shapiro Wilk Test Statistic	0.794					Shapiro Wilk Test Statistic	0.927
384					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
385					Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level	
386												
387				Assuming Normal Distribution						Assuming Lognormal Distribution		
388					DL/2 Substitution Method						DL/2 Substitution Method	
389					Mean	2.688					Mean	-1.742
390					SD	8.486					SD	2
391					95% DL/2 (t) UCL	6.704					95% H-Stat (DL/2) UCL	17.34
392												
393					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
394					MLE yields a negative mean						Mean in Log Scale	-4.566
395											SD in Log Scale	3.997
396											Mean in Original Scale	2.638
397											SD in Original Scale	8.502
398											95% t UCL	6.662
399											95% Percentile Bootstrap UCL	7.1
400											95% BCA Bootstrap UCL	9.388
401											95% H-UCL	560705
402												
403				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
404					k star (bias corrected)	N/A				Data appear Normal at 5% Significance Level		
405					Theta Star	N/A						
406					nu star	N/A						
407												
408					A-D Test Statistic	N/A				Nonparametric Statistics		
409					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
410					K-S Test Statistic	N/A					Mean	3.807
411					5% K-S Critical Value	N/A					SD	7.833
412				Data not Gamma Distributed at 5% Significance Level							SE of Mean	2.564
413											95% KM (t) UCL	8.348

	A	B	C	D	E	F	G	H	I	J	K	L
414					Assuming Gamma Distribution						95% KM (z) UCL	8.024
415					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	7.152
416					Minimum	N/A					95% KM (bootstrap t) UCL	32.31
417					Maximum	N/A					95% KM (BCA) UCL	32
418					Mean	N/A					95% KM (Percentile Bootstrap) UCL	32
419					Median	N/A					95% KM (Chebyshev) UCL	14.98
420					SD	N/A					97.5% KM (Chebyshev) UCL	19.82
421					k star	N/A					99% KM (Chebyshev) UCL	29.32
422					Theta star	N/A						
423					Nu star	N/A				Potential UCLs to Use		
424					AppChi2	N/A					95% KM (t) UCL	8.348
425				95% Gamma Approximate UCL (Use when n >= 40)		N/A					95% KM (Percentile Bootstrap) UCL	32
426				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
427	Note: DL/2 is not a recommended method.											
428												
429	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
430	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
431	For additional insight, the user may want to consult a statistician.											
432												
433												
434	Acenaphthylene											
435												
436					General Statistics							
437					Number of Valid Data	14					Number of Detected Data	3
438					Number of Distinct Detected Data	3					Number of Non-Detect Data	11
439											Percent Non-Detects	78.57%
440												
441					Raw Statistics					Log-transformed Statistics		
442					Minimum Detected	0.26					Minimum Detected	-1.347
443					Maximum Detected	4.8					Maximum Detected	1.569
444					Mean of Detected	1.787					Mean of Detected	-0.327
445					SD of Detected	2.61					SD of Detected	1.644
446					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
447					Maximum Non-Detect	0.24					Maximum Non-Detect	-1.427
448												
449	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	11
450	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
451	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	78.57%
452												
453	Warning: There are only 3 Distinct Detected Values in this data set											
454	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
455	Those methods will return a 'N/A' value on your output display!											
456												
457	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
458	However, results obtained using 4 to 9 distinct values may not be reliable.											
459	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
460												
461												
462					UCL Statistics							
463					Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only		
464					Shapiro Wilk Test Statistic	0.757					Shapiro Wilk Test Statistic	0.787
465					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
466					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
467												
468					Assuming Normal Distribution					Assuming Lognormal Distribution		
469					DL/2 Substitution Method						DL/2 Substitution Method	
470					Mean	0.44					Mean	-2.19
471					SD	1.257					SD	1.252
472					95% DL/2 (t) UCL	1.035					95% H-Stat (DL/2) UCL	0.753

	A	B	C	D	E	F	G	H	I	J	K	L
473												
474					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
475					**MLE yields a negative mean**						Mean in Log Scale	-6.441
476											SD in Log Scale	3.912
477											Mean in Original Scale	0.384
478											SD in Original Scale	1.275
479											95% t UCL	0.988
480											95% Percentile Bootstrap UCL	1.05
481											95% BCA Bootstrap UCL	1.412
482											95% H-UCL	41125
483												
484					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
485					k star (bias corrected)	N/A			**Data appear Lognormal at 5% Significance Level**			
486					Theta Star	N/A						
487					nu star	N/A						
488												
489					A-D Test Statistic	N/A			**Nonparametric Statistics**			
490					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
491					K-S Test Statistic	N/A					Mean	0.587
492					5% K-S Critical Value	N/A					SD	1.168
493					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.382
494											95% KM (t) UCL	1.264
495					**Assuming Gamma Distribution**						95% KM (z) UCL	1.216
496					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.137
497					Minimum	N/A					95% KM (bootstrap t) UCL	29.98
498					Maximum	N/A					95% KM (BCA) UCL	4.8
499					Mean	N/A					95% KM (Percentile Bootstrap) UCL	4.8
500					Median	N/A					95% KM (Chebyshev) UCL	2.254
501					SD	N/A					97.5% KM (Chebyshev) UCL	2.976
502					k star	N/A					99% KM (Chebyshev) UCL	4.393
503					Theta star	N/A						
504					Nu star	N/A			**Potential UCLs to Use**			
505					AppChi2	N/A					97.5% KM (Chebyshev) UCL	2.976
506					95% Gamma Approximate UCL (Use when n >= 40)	N/A						
507					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
508	**Note: DL/2 is not a recommended method.**											
509												
510	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
511	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
512	**For additional insight, the user may want to consult a statistician.**											
513												
514												
515	**Benzo(a)anthracene**											
516												
517					**General Statistics**							
518					Number of Valid Data	14					Number of Detected Data	3
519					Number of Distinct Detected Data	3					Number of Non-Detect Data	11
520											Percent Non-Detects	78.57%
521												
522					**Raw Statistics**				**Log-transformed Statistics**			
523					Minimum Detected	0.29					Minimum Detected	-1.238
524					Maximum Detected	2.9					Maximum Detected	1.065
525					Mean of Detected	1.497					Mean of Detected	0.0297
526					SD of Detected	1.316					SD of Detected	1.169
527					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
528					Maximum Non-Detect	0.24					Maximum Non-Detect	-1.427
529												
530	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	11
531	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3

	A	B	C	D	E	F	G	H	I	J	K	L
532	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	78.57%
533												
534	Warning: There are only 3 Distinct Detected Values in this data set											
535	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
536	Those methods will return a 'N/A' value on your output display!											
537												
538	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
539	However, results obtained using 4 to 9 distinct values may not be reliable.											
540	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
541												
542												
543	UCL Statistics											
544	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
545					Shapiro Wilk Test Statistic	0.983					Shapiro Wilk Test Statistic	0.97
546					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
547	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
548												
549	Assuming Normal Distribution						Assuming Lognormal Distribution					
550					DL/2 Substitution Method						DL/2 Substitution Method	
551					Mean	0.378					Mean	-2.114
552					SD	0.797					SD	1.301
553					95% DL/2 (t) UCL	0.755					95% H-Stat (DL/2) UCL	0.933
554												
555					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
556	MLE yields a negative mean										Mean in Log Scale	-4.446
557											SD in Log Scale	2.862
558											Mean in Original Scale	0.328
559											SD in Original Scale	0.817
560											95% t UCL	0.715
561											95% Percentile Bootstrap UCL	0.719
562											95% BCA Bootstrap UCL	0.927
563											95% H-UCL	118
564												
565	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
566					k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level					
567					Theta Star	N/A						
568					nu star	N/A						
569												
570					A-D Test Statistic	N/A	Nonparametric Statistics					
571					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
572					K-S Test Statistic	N/A					Mean	0.549
573					5% K-S Critical Value	N/A					SD	0.702
574	Data not Gamma Distributed at 5% Significance Level										SE of Mean	0.23
575											95% KM (t) UCL	0.955
576	Assuming Gamma Distribution										95% KM (z) UCL	0.926
577					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.236
578					Minimum	N/A					95% KM (bootstrap t) UCL	0.797
579					Maximum	N/A					95% KM (BCA) UCL	2.9
580					Mean	N/A					95% KM (Percentile Bootstrap) UCL	2.9
581					Median	N/A					95% KM (Chebyshev) UCL	1.55
582					SD	N/A					97.5% KM (Chebyshev) UCL	1.983
583					k star	N/A					99% KM (Chebyshev) UCL	2.834
584					Theta star	N/A						
585					Nu star	N/A	Potential UCLs to Use					
586					AppChi2	N/A					95% KM (t) UCL	0.955
587					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (Percentile Bootstrap) UCL	2.9
588					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
589	Note: DL/2 is not a recommended method.											
590												

	A	B	C	D	E	F	G	H	I	J	K	L
591	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
592	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
593	For additional insight, the user may want to consult a statistician.											
594												
595												
596	Benzo(a)pyrene											
597												
598	General Statistics											
599					Number of Valid Data	14				Number of Detected Data		4
600					Number of Distinct Detected Data	4				Number of Non-Detect Data		10
601										Percent Non-Detects		71.43%
602												
603	Raw Statistics						Log-transformed Statistics					
604					Minimum Detected	0.1				Minimum Detected		-2.303
605					Maximum Detected	2				Maximum Detected		0.693
606					Mean of Detected	0.993				Mean of Detected		-0.713
607					SD of Detected	0.998				SD of Detected		1.546
608					Minimum Non-Detect	0.094				Minimum Non-Detect		-2.364
609					Maximum Non-Detect	0.21				Maximum Non-Detect		-1.561
610												
611	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		12
612	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
613	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		85.71%
614												
615	Warning: There are only 4 Distinct Detected Values in this data											
616	Note: It should be noted that even though bootstrap may be performed on this data set											
617	the resulting calculations may not be reliable enough to draw conclusions											
618												
619	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
620												
621												
622	UCL Statistics											
623	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
624					Shapiro Wilk Test Statistic	0.817				Shapiro Wilk Test Statistic		0.833
625					5% Shapiro Wilk Critical Value	0.748				5% Shapiro Wilk Critical Value		0.748
626	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
627												
628	Assuming Normal Distribution						Assuming Lognormal Distribution					
629					DL/2 Substitution Method					DL/2 Substitution Method		
630					Mean	0.332				Mean		-2.172
631					SD	0.647				SD		1.255
632					95% DL/2 (t) UCL	0.638				95% H-Stat (DL/2) UCL		0.772
633												
634					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
635	MLE method failed to converge properly									Mean in Log Scale		-3.863
636										SD in Log Scale		2.489
637										Mean in Original Scale		0.292
638										SD in Original Scale		0.665
639										95% t UCL		0.606
640										95% Percentile Bootstrap UCL		0.578
641										95% BCA Bootstrap UCL		0.682
642										95% H-UCL		23.44
643												
644	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
645					k star (bias corrected)	0.376	Data appear Normal at 5% Significance Level					
646					Theta Star	2.641						
647					nu star	3.007						
648												
649					A-D Test Statistic	0.524	Nonparametric Statistics					

	A	B	C	D	E	F	G	H	I	J	K	L
650					5% A-D Critical Value	0.669				Kaplan-Meier (KM) Method		
651					K-S Test Statistic	0.669					Mean	0.358
652					5% K-S Critical Value	0.404					SD	0.612
653		Data appear Gamma Distributed at 5% Significance Level									SE of Mean	0.189
654											95% KM (t) UCL	0.692
655			Assuming Gamma Distribution								95% KM (z) UCL	0.668
656				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.632
657					Minimum	0.000001					95% KM (bootstrap t) UCL	0.565
658					Maximum	2					95% KM (BCA) UCL	2
659					Mean	0.284					95% KM (Percentile Bootstrap) UCL	1.743
660					Median	0.000001					95% KM (Chebyshev) UCL	1.181
661					SD	0.668					97.5% KM (Chebyshev) UCL	1.538
662					k star	0.121					99% KM (Chebyshev) UCL	2.238
663					Theta star	2.35						
664					Nu star	3.379				Potential UCLs to Use		
665					AppChi2	0.493					95% KM (t) UCL	0.692
666				95% Gamma Approximate UCL (Use when n >= 40)		1.943					95% KM (Percentile Bootstrap) UCL	1.743
667				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
668	Note: DL/2 is not a recommended method.											
669												
670				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
671				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
672				For additional insight, the user may want to consult a statistician.								
673												
674												
675	Benzo(b)fluoranthene											
676												
677					General Statistics							
678				Number of Valid Data		14				Number of Detected Data		3
679				Number of Distinct Detected Data		3				Number of Non-Detect Data		11
680										Percent Non-Detects		78.57%
681												
682				Raw Statistics						Log-transformed Statistics		
683				Minimum Detected		0.15				Minimum Detected		-1.897
684				Maximum Detected		2.7				Maximum Detected		0.993
685				Mean of Detected		1.683				Mean of Detected		-0.0385
686				SD of Detected		1.351				SD of Detected		1.613
687				Minimum Non-Detect		0.094				Minimum Non-Detect		-2.364
688				Maximum Non-Detect		0.36				Maximum Non-Detect		-1.022
689												
690	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		12
691	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
692	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		85.71%
693												
694				Warning: There are only 3 Distinct Detected Values in this data set								
695				The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.								
696				Those methods will return a 'N/A' value on your output display!								
697												
698				It is necessary to have 4 or more Distinct Values for bootstrap methods.								
699				However, results obtained using 4 to 9 distinct values may not be reliable.								
700				It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.								
701												
702												
703					UCL Statistics							
704				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
705				Shapiro Wilk Test Statistic		0.89				Shapiro Wilk Test Statistic		0.803
706				5% Shapiro Wilk Critical Value		0.767				5% Shapiro Wilk Critical Value		0.767
707				Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
708												

	A	B	C	D	E	F	G	H	I	J	K	L
709				Assuming Normal Distribution					Assuming Lognormal Distribution			
710					DL/2 Substitution Method						DL/2 Substitution Method	
711					Mean	0.422					Mean	-2.099
712					SD	0.866					SD	1.352
713					95% DL/2 (t) UCL	0.832					95% H-Stat (DL/2) UCL	1.1
714												
715					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
716				MLE method failed to converge properly							Mean in Log Scale	-4.412
717											SD in Log Scale	2.836
718											Mean in Original Scale	0.367
719											SD in Original Scale	0.889
720											95% t UCL	0.788
721											95% Percentile Bootstrap UCL	0.75
722											95% BCA Bootstrap UCL	0.982
723											95% H-UCL	103.6
724												
725				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
726					k star (bias corrected)	N/A			Data appear Normal at 5% Significance Level			
727					Theta Star	N/A						
728					nu star	N/A						
729												
730					A-D Test Statistic	N/A			Nonparametric Statistics			
731					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
732					K-S Test Statistic	N/A					Mean	0.479
733					5% K-S Critical Value	N/A					SD	0.81
734				Data not Gamma Distributed at 5% Significance Level							SE of Mean	0.265
735											95% KM (t) UCL	0.948
736				Assuming Gamma Distribution							95% KM (z) UCL	0.915
737					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.792
738					Minimum	N/A					95% KM (bootstrap t) UCL	0.67
739					Maximum	N/A					95% KM (BCA) UCL	N/A
740					Mean	N/A					95% KM (Percentile Bootstrap) UCL	2.7
741					Median	N/A					95% KM (Chebyshev) UCL	1.635
742					SD	N/A					97.5% KM (Chebyshev) UCL	2.135
743					k star	N/A					99% KM (Chebyshev) UCL	3.118
744					Theta star	N/A						
745					Nu star	N/A			Potential UCLs to Use			
746					AppChi2	N/A					95% KM (t) UCL	0.948
747					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (Percentile Bootstrap) UCL	2.7
748					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
749	Note: DL/2 is not a recommended method.											
750												
751				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
752				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
753				For additional insight, the user may want to consult a statistician.								
754												
755												
756	Benzo(k)fluoranthene											
757												
758					General Statistics							
759					Number of Valid Data	14					Number of Detected Data	2
760					Number of Distinct Detected Data	2					Number of Non-Detect Data	12
761											Percent Non-Detects	85.71%
762												
763				Raw Statistics					Log-transformed Statistics			
764					Minimum Detected	0.92					Minimum Detected	-0.0834
765					Maximum Detected	0.94					Maximum Detected	-0.0619
766					Mean of Detected	0.93					Mean of Detected	-0.0726
767					SD of Detected	0.0141					SD of Detected	0.0152

	A	B	C	D	E	F	G	H	I	J	K	L
768					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
769					Maximum Non-Detect	0.24					Maximum Non-Detect	-1.427
770												
771	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	12
772	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	2
773	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	85.71%
774												
775	**Warning: Data set has only 2 Distinct Detected Values.**											
776	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
777	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
778												
779	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
780												
781	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
782	**Those methods will return a 'N/A' value on your output display!**											
783												
784	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
785	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
786	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
787												
788												
789	**UCL Statistics**											
790	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
791					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
792					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
793	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
794												
795	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
796					DL/2 Substitution Method						DL/2 Substitution Method	
797					Mean	0.197					Mean	-2.298
798					SD	0.312					SD	1.016
799					95% DL/2 (t) UCL	0.345					95% H-Stat (DL/2) UCL	0.372
800												
801					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
802	**MLE method failed to converge properly**										Mean in Log Scale	N/A
803											SD in Log Scale	N/A
804											Mean in Original Scale	N/A
805											SD in Original Scale	N/A
806											95% t UCL	N/A
807											95% Percentile Bootstrap UCL	N/A
808											95% BCA Bootstrap UCL	N/A
809											95% H-UCL	N/A
810												
811	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
812					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
813					Theta Star	N/A						
814					nu star	N/A						
815												
816					A-D Test Statistic	N/A	**Nonparametric Statistics**					
817					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
818					K-S Test Statistic	N/A					Mean	0.921
819					5% K-S Critical Value	N/A					SD	0.00515
820	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00195
821											95% KM (t) UCL	0.925
822	**Assuming Gamma Distribution**										95% KM (z) UCL	0.925
823					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.935
824					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
825					Maximum	N/A					95% KM (BCA) UCL	0.94
826					Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A

	A	B	C	D	E	F	G	H	I	J	K	L
827					Median	N/A				95% KM (Chebyshev) UCL		0.93
828					SD	N/A				97.5% KM (Chebyshev) UCL		0.934
829					k star	N/A				99% KM (Chebyshev) UCL		0.941
830					Theta star	N/A						
831					Nu star	N/A			Potential UCLs to Use			
832					AppChi2	N/A				95% KM (t) UCL		0.925
833			95% Gamma Approximate UCL (Use when n >= 40)			N/A				95% KM (% Bootstrap) UCL		N/A
834			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
835	Note: DL/2 is not a recommended method.											
836												
837	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
838	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
839	For additional insight, the user may want to consult a statistician.											
840												
841												
842	Carbazole											
843												
844	General Statistics											
845					Number of Valid Data	8				Number of Detected Data		2
846					Number of Distinct Detected Data	2				Number of Non-Detect Data		6
847										Percent Non-Detects		75.00%
848												
849	Raw Statistics						Log-transformed Statistics					
850					Minimum Detected	4.3				Minimum Detected		1.459
851					Maximum Detected	8.6				Maximum Detected		2.152
852					Mean of Detected	6.45				Mean of Detected		1.805
853					SD of Detected	3.041				SD of Detected		0.49
854					Minimum Non-Detect	0.19				Minimum Non-Detect		-1.661
855					Maximum Non-Detect	0.71				Maximum Non-Detect		-0.342
856												
857	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		6
858	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
859	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		75.00%
860												
861	Warning: Data set has only 2 Distinct Detected Values.											
862	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
863	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
864												
865	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
866												
867	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
868	Those methods will return a 'N/A' value on your output display!											
869												
870	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
871	However, results obtained using 4 to 9 distinct values may not be reliable.											
872	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
873												
874												
875	UCL Statistics											
876	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
877					Shapiro Wilk Test Statistic	N/A				Shapiro Wilk Test Statistic		N/A
878					5% Shapiro Wilk Critical Value	N/A				5% Shapiro Wilk Critical Value		N/A
879	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
880												
881	Assuming Normal Distribution						Assuming Lognormal Distribution					
882					DL/2 Substitution Method					DL/2 Substitution Method		
883					Mean	1.751				Mean		-0.961
884					SD	3.122				SD		1.804
885					95% DL/2 (t) UCL	3.842				95% H-Stat (DL/2) UCL		87.35

	A	B	C	D	E	F	G	H	I	J	K	L
886												
887					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
888					**MLE method failed to converge properly**						Mean in Log Scale	N/A
889											SD in Log Scale	N/A
890											Mean in Original Scale	N/A
891											SD in Original Scale	N/A
892											95% t UCL	N/A
893											95% Percentile Bootstrap UCL	N/A
894											95% BCA Bootstrap UCL	N/A
895											95% H-UCL	N/A
896												
897					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
898					k star (bias corrected)	N/A				**Data do not follow a Discernable Distribution (0.05)**		
899					Theta Star	N/A						
900					nu star	N/A						
901												
902					A-D Test Statistic	N/A				**Nonparametric Statistics**		
903					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
904					K-S Test Statistic	N/A					Mean	4.838
905					5% K-S Critical Value	N/A					SD	1.422
906					**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.711
907											95% KM (t) UCL	6.185
908					**Assuming Gamma Distribution**						95% KM (z) UCL	6.007
909					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	7.949
910					Minimum	N/A					95% KM (bootstrap t) UCL	4.838
911					Maximum	N/A					95% KM (BCA) UCL	8.6
912					Mean	N/A					95% KM (Percentile Bootstrap) UCL	8.6
913					Median	N/A					95% KM (Chebyshev) UCL	7.937
914					SD	N/A					97.5% KM (Chebyshev) UCL	9.278
915					k star	N/A					99% KM (Chebyshev) UCL	11.91
916					Theta star	N/A						
917					Nu star	N/A				**Potential UCLs to Use**		
918					AppChi2	N/A					95% KM (t) UCL	6.185
919					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (% Bootstrap) UCL	8.6
920					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
921	**Note: DL/2 is not a recommended method.**											
922												
923	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
924	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
925	**For additional insight, the user may want to consult a statistician.**											
926												
927												
928	**Dibenz(a,h)anthracene**											
929												
930					**General Statistics**							
931					Number of Valid Data	14					Number of Detected Data	2
932					Number of Distinct Detected Data	2					Number of Non-Detect Data	12
933											Percent Non-Detects	85.71%
934												
935					**Raw Statistics**					**Log-transformed Statistics**		
936					Minimum Detected	0.21					Minimum Detected	-1.561
937					Maximum Detected	0.26					Maximum Detected	-1.347
938					Mean of Detected	0.235					Mean of Detected	-1.454
939					SD of Detected	0.0354					SD of Detected	0.151
940					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
941					Maximum Non-Detect	0.3					Maximum Non-Detect	-1.204
942												
943	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	14
944	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0

	A	B	C	D	E	F	G	H	I	J	K	L
945	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
946												
947	Warning: Data set has only 2 Distinct Detected Values.											
948	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
949	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
950												
951	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
952												
953	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
954	Those methods will return a 'N/A' value on your output display!											
955												
956	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
957	However, results obtained using 4 to 9 distinct values may not be reliable.											
958	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
959												
960												
961	UCL Statistics											
962	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
963					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
964					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
965	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
966												
967	Assuming Normal Distribution						Assuming Lognormal Distribution					
968					DL/2 Substitution Method						DL/2 Substitution Method	
969					Mean	0.102					Mean	-2.463
970					SD	0.0665					SD	0.603
971					95% DL/2 (t) UCL	0.133					95% H-Stat (DL/2) UCL	0.148
972												
973					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
974	MLE method failed to converge properly										Mean in Log Scale	N/A
975											SD in Log Scale	N/A
976											Mean in Original Scale	N/A
977											SD in Original Scale	N/A
978											95% t UCL	N/A
979											95% Percentile Bootstrap UCL	N/A
980											95% BCA Bootstrap UCL	N/A
981											95% H-UCL	N/A
982												
983	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
984					k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)					
985					Theta Star	N/A						
986					nu star	N/A						
987												
988					A-D Test Statistic	N/A	Nonparametric Statistics					
989					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
990					K-S Test Statistic	N/A					Mean	0.214
991					5% K-S Critical Value	N/A					SD	0.0133
992	Data not Gamma Distributed at 5% Significance Level										SE of Mean	0.00523
993											95% KM (t) UCL	0.223
994	Assuming Gamma Distribution										95% KM (z) UCL	0.222
995					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.248
996					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
997					Maximum	N/A					95% KM (BCA) UCL	N/A
998					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.26
999					Median	N/A					95% KM (Chebyshev) UCL	0.237
1000					SD	N/A					97.5% KM (Chebyshev) UCL	0.246
1001					k star	N/A					99% KM (Chebyshev) UCL	0.266
1002					Theta star	N/A						
1003					Nu star	N/A	Potential UCLs to Use					

	A	B	C	D	E	F	G	H	I	J	K	L
1004					AppChi2	N/A					95% KM (t) UCL	0.223
1005			95% Gamma Approximate UCL (Use when n >= 40)			N/A					95% KM (% Bootstrap) UCL	0.26
1006			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
1007	Note: DL/2 is not a recommended method.											
1008												
1009	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1010	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1011	For additional insight, the user may want to consult a statistician.											
1012												
1013												
1014	Dibenzofuran											
1015												
1016	General Statistics											
1017					Number of Valid Data	8					Number of Detected Data	2
1018					Number of Distinct Detected Data	2					Number of Non-Detect Data	6
1019											Percent Non-Detects	75.00%
1020												
1021	Raw Statistics						Log-transformed Statistics					
1022					Minimum Detected	3					Minimum Detected	1.099
1023					Maximum Detected	19					Maximum Detected	2.944
1024					Mean of Detected	11					Mean of Detected	2.022
1025					SD of Detected	11.31					SD of Detected	1.305
1026					Minimum Non-Detect	9					Minimum Non-Detect	2.197
1027					Maximum Non-Detect	12					Maximum Non-Detect	2.485
1028												
1029	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	7
1030	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
1031	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	87.50%
1032												
1033	Warning: Data set has only 2 Distinct Detected Values.											
1034	This may not be adequate enough to compute meaningful and reliable test statistics and estimates.											
1035	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
1036												
1037	Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.											
1038												
1039	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
1040	Those methods will return a 'N/A' value on your output display!											
1041												
1042	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
1043	However, results obtained using 4 to 9 distinct values may not be reliable.											
1044	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
1045												
1046												
1047	UCL Statistics											
1048	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1049					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
1050					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
1051	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
1052												
1053	Assuming Normal Distribution						Assuming Lognormal Distribution					
1054					DL/2 Substitution Method						DL/2 Substitution Method	
1055					Mean	6.5					Mean	1.709
1056					SD	5.12					SD	0.537
1057					95% DL/2 (t) UCL	9.93					95% H-Stat (DL/2) UCL	10.42
1058												
1059					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1060	MLE method failed to converge properly										Mean in Log Scale	N/A
1061											SD in Log Scale	N/A
1062											Mean in Original Scale	N/A

	A	B	C	D	E	F	G	H	I	J	K	L
1063											SD in Original Scale	N/A
1064											95% t UCL	N/A
1065											95% Percentile Bootstrap UCL	N/A
1066											95% BCA Bootstrap UCL	N/A
1067											95% H-UCL	N/A
1068												
1069				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
1070					k star (bias corrected)	N/A			Data do not follow a Discernable Distribution (0.05)			
1071					Theta Star	N/A						
1072					nu star	N/A						
1073												
1074					A-D Test Statistic	N/A			Nonparametric Statistics			
1075					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1076					K-S Test Statistic	N/A					Mean	5
1077					5% K-S Critical Value	N/A					SD	5.292
1078				Data not Gamma Distributed at 5% Significance Level							SE of Mean	2.646
1079											95% KM (t) UCL	10.01
1080				Assuming Gamma Distribution							95% KM (z) UCL	9.352
1081					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	16.58
1082					Minimum	N/A					95% KM (bootstrap t) UCL	5
1083					Maximum	N/A					95% KM (BCA) UCL	19
1084					Mean	N/A					95% KM (Percentile Bootstrap) UCL	19
1085					Median	N/A					95% KM (Chebyshev) UCL	16.53
1086					SD	N/A					97.5% KM (Chebyshev) UCL	21.52
1087					k star	N/A					99% KM (Chebyshev) UCL	31.32
1088					Theta star	N/A						
1089					Nu star	N/A			Potential UCLs to Use			
1090					AppChi2	N/A					95% KM (BCA) UCL	19
1091					95% Gamma Approximate UCL (Use when n >= 40)	N/A						
1092					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1093	Note: DL/2 is not a recommended method.											
1094												
1095				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1096				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1097				For additional insight, the user may want to consult a statistician.								
1098												
1099												
1100	Indeno(1,2,3-cd)pyrene											
1101												
1102						General Statistics						
1103					Number of Valid Data	14					Number of Detected Data	1
1104					Number of Distinct Detected Data	1					Number of Non-Detect Data	13
1105											Percent Non-Detects	92.86%
1106												
1107				Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!								
1108				It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).								
1109												
1110				The data set for variable Indeno(1,2,3-cd)pyrene was not processed!								
1111												
1112												
1113												
1114	Naphthalene											
1115												
1116						General Statistics						
1117					Number of Valid Data	14					Number of Detected Data	4
1118					Number of Distinct Detected Data	4					Number of Non-Detect Data	10
1119											Percent Non-Detects	71.43%
1120												
1121				Raw Statistics					Log-transformed Statistics			

	A	B	C	D	E	F	G	H	I	J	K	L
1122					Minimum Detected	0.063					Minimum Detected	-2.765
1123					Maximum Detected	560					Maximum Detected	6.328
1124					Mean of Detected	146					Mean of Detected	2.132
1125					SD of Detected	276					SD of Detected	3.735
1126					Minimum Non-Detect	0.094					Minimum Non-Detect	-2.364
1127					Maximum Non-Detect	0.24					Maximum Non-Detect	-1.427
1128												
1129	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	11
1130	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
1131	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	78.57%
1132												
1133	**Warning: There are only 4 Distinct Detected Values in this data**											
1134	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1135	**the resulting calculations may not be reliable enough to draw conclusions**											
1136												
1137	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1138												
1139												
1140	**UCL Statistics**											
1141	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1142					Shapiro Wilk Test Statistic	0.649					Shapiro Wilk Test Statistic	0.942
1143					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
1144	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1145												
1146	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1147					DL/2 Substitution Method						DL/2 Substitution Method	
1148					Mean	41.77					Mean	-1.292
1149					SD	149.2					SD	2.897
1150					95% DL/2 (t) UCL	112.4					95% H-Stat (DL/2) UCL	3450
1151												
1152					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1153	**MLE yields a negative mean**										Mean in Log Scale	-1.64
1154											SD in Log Scale	3.443
1155											Mean in Original Scale	41.83
1156											SD in Original Scale	149.2
1157											95% t UCL	112.4
1158											95% Percentile Bootstrap UCL	121
1159											95% BCA Bootstrap UCL	161.7
1160											95% H-UCL	110792
1161												
1162	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1163					k star (bias corrected)	0.229	**Data appear Gamma Distributed at 5% Significance Level**					
1164					Theta Star	637.7						
1165					nu star	1.832						
1166												
1167					A-D Test Statistic	0.355	**Nonparametric Statistics**					
1168					5% A-D Critical Value	0.719					Kaplan-Meier (KM) Method	
1169					K-S Test Statistic	0.719					Mean	41.76
1170					5% K-S Critical Value	0.421					SD	143.8
1171	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	44.38
1172											95% KM (t) UCL	120.3
1173	**Assuming Gamma Distribution**										95% KM (z) UCL	114.8
1174					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	107
1175					Minimum	0.000001					95% KM (bootstrap t) UCL	1631
1176					Maximum	560					95% KM (BCA) UCL	560
1177					Mean	41.72					95% KM (Percentile Bootstrap) UCL	130.2
1178					Median	0.000001					95% KM (Chebyshev) UCL	235.2
1179					SD	149.2					97.5% KM (Chebyshev) UCL	318.9
1180					k star	0.0992					99% KM (Chebyshev) UCL	483.3

	A	B	C	D	E	F	G	H	I	J	K	L
1181					Theta star	420.7						
1182					Nu star	2.777			Potential UCLs to Use			
1183					AppChi2	0.31					95% KM (t) UCL	120.3
1184				95% Gamma Approximate UCL (Use when n >= 40)		374.3						
1185				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
1186	Note: DL/2 is not a recommended method.											
1187												
1188	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1189	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1190	For additional insight, the user may want to consult a statistician.											
1191												
1192												
1193	Dieldrin											
1194												
1195	General Statistics											
1196					Number of Valid Data	8				Number of Detected Data		1
1197					Number of Distinct Detected Data	1				Number of Non-Detect Data		7
1198										Percent Non-Detects		87.50%
1199												
1200	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
1201	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
1202												
1203	The data set for variable Dieldrin was not processed!											
1204												
1205												
1206												
1207	Aluminum											
1208												
1209	General Statistics											
1210					Number of Valid Data	14				Number of Detected Data		13
1211					Number of Distinct Detected Data	13				Number of Non-Detect Data		1
1212										Percent Non-Detects		7.14%
1213												
1214	Raw Statistics						Log-transformed Statistics					
1215					Minimum Detected	51.6				Minimum Detected		3.944
1216					Maximum Detected	23300				Maximum Detected		10.06
1217					Mean of Detected	3425				Mean of Detected		6.31
1218					SD of Detected	6965				SD of Detected		2.031
1219					Minimum Non-Detect	78.6				Minimum Non-Detect		4.364
1220					Maximum Non-Detect	78.6				Maximum Non-Detect		4.364
1221												
1222												
1223	UCL Statistics											
1224	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1225					Shapiro Wilk Test Statistic	0.557				Shapiro Wilk Test Statistic		0.919
1226					5% Shapiro Wilk Critical Value	0.866				5% Shapiro Wilk Critical Value		0.866
1227	Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1228												
1229	Assuming Normal Distribution						Assuming Lognormal Distribution					
1230					DL/2 Substitution Method					DL/2 Substitution Method		
1231					Mean	3183				Mean		6.122
1232					SD	6753				SD		2.074
1233					95% DL/2 (t) UCL	6379				95% H-Stat (DL/2) UCL		62901
1234												
1235					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
1236					Mean	2022				Mean in Log Scale		6.093
1237					SD	7646				SD in Log Scale		2.112
1238					95% MLE (t) UCL	5641				Mean in Original Scale		3182
1239					95% MLE (Tiku) UCL	5590				SD in Original Scale		6753

	A	B	C	D	E	F	G	H	I	J	K	L
1240											95% t UCL	6379
1241											95% Percentile Bootstrap UCL	6512
1242											95% BCA Bootstrap UCL	7984
1243											95% H UCL	72896
1244												
1245			Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only			
1246					k star (bias corrected)	0.332			Data Follow Appr. Gamma Distribution at 5% Significance Level			
1247					Theta Star	10311						
1248					nu star	8.636						
1249												
1250					A-D Test Statistic	0.943			Nonparametric Statistics			
1251					5% A-D Critical Value	0.817					Kaplan-Meier (KM) Method	
1252					K-S Test Statistic	0.817					Mean	3184
1253					5% K-S Critical Value	0.254					SD	6507
1254			Data follow Appr. Gamma Distribution at 5% Significance Level								SE of Mean	1810
1255											95% KM (t) UCL	6390
1256			Assuming Gamma Distribution								95% KM (z) UCL	6162
1257					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	6380
1258					Minimum	0.000001					95% KM (bootstrap t) UCL	22156
1259					Maximum	23300					95% KM (BCA) UCL	6500
1260					Mean	3181					95% KM (Percentile Bootstrap) UCL	6443
1261					Median	281.5					95% KM (Chebyshev) UCL	11074
1262					SD	6754					97.5% KM (Chebyshev) UCL	14488
1263					k star	0.225					99% KM (Chebyshev) UCL	21193
1264					Theta star	14118						
1265					Nu star	6.308			Potential UCLs to Use			
1266					AppChi2	1.799					95% KM (Chebyshev) UCL	11074
1267					95% Gamma Approximate UCL (Use when n >= 40)	11151						
1268					95% Adjusted Gamma UCL (Use when n < 40)	13384						
1269	Note: DL/2 is not a recommended method.											
1270												
1271			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1272			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
1273			For additional insight, the user may want to consult a statistician.									
1274												
1275												
1276	Antimony											
1277												
1278					General Statistics							
1279					Number of Valid Data	14					Number of Detected Data	8
1280					Number of Distinct Detected Data	7					Number of Non-Detect Data	6
1281											Percent Non-Detects	42.86%
1282												
1283			Raw Statistics						Log-transformed Statistics			
1284					Minimum Detected	0.17					Minimum Detected	-1.772
1285					Maximum Detected	0.67					Maximum Detected	-0.4
1286					Mean of Detected	0.453					Mean of Detected	-0.864
1287					SD of Detected	0.16					SD of Detected	0.434
1288					Minimum Non-Detect	5					Minimum Non-Detect	1.609
1289					Maximum Non-Detect	5					Maximum Non-Detect	1.609
1290												
1291												
1292			Warning: There are only 8 Detected Values in this data									
1293			Note: It should be noted that even though bootstrap may be performed on this data set									
1294			the resulting calculations may not be reliable enough to draw conclusions									
1295												
1296			It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.									
1297												
1298												

	A	B	C	D	E	F	G	H	I	J	K	L
1299						UCL Statistics						
1300				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
1301					Shapiro Wilk Test Statistic	0.954					Shapiro Wilk Test Statistic	0.873
1302					5% Shapiro Wilk Critical Value	0.818					5% Shapiro Wilk Critical Value	0.818
1303				Data appear Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
1304												
1305				Assuming Normal Distribution					Assuming Lognormal Distribution			
1306					DL/2 Substitution Method						DL/2 Substitution Method	
1307					Mean	1.33					Mean	-0.101
1308					SD	1.058					SD	0.968
1309					95% DL/2 (t) UCL	1.831					95% H-Stat (DL/2) UCL	3.014
1310												
1311					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1312				MLE method failed to converge properly							Mean in Log Scale	-0.864
1313											SD in Log Scale	0.398
1314											Mean in Original Scale	0.451
1315											SD in Original Scale	0.158
1316											95% t UCL	0.525
1317											95% Percentile Bootstrap UCL	0.516
1318											95% BCA Bootstrap UCL	0.518
1319											95% H-UCL	0.568
1320												
1321				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
1322					k star (bias corrected)	4.601			Data appear Normal at 5% Significance Level			
1323					Theta Star	0.0984						
1324					nu star	73.61						
1325												
1326					A-D Test Statistic	0.398			Nonparametric Statistics			
1327					5% A-D Critical Value	0.717					Kaplan-Meier (KM) Method	
1328					K-S Test Statistic	0.717					Mean	0.453
1329					5% K-S Critical Value	0.295					SD	0.149
1330				Data appear Gamma Distributed at 5% Significance Level							SE of Mean	0.0565
1331											95% KM (t) UCL	0.553
1332				Assuming Gamma Distribution							95% KM (z) UCL	0.545
1333					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.556
1334					Minimum	0.17					95% KM (bootstrap t) UCL	0.552
1335					Maximum	0.67					95% KM (BCA) UCL	0.541
1336					Mean	0.454					95% KM (Percentile Bootstrap) UCL	0.54
1337					Median	0.476					95% KM (Chebyshev) UCL	0.699
1338					SD	0.15					97.5% KM (Chebyshev) UCL	0.805
1339					k star	6.309					99% KM (Chebyshev) UCL	1.015
1340					Theta star	0.0719						
1341					Nu star	176.7			Potential UCLs to Use			
1342					AppChi2	146.9					95% KM (t) UCL	0.553
1343					95% Gamma Approximate UCL (Use when n >= 40)	0.546					95% KM (Percentile Bootstrap) UCL	0.54
1344					95% Adjusted Gamma UCL (Use when n < 40)	0.559						
1345	Note: DL/2 is not a recommended method.											
1346												
1347				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1348				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1349				For additional insight, the user may want to consult a statistician.								
1350												
1351												
1352	Arsenic											
1353												
1354						General Statistics						
1355					Number of Valid Data	14					Number of Detected Data	8
1356					Number of Distinct Detected Data	8					Number of Non-Detect Data	6
1357											Percent Non-Detects	42.86%

	A	B	C	D	E	F	G	H	I	J	K	L
1358												
1359	Raw Statistics						Log-transformed Statistics					
1360					Minimum Detected	1.8				Minimum Detected		0.588
1361					Maximum Detected	53.8				Maximum Detected		3.985
1362					Mean of Detected	12.81				Mean of Detected		2.029
1363					SD of Detected	17.15				SD of Detected		1.011
1364					Minimum Non-Detect	2.8				Minimum Non-Detect		1.03
1365					Maximum Non-Detect	8.3				Maximum Non-Detect		2.116
1366												
1367	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		12
1368	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
1369	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		85.71%
1370												
1371	Warning: There are only 8 Detected Values in this data											
1372	Note: It should be noted that even though bootstrap may be performed on this data set											
1373	the resulting calculations may not be reliable enough to draw conclusions											
1374												
1375	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
1376												
1377												
1378	UCL Statistics											
1379	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1380					Shapiro Wilk Test Statistic	0.632				Shapiro Wilk Test Statistic		0.935
1381					5% Shapiro Wilk Critical Value	0.818				5% Shapiro Wilk Critical Value		0.818
1382	Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1383												
1384	Assuming Normal Distribution						Assuming Lognormal Distribution					
1385					DL/2 Substitution Method					DL/2 Substitution Method		
1386					Mean	8.457				Mean		1.552
1387					SD	13.63				SD		0.965
1388					95% DL/2 (t) UCL	14.91				95% H-Stat (DL/2) UCL		15.63
1389												
1390					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1391	MLE method failed to converge properly									Mean in Log Scale		1.493
1392										SD in Log Scale		1.012
1393										Mean in Original Scale		8.32
1394										SD in Original Scale		13.7
1395										95% t UCL		14.8
1396										95% Percentile Bootstrap UCL		14.87
1397										95% BCA Bootstrap UCL		19.52
1398										95% H-UCL		16.34
1399												
1400	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
1401					k star (bias corrected)	0.768	Data appear Gamma Distributed at 5% Significance Level					
1402					Theta Star	16.69						
1403					nu star	12.28						
1404												
1405					A-D Test Statistic	0.66	Nonparametric Statistics					
1406					5% A-D Critical Value	0.734				Kaplan-Meier (KM) Method		
1407					K-S Test Statistic	0.734				Mean		8.517
1408					5% K-S Critical Value	0.301				SD		13.14
1409	Data appear Gamma Distributed at 5% Significance Level									SE of Mean		3.767
1410										95% KM (t) UCL		15.19
1411	Assuming Gamma Distribution									95% KM (z) UCL		14.71
1412					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		14.62
1413					Minimum	0.000001				95% KM (bootstrap t) UCL		35.63
1414					Maximum	53.8				95% KM (BCA) UCL		17.3
1415					Mean	7.55				95% KM (Percentile Bootstrap) UCL		15.58
1416					Median	3.201				95% KM (Chebyshev) UCL		24.94

	A	B	C	D	E	F	G	H	I	J	K	L
1417					SD	14.08				97.5% KM (Chebyshev) UCL		32.04
1418					k star	0.174				99% KM (Chebyshev) UCL		46
1419					Theta star	43.49						
1420					Nu star	4.861			**Potential UCLs to Use**			
1421					AppChi2	1.088				95% KM (BCA) UCL		17.3
1422			95% Gamma Approximate UCL (Use when n >= 40)			33.72						
1423			95% Adjusted Gamma UCL (Use when n < 40)			41.99						
1424	**Note: DL/2 is not a recommended method.**											
1425												
1426	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1427	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1428	**For additional insight, the user may want to consult a statistician.**											
1429												
1430												
1431	**Barium**											
1432												
1433					**General Statistics**							
1434					Number of Valid Observations	14				Number of Distinct Observations		14
1435												
1436					**Raw Statistics**				**Log-transformed Statistics**			
1437					Minimum	12.1				Minimum of Log Data		2.493
1438					Maximum	302				Maximum of Log Data		5.71
1439					Mean	64.3				Mean of log Data		3.668
1440					Geometric Mean	39.19				SD of log Data		0.948
1441					Median	25.85						
1442					SD	79.98						
1443					Std. Error of Mean	21.38						
1444					Coefficient of Variation	1.244						
1445					Skewness	2.339						
1446												
1447					**Relevant UCL Statistics**							
1448					**Normal Distribution Test**				**Lognormal Distribution Test**			
1449					Shapiro Wilk Test Statistic	0.653				Shapiro Wilk Test Statistic		0.862
1450					Shapiro Wilk Critical Value	0.874				Shapiro Wilk Critical Value		0.874
1451					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1452												
1453					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1454					95% Student's-t UCL	102.2				95% H-UCL		125.1
1455					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		129
1456					95% Adjusted-CLT UCL (Chen-1995)	113.7				97.5% Chebyshev (MVUE) UCL		159.4
1457					95% Modified-t UCL (Johnson-1978)	104.4				99% Chebyshev (MVUE) UCL		219
1458												
1459					**Gamma Distribution Test**				**Data Distribution**			
1460					k star (bias corrected)	0.949			**Data do not follow a Discernable Distribution (0.05)**			
1461					Theta Star	67.72						
1462					MLE of Mean	64.3						
1463					MLE of Standard Deviation	65.99						
1464					nu star	26.59						
1465					Approximate Chi Square Value (.05)	15.83			**Nonparametric Statistics**			
1466					Adjusted Level of Significance	0.0312				95% CLT UCL		99.46
1467					Adjusted Chi Square Value	14.74				95% Jackknife UCL		102.2
1468										95% Standard Bootstrap UCL		97.91
1469					Anderson-Darling Test Statistic	1.335				95% Bootstrap-t UCL		137.2
1470					Anderson-Darling 5% Critical Value	0.757				95% Hall's Bootstrap UCL		193.7
1471					Kolmogorov-Smirnov Test Statistic	0.329				95% Percentile Bootstrap UCL		100.4
1472					Kolmogorov-Smirnov 5% Critical Value	0.234				95% BCA Bootstrap UCL		114.7
1473					**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		157.5
1474										97.5% Chebyshev(Mean, Sd) UCL		197.8
1475					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		277

	A	B	C	D	E	F	G	H	I	J	K	L
1476			95% Approximate Gamma UCL (Use when n >= 40)			108						
1477			95% Adjusted Gamma UCL (Use when n < 40)			116						
1478												
1479			Potential UCL to Use						Use 95% Chebyshev (Mean, Sd) UCL			157.5
1480												
1481			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1482			These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)									
1483			and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.									
1484												
1485												
1486	Chromium											
1487												
1488					General Statistics							
1489					Number of Valid Observations	14				Number of Distinct Observations		13
1490												
1491					Raw Statistics					Log-transformed Statistics		
1492					Minimum	0.72				Minimum of Log Data		-0.329
1493					Maximum	44.5				Maximum of Log Data		3.795
1494					Mean	7.655				Mean of log Data		1.115
1495					Geometric Mean	3.05				SD of log Data		1.34
1496					Median	2.3						
1497					SD	12.37						
1498					Std. Error of Mean	3.306						
1499					Coefficient of Variation	1.616						
1500					Skewness	2.471						
1501												
1502					Relevant UCL Statistics							
1503					Normal Distribution Test					Lognormal Distribution Test		
1504					Shapiro Wilk Test Statistic	0.625				Shapiro Wilk Test Statistic		0.899
1505					Shapiro Wilk Critical Value	0.874				Shapiro Wilk Critical Value		0.874
1506					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
1507												
1508					Assuming Normal Distribution					Assuming Lognormal Distribution		
1509					95% Student's-t UCL	13.51				95% H-UCL		26.38
1510					95% UCLs (Adjusted for Skewness)					95% Chebyshev (MVUE) UCL		18.49
1511					95% Adjusted-CLT UCL (Chen-1995)	15.43				97.5% Chebyshev (MVUE) UCL		23.58
1512					95% Modified-t UCL (Johnson-1978)	13.87				99% Chebyshev (MVUE) UCL		33.57
1513												
1514					Gamma Distribution Test					Data Distribution		
1515					k star (bias corrected)	0.568				Data Follow Appr. Gamma Distribution at 5% Significance Level		
1516					Theta Star	13.49						
1517					MLE of Mean	7.655						
1518					MLE of Standard Deviation	10.16						
1519					nu star	15.89						
1520					Approximate Chi Square Value (.05)	7.888				Nonparametric Statistics		
1521					Adjusted Level of Significance	0.0312				95% CLT UCL		13.09
1522					Adjusted Chi Square Value	7.151				95% Jackknife UCL		13.51
1523										95% Standard Bootstrap UCL		12.8
1524					Anderson-Darling Test Statistic	0.964				95% Bootstrap-t UCL		24.86
1525					Anderson-Darling 5% Critical Value	0.779				95% Hall's Bootstrap UCL		35.56
1526					Kolmogorov-Smirnov Test Statistic	0.225				95% Percentile Bootstrap UCL		13.33
1527					Kolmogorov-Smirnov 5% Critical Value	0.239				95% BCA Bootstrap UCL		15.27
1528					Data follow Appr. Gamma Distribution at 5% Significance Level					95% Chebyshev(Mean, Sd) UCL		22.06
1529										97.5% Chebyshev(Mean, Sd) UCL		28.3
1530					Assuming Gamma Distribution					99% Chebyshev(Mean, Sd) UCL		40.55
1531					95% Approximate Gamma UCL (Use when n >= 40)	15.43						
1532					95% Adjusted Gamma UCL (Use when n < 40)	17.02						
1533												
1534					Potential UCL to Use					Use 95% Approximate Gamma UCL		15.43

	A	B	C	D	E	F	G	H	I	J	K	L
1535												
1536	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1537	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1538	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
1539												
1540												
1541	Cobalt											
1542												
1543	General Statistics											
1544					Number of Valid Data	14			Number of Detected Data			8
1545					Number of Distinct Detected Data	8			Number of Non-Detect Data			6
1546									Percent Non-Detects			42.86%
1547												
1548	Raw Statistics						Log-transformed Statistics					
1549					Minimum Detected	0.27			Minimum Detected			-1.309
1550					Maximum Detected	5.1			Maximum Detected			1.629
1551					Mean of Detected	1.844			Mean of Detected			0.113
1552					SD of Detected	1.831			SD of Detected			1.12
1553					Minimum Non-Detect	4			Minimum Non-Detect			1.386
1554					Maximum Non-Detect	30			Maximum Non-Detect			3.401
1555												
1556	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			14
1557	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1558	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1559												
1560	Warning: There are only 8 Detected Values in this data											
1561	Note: It should be noted that even though bootstrap may be performed on this data set											
1562	the resulting calculations may not be reliable enough to draw conclusions											
1563												
1564	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
1565												
1566												
1567	UCL Statistics											
1568	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1569					Shapiro Wilk Test Statistic	0.837			Shapiro Wilk Test Statistic			0.937
1570					5% Shapiro Wilk Critical Value	0.818			5% Shapiro Wilk Critical Value			0.818
1571	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1572												
1573	Assuming Normal Distribution						Assuming Lognormal Distribution					
1574					DL/2 Substitution Method				DL/2 Substitution Method			
1575					Mean	3.768			Mean			0.65
1576					SD	4.945			SD			1.227
1577					95% DL/2 (t) UCL	6.108			95% H-Stat (DL/2) UCL			12.01
1578												
1579					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1580	MLE method failed to converge properly								Mean in Log Scale			-0.0499
1581									SD in Log Scale			0.935
1582									Mean in Original Scale			1.44
1583									SD in Original Scale			1.466
1584									95% t UCL			2.133
1585									95% Percentile Bootstrap UCL			2.084
1586									95% BCA Bootstrap UCL			2.274
1587									95% H-UCL			2.959
1588												
1589	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
1590					k star (bias corrected)	0.796	Data appear Normal at 5% Significance Level					
1591					Theta Star	2.316						
1592					nu star	12.74						
1593												

	A	B	C	D	E	F	G	H	I	J	K	L
1594					A-D Test Statistic	0.297			Nonparametric Statistics			
1595					5% A-D Critical Value	0.734					Kaplan-Meier (KM) Method	
1596					K-S Test Statistic	0.734					Mean	1.538
1597					5% K-S Critical Value	0.301					SD	1.515
1598		Data appear Gamma Distributed at 5% Significance Level									SE of Mean	0.492
1599											95% KM (t) UCL	2.41
1600			Assuming Gamma Distribution								95% KM (z) UCL	2.348
1601				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	2.413
1602					Minimum	0.000001					95% KM (bootstrap t) UCL	2.842
1603					Maximum	5.1					95% KM (BCA) UCL	2.317
1604					Mean	1.593					95% KM (Percentile Bootstrap) UCL	2.332
1605					Median	1.105					95% KM (Chebyshev) UCL	3.684
1606					SD	1.525					97.5% KM (Chebyshev) UCL	4.613
1607					k star	0.429					99% KM (Chebyshev) UCL	6.438
1608					Theta star	3.711						
1609					Nu star	12.02			Potential UCLs to Use			
1610					AppChi2	5.243					95% KM (t) UCL	2.41
1611				95% Gamma Approximate UCL (Use when n >= 40)		3.654					95% KM (Percentile Bootstrap) UCL	2.332
1612				95% Adjusted Gamma UCL (Use when n < 40)		4.11						
1613	Note: DL/2 is not a recommended method.											
1614												
1615			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1616			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
1617			For additional insight, the user may want to consult a statistician.									
1618												
1619												
1620	Iron											
1621												
1622					General Statistics							
1623					Number of Valid Data	14					Number of Detected Data	12
1624					Number of Distinct Detected Data	12					Number of Non-Detect Data	2
1625											Percent Non-Detects	14.29%
1626												
1627					Raw Statistics				Log-transformed Statistics			
1628					Minimum Detected	296					Minimum Detected	5.69
1629					Maximum Detected	39400					Maximum Detected	10.58
1630					Mean of Detected	11308					Mean of Detected	8.161
1631					SD of Detected	14513					SD of Detected	1.8
1632					Minimum Non-Detect	60.6					Minimum Non-Detect	4.104
1633					Maximum Non-Detect	65.3					Maximum Non-Detect	4.179
1634												
1635	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	2
1636	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	12
1637	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	14.29%
1638												
1639					UCL Statistics							
1640			Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only			
1641					Shapiro Wilk Test Statistic	0.758					Shapiro Wilk Test Statistic	0.913
1642					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
1643			Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level			
1644												
1645			Assuming Normal Distribution						Assuming Lognormal Distribution			
1646					DL/2 Substitution Method						DL/2 Substitution Method	
1647					Mean	9697					Mean	7.488
1648					SD	13964					SD	2.381
1649					95% DL/2 (t) UCL	16307					95% H-Stat (DL/2) UCL	1112175
1650												
1651					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
1652					Mean	8354					Mean in Log Scale	7.559

	A	B	C	D	E	F	G	H	I	J	K	L
1653					SD	15043					SD in Log Scale	2.253
1654					95% MLE (t) UCL	15473					Mean in Original Scale	9700
1655					95% MLE (Tiku) UCL	15236					SD in Original Scale	13962
1656											95% t UCL	16308
1657											95% Percentile Bootstrap UCL	15891
1658											95% BCA Bootstrap UCL	16954
1659											95% H UCL	622649
1660												
1661			Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only			
1662					k star (bias corrected)	0.458			Data appear Gamma Distributed at 5% Significance Level			
1663					Theta Star	24717						
1664					nu star	10.98						
1665												
1666					A-D Test Statistic	0.588			Nonparametric Statistics			
1667					5% A-D Critical Value	0.782					Kaplan-Meier (KM) Method	
1668					K-S Test Statistic	0.782					Mean	9735
1669					5% K-S Critical Value	0.258					SD	13429
1670			Data appear Gamma Distributed at 5% Significance Level								SE of Mean	3749
1671											95% KM (t) UCL	16374
1672			Assuming Gamma Distribution								95% KM (z) UCL	15901
1673					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	16323
1674					Minimum	0.000001					95% KM (bootstrap t) UCL	18038
1675					Maximum	39400					95% KM (BCA) UCL	15956
1676					Mean	9693					95% KM (Percentile Bootstrap) UCL	15733
1677					Median	1930					95% KM (Chebyshev) UCL	26075
1678					SD	13967					97.5% KM (Chebyshev) UCL	33146
1679					k star	0.189					99% KM (Chebyshev) UCL	47034
1680					Theta star	51292						
1681					Nu star	5.291			Potential UCLs to Use			
1682					AppChi2	1.289					95% KM (Chebyshev) UCL	26075
1683					95% Gamma Approximate UCL (Use when n >= 40)	39786						
1684					95% Adjusted Gamma UCL (Use when n < 40)	48923						
1685	Note: DL/2 is not a recommended method.											
1686												
1687			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
1688			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
1689			For additional insight, the user may want to consult a statistician.									
1690												
1691												
1692	Manganese											
1693												
1694					General Statistics							
1695					Number of Valid Observations	14					Number of Distinct Observations	14
1696												
1697					Raw Statistics				Log-transformed Statistics			
1698					Minimum	26.9					Minimum of Log Data	3.292
1699					Maximum	642					Maximum of Log Data	6.465
1700					Mean	207.4					Mean of log Data	4.854
1701					Geometric Mean	128.2					SD of log Data	1.09
1702					Median	141.5						
1703					SD	190.2						
1704					Std. Error of Mean	50.82						
1705					Coefficient of Variation	0.917						
1706					Skewness	1.001						
1707												
1708					Relevant UCL Statistics							
1709					Normal Distribution Test				Lognormal Distribution Test			
1710					Shapiro Wilk Test Statistic	0.866					Shapiro Wilk Test Statistic	0.924
1711					Shapiro Wilk Critical Value	0.874					Shapiro Wilk Critical Value	0.874

	A	B	C	D	E	F	G	H	I	J	K	L
1712	Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1713												
1714	Assuming Normal Distribution						Assuming Lognormal Distribution					
1715					95% Student's-t UCL	297.4					95% H-UCL	565.1
1716	95% UCLs (Adjusted for Skewness)										95% Chebyshev (MVUE) UCL	522.2
1717					95% Adjusted-CLT UCL (Chen-1995)	305.5					97.5% Chebyshev (MVUE) UCL	653.6
1718					95% Modified-t UCL (Johnson-1978)	299.6					99% Chebyshev (MVUE) UCL	911.8
1719												
1720	Gamma Distribution Test						Data Distribution					
1721					k star (bias corrected)	0.973	Data appear Gamma Distributed at 5% Significance Level					
1722					Theta Star	213						
1723					MLE of Mean	207.4						
1724					MLE of Standard Deviation	210.2						
1725					nu star	27.25						
1726					Approximate Chi Square Value (.05)	16.35	Nonparametric Statistics					
1727					Adjusted Level of Significance	0.0312					95% CLT UCL	291
1728					Adjusted Chi Square Value	15.24					95% Jackknife UCL	297.4
1729											95% Standard Bootstrap UCL	286.2
1730					Anderson-Darling Test Statistic	0.434					95% Bootstrap-t UCL	317.9
1731					Anderson-Darling 5% Critical Value	0.757					95% Hall's Bootstrap UCL	306.5
1732					Kolmogorov-Smirnov Test Statistic	0.175					95% Percentile Bootstrap UCL	291.2
1733					Kolmogorov-Smirnov 5% Critical Value	0.234					95% BCA Bootstrap UCL	297.7
1734	Data appear Gamma Distributed at 5% Significance Level										95% Chebyshev(Mean, Sd) UCL	428.9
1735											97.5% Chebyshev(Mean, Sd) UCL	524.8
1736	Assuming Gamma Distribution										99% Chebyshev(Mean, Sd) UCL	713.1
1737					95% Approximate Gamma UCL (Use when n >= 40)	345.7						
1738					95% Adjusted Gamma UCL (Use when n < 40)	370.9						
1739												
1740	Potential UCL to Use										Use 95% Approximate Gamma UCL	345.7
1741												
1742	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1743	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1744	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
1745												
1746												
1747	Mercury											
1748												
1749	General Statistics											
1750					Number of Valid Data	14					Number of Detected Data	3
1751					Number of Distinct Detected Data	3					Number of Non-Detect Data	11
1752											Percent Non-Detects	78.57%
1753												
1754	Raw Statistics						Log-transformed Statistics					
1755					Minimum Detected	0.03					Minimum Detected	-3.507
1756					Maximum Detected	2.3					Maximum Detected	0.833
1757					Mean of Detected	1.02					Mean of Detected	-0.996
1758					SD of Detected	1.162					SD of Detected	2.249
1759					Minimum Non-Detect	0.1					Minimum Non-Detect	-2.303
1760					Maximum Non-Detect	0.2					Maximum Non-Detect	-1.609
1761												
1762	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	12
1763	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	2
1764	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	85.71%
1765												
1766	Warning: There are only 3 Distinct Detected Values in this data set											
1767	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
1768	Those methods will return a 'N/A' value on your output display!											
1769												
1770	It is necessary to have 4 or more Distinct Values for bootstrap methods.											

	A	B	C	D	E	F	G	H	I	J	K	L
1771	However, results obtained using 4 to 9 distinct values may not be reliable.											
1772	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
1773												
1774												
1775	UCL Statistics											
1776	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
1777					Shapiro Wilk Test Statistic	0.953				Shapiro Wilk Test Statistic		0.931
1778					5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value		0.767
1779	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
1780												
1781	Assuming Normal Distribution						Assuming Lognormal Distribution					
1782					DL/2 Substitution Method					DL/2 Substitution Method		
1783					Mean	0.276				Mean		-2.32
1784					SD	0.609				SD		1.18
1785					95% DL/2 (t) UCL	0.564				95% H-Stat (DL/2) UCL		0.544
1786												
1787					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1788	MLE method failed to converge properly									Mean in Log Scale		-3.06
1789										SD in Log Scale		1.882
1790										Mean in Original Scale		0.262
1791										SD in Original Scale		0.616
1792										95% t UCL		0.554
1793										95% Percentile Bootstrap UCL		0.546
1794										95% BCA Bootstrap UCL		0.744
1795										95% H-UCL		2.788
1796												
1797	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
1798					k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level					
1799					Theta Star	N/A						
1800					nu star	N/A						
1801												
1802					A-D Test Statistic	N/A	Nonparametric Statistics					
1803					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1804					K-S Test Statistic	N/A				Mean		0.242
1805					5% K-S Critical Value	N/A				SD		0.598
1806	Data not Gamma Distributed at 5% Significance Level									SE of Mean		0.196
1807										95% KM (t) UCL		0.589
1808	Assuming Gamma Distribution									95% KM (z) UCL		0.564
1809					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.737
1810					Minimum	N/A				95% KM (bootstrap t) UCL		0.548
1811					Maximum	N/A				95% KM (BCA) UCL		2.3
1812					Mean	N/A				95% KM (Percentile Bootstrap) UCL		N/A
1813					Median	N/A				95% KM (Chebyshev) UCL		1.096
1814					SD	N/A				97.5% KM (Chebyshev) UCL		1.465
1815					k star	N/A				99% KM (Chebyshev) UCL		2.191
1816					Theta star	N/A						
1817					Nu star	N/A	Potential UCLs to Use					
1818					AppChi2	N/A				95% KM (t) UCL		0.589
1819					95% Gamma Approximate UCL (Use when n >= 40)	N/A				95% KM (Percentile Bootstrap) UCL		N/A
1820					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1821	Note: DL/2 is not a recommended method.											
1822												
1823	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1824	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1825	For additional insight, the user may want to consult a statistician.											
1826												
1827												
1828	Thallium											
1829												

	A	B	C	D	E	F	G	H	I	J	K	L
1830						General Statistics						
1831					Number of Valid Data	14				Number of Detected Data		1
1832					Number of Distinct Detected Data	1				Number of Non-Detect Data		13
1833										Percent Non-Detects		92.86%
1834												
1835					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
1836					It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).							
1837												
1838					The data set for variable Thallium was not processed!							
1839												
1840												
1841												
1842	Vanadium											
1843												
1844						General Statistics						
1845					Number of Valid Data	14				Number of Detected Data		10
1846					Number of Distinct Detected Data	9				Number of Non-Detect Data		4
1847										Percent Non-Detects		28.57%
1848												
1849					Raw Statistics					Log-transformed Statistics		
1850					Minimum Detected	0.36				Minimum Detected		-1.022
1851					Maximum Detected	55.2				Maximum Detected		4.011
1852					Mean of Detected	11.08				Mean of Detected		1.275
1853					SD of Detected	17.35				SD of Detected		1.645
1854					Minimum Non-Detect	25				Minimum Non-Detect		3.219
1855					Maximum Non-Detect	25				Maximum Non-Detect		3.219
1856												
1857												
1858						UCL Statistics						
1859					Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only		
1860					Shapiro Wilk Test Statistic	0.678				Shapiro Wilk Test Statistic		0.938
1861					5% Shapiro Wilk Critical Value	0.842				5% Shapiro Wilk Critical Value		0.842
1862					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
1863												
1864					Assuming Normal Distribution					Assuming Lognormal Distribution		
1865					DL/2 Substitution Method					DL/2 Substitution Method		
1866					Mean	11.49				Mean		1.632
1867					SD	14.45				SD		1.489
1868					95% DL/2 (t) UCL	18.33				95% H-Stat (DL/2) UCL		70.59
1869												
1870					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1871					MLE method failed to converge properly					Mean in Log Scale		1.186
1872										SD in Log Scale		1.482
1873										Mean in Original Scale		9.073
1874										SD in Original Scale		14.94
1875										95% t UCL		16.14
1876										95% Percentile Bootstrap UCL		16.08
1877										95% BCA Bootstrap UCL		18.31
1878										95% H-UCL		44.06
1879												
1880					Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only		
1881					k star (bias corrected)	0.454				Data appear Gamma Distributed at 5% Significance Level		
1882					Theta Star	24.4						
1883					nu star	9.082						
1884												
1885					A-D Test Statistic	0.573				Nonparametric Statistics		
1886					5% A-D Critical Value	0.773				Kaplan-Meier (KM) Method		
1887					K-S Test Statistic	0.773				Mean		9.679
1888					5% K-S Critical Value	0.28				SD		14.69

	A	B	C	D	E	F	G	H	I	J	K	L
1889	Data appear Gamma Distributed at 5% Significance Level										SE of Mean	4.373
1890											95% KM (t) UCL	17.42
1891	Assuming Gamma Distribution										95% KM (z) UCL	16.87
1892			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	17.4
1893					Minimum	0.000001					95% KM (bootstrap t) UCL	29.03
1894					Maximum	55.2					95% KM (BCA) UCL	17.57
1895					Mean	10.13					95% KM (Percentile Bootstrap) UCL	16.89
1896					Median	2.15					95% KM (Chebyshev) UCL	28.74
1897					SD	15.32					97.5% KM (Chebyshev) UCL	36.99
1898					k star	0.306					99% KM (Chebyshev) UCL	53.19
1899					Theta star	33.16						
1900					Nu star	8.556			Potential UCLs to Use			
1901					AppChi2	3.061					95% KM (Chebyshev) UCL	28.74
1902			95% Gamma Approximate UCL (Use when n >= 40)			28.32						
1903				95% Adjusted Gamma UCL (Use when n < 40)		32.82						
1904	Note: DL/2 is not a recommended method.											
1905												
1906	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1907	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1908	For additional insight, the user may want to consult a statistician.											
1909												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG10								
2			User Selected Options									
3			From File	WorkSheet.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Lead											
10												
11						General Statistics						
12						Number of Valid Data	14			Number of Detected Data		6
13						Number of Distinct Detected Data	6			Number of Non-Detect Data		8
14										Percent Non-Detects		57.14%
15												
16				Raw Statistics						Log-transformed Statistics		
17						Minimum Detected	1.6			Minimum Detected		0.47
18						Maximum Detected	18.6			Maximum Detected		2.923
19						Mean of Detected	7.633			Mean of Detected		1.622
20						SD of Detected	7.31			SD of Detected		0.999
21						Minimum Non-Detect	4			Minimum Non-Detect		1.386
22						Maximum Non-Detect	5			Maximum Non-Detect		1.609
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		11
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		78.57%
27												
28						Warning: There are only 6 Detected Values in this data						
29						Note: It should be noted that even though bootstrap may be performed on this data set						
30						the resulting calculations may not be reliable enough to draw conclusions						
31												
32						It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.						
33												
34												
35						UCL Statistics						
36				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
37						Shapiro Wilk Test Statistic	0.803			Shapiro Wilk Test Statistic		0.907
38						5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value		0.788
39				Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
40												
41				Assuming Normal Distribution						Assuming Lognormal Distribution		
42						DL/2 Substitution Method				DL/2 Substitution Method		
43						Mean	4.486			Mean		1.123
44						SD	5.346			SD		0.768
45						95% DL/2 (t) UCL	7.016			95% H-Stat (DL/2) UCL		6.935
46												
47						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
48						MLE yields a negative mean				Mean in Log Scale		1.167
49										SD in Log Scale		0.843
50										Mean in Original Scale		4.745
51										SD in Original Scale		5.311
52										95% t UCL		7.258
53										95% Percentile Bootstrap UCL		7.226
54										95% BCA Bootstrap UCL		7.787
55										95% H-UCL		8.299
56												
57				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
58						k star (bias corrected)	0.791			Data appear Normal at 5% Significance Level		
59						Theta Star	9.645					

	A	B	C	D	E	F	G	H	I	J	K	L
60					nu star	9.497						
61												
62					A-D Test Statistic	0.47	**Nonparametric Statistics**					
63					5% A-D Critical Value	0.71				Kaplan-Meier (KM) Method		
64					K-S Test Statistic	0.71				Mean		4.624
65					5% K-S Critical Value	0.338				SD		5.106
66	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		1.515
67										95% KM (t) UCL		7.306
68			**Assuming Gamma Distribution**							95% KM (z) UCL		7.115
69			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		7.204
70					Minimum	0.000001				95% KM (bootstrap t) UCL		13.85
71					Maximum	18.6				95% KM (BCA) UCL		7.814
72					Mean	4.939				95% KM (Percentile Bootstrap) UCL		7.35
73					Median	3.214				95% KM (Chebyshev) UCL		11.23
74					SD	5.59				97.5% KM (Chebyshev) UCL		14.08
75					k star	0.266				99% KM (Chebyshev) UCL		19.7
76					Theta star	18.55						
77					Nu star	7.455			**Potential UCLs to Use**			
78					AppChi2	2.424				95% KM (t) UCL		7.306
79				95% Gamma Approximate UCL (Use when n >= 40)		15.19				95% KM (Percentile Bootstrap) UCL		7.35
80				95% Adjusted Gamma UCL (Use when n < 40)		17.87						
81	**Note: DL/2 is not a recommended method.**											
82												
83	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
84	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
85	**For additional insight, the user may want to consult a statistician.**											
86												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG14								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Benzo(a)pyrene											
10												
11						General Statistics						
12						Number of Valid Data	13			Number of Detected Data		11
13						Number of Distinct Detected Data	11			Number of Non-Detect Data		2
14										Percent Non-Detects		15.38%
15												
16				Raw Statistics						Log-transformed Statistics		
17						Minimum Detected	0.12			Minimum Detected		-2.12
18						Maximum Detected	380			Maximum Detected		5.94
19						Mean of Detected	73.66			Mean of Detected		2.97
20						SD of Detected	113.1			SD of Detected		2.194
21						Minimum Non-Detect	26			Minimum Non-Detect		3.258
22						Maximum Non-Detect	27			Maximum Non-Detect		3.296
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		8
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		61.54%
27												
28						UCL Statistics						
29				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
30						Shapiro Wilk Test Statistic	0.68			Shapiro Wilk Test Statistic		0.911
31						5% Shapiro Wilk Critical Value	0.85			5% Shapiro Wilk Critical Value		0.85
32				Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
33												
34				Assuming Normal Distribution						Assuming Lognormal Distribution		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	64.36			Mean		2.911
37						SD	105.7			SD		2.008
38						95% DL/2 (t) UCL	116.6			95% H-Stat (DL/2) UCL		2257
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41				MLE yields a negative mean						Mean in Log Scale		2.752
42										SD in Log Scale		2.072
43										Mean in Original Scale		63.05
44										SD in Original Scale		106.5
45										95% t UCL		115.7
46										95% Percentile Bootstrap UCL		115.8
47										95% BCA Bootstrap UCL		143.1
48										95% H-UCL		2617
49												
50				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
51						k star (bias corrected)	0.41			Data appear Gamma Distributed at 5% Significance Level		
52						Theta Star	179.6					
53						nu star	9.024					
54												
55						A-D Test Statistic	0.303			Nonparametric Statistics		
56						5% A-D Critical Value	0.785			Kaplan-Meier (KM) Method		
57						K-S Test Statistic	0.785			Mean		63.59
58						5% K-S Critical Value	0.27			SD		102
59				Data appear Gamma Distributed at 5% Significance Level						SE of Mean		29.68

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% KM (t) UCL	116.5
61				Assuming Gamma Distribution							95% KM (z) UCL	112.4
62					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	116.1
63					Minimum	0.000001					95% KM (bootstrap t) UCL	181
64					Maximum	380					95% KM (BCA) UCL	117.9
65					Mean	62.32					95% KM (Percentile Bootstrap) UCL	116.4
66					Median	9.7					95% KM (Chebyshev) UCL	193
67					SD	106.9					97.5% KM (Chebyshev) UCL	248.9
68					k star	0.203					99% KM (Chebyshev) UCL	358.9
69					Theta star	307.3						
70					Nu star	5.273			Potential UCLs to Use			
71					AppChi2	1.28					95% KM (Chebyshev) UCL	193
72					95% Gamma Approximate UCL (Use when n >= 40)	256.7						
73					95% Adjusted Gamma UCL (Use when n < 40)	320.8						
74	Note: DL/2 is not a recommended method.											
75												
76	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
77	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
78	For additional insight, the user may want to consult a statistician.											
79												
80												
81	Arsenic											
82												
83					General Statistics							
84					Number of Valid Observations	13					Number of Distinct Observations	12
85												
86					Raw Statistics				Log-transformed Statistics			
87					Minimum	2.3					Minimum of Log Data	0.833
88					Maximum	13.2					Maximum of Log Data	2.58
89					Mean	5.446					Mean of log Data	1.549
90					Geometric Mean	4.709					SD of log Data	0.541
91					Median	4.5						
92					SD	3.339						
93					Std. Error of Mean	0.926						
94					Coefficient of Variation	0.613						
95					Skewness	1.425						
96												
97					Relevant UCL Statistics							
98					Normal Distribution Test				Lognormal Distribution Test			
99					Shapiro Wilk Test Statistic	0.814					Shapiro Wilk Test Statistic	0.927
100					Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866
101					Data not Normal at 5% Significance Level				Data appear Lognormal at 5% Significance Level			
102												
103					Assuming Normal Distribution				Assuming Lognormal Distribution			
104					95% Student's-t UCL	7.096					95% H-UCL	7.643
105					95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL	9.014
106					95% Adjusted-CLT UCL (Chen-1995)	7.36					97.5% Chebyshev (MVUE) UCL	10.58
107					95% Modified-t UCL (Johnson-1978)	7.157					99% Chebyshev (MVUE) UCL	13.67
108												
109					Gamma Distribution Test				Data Distribution			
110					k star (bias corrected)	2.817			Data Follow Appr. Gamma Distribution at 5% Significance Level			
111					Theta Star	1.933						
112					MLE of Mean	5.446						
113					MLE of Standard Deviation	3.245						
114					nu star	73.24						
115					Approximate Chi Square Value (.05)	54.53			Nonparametric Statistics			
116					Adjusted Level of Significance	0.0301					95% CLT UCL	6.969
117					Adjusted Chi Square Value	52.24					95% Jackknife UCL	7.096
118											95% Standard Bootstrap UCL	6.898

	A	B	C	D	E	F	G	H	I	J	K	L
119					Anderson-Darling Test Statistic	0.614					95% Bootstrap-t UCL	7.794
120					Anderson-Darling 5% Critical Value	0.738					95% Hall's Bootstrap UCL	7.59
121					Kolmogorov-Smirnov Test Statistic	0.262					95% Percentile Bootstrap UCL	6.954
122					Kolmogorov-Smirnov 5% Critical Value	0.238					95% BCA Bootstrap UCL	7.285
123					**Data follow Appr. Gamma Distribution at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL	9.482
124											97.5% Chebyshev(Mean, Sd) UCL	11.23
125					**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL	14.66
126					95% Approximate Gamma UCL (Use when n >= 40)	7.315						
127					95% Adjusted Gamma UCL (Use when n < 40)	7.636						
128												
129					**Potential UCL to Use**						Use 95% Approximate Gamma UCL	7.315
130												
131	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
132	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
133	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
134												
135												
136	**Chromium**											
137												
138					**General Statistics**							
139					Number of Valid Observations	13					Number of Distinct Observations	13
140												
141					**Raw Statistics**						**Log-transformed Statistics**	
142					Minimum	9.4					Minimum of Log Data	2.241
143					Maximum	71.8					Maximum of Log Data	4.274
144					Mean	20.29					Mean of log Data	2.848
145					Geometric Mean	17.26					SD of log Data	0.52
146					Median	16						
147					SD	16.19						
148					Std. Error of Mean	4.489						
149					Coefficient of Variation	0.798						
150					Skewness	3.091						
151												
152					**Relevant UCL Statistics**							
153					**Normal Distribution Test**						**Lognormal Distribution Test**	
154					Shapiro Wilk Test Statistic	0.581					Shapiro Wilk Test Statistic	0.841
155					Shapiro Wilk Critical Value	0.866					Shapiro Wilk Critical Value	0.866
156					**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**	
157												
158					**Assuming Normal Distribution**						**Assuming Lognormal Distribution**	
159					95% Student's-t UCL	28.29					95% H-UCL	27.21
160					**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL	32.13
161					95% Adjusted-CLT UCL (Chen-1995)	31.79					97.5% Chebyshev (MVUE) UCL	37.59
162					95% Modified-t UCL (Johnson-1978)	28.94					99% Chebyshev (MVUE) UCL	48.3
163												
164					**Gamma Distribution Test**						**Data Distribution**	
165					k star (bias corrected)	2.548					**Data do not follow a Discernable Distribution (0.05)**	
166					Theta Star	7.965						
167					MLE of Mean	20.29						
168					MLE of Standard Deviation	12.71						
169					nu star	66.24						
170					Approximate Chi Square Value (.05)	48.51					**Nonparametric Statistics**	
171					Adjusted Level of Significance	0.0301					95% CLT UCL	27.68
172					Adjusted Chi Square Value	46.36					95% Jackknife UCL	28.29
173											95% Standard Bootstrap UCL	27.61
174					Anderson-Darling Test Statistic	1.141					95% Bootstrap-t UCL	45.42
175					Anderson-Darling 5% Critical Value	0.739					95% Hall's Bootstrap UCL	62.06
176					Kolmogorov-Smirnov Test Statistic	0.289					95% Percentile Bootstrap UCL	28.79
177					Kolmogorov-Smirnov 5% Critical Value	0.238					95% BCA Bootstrap UCL	32.95

	A	B	C	D	E	F	G	H	I	J	K	L
178	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					39.86
179							97.5% Chebyshev(Mean, Sd) UCL					48.33
180	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					64.96
181	95% Approximate Gamma UCL (Use when n >= 40)					27.71						
182	95% Adjusted Gamma UCL (Use when n < 40)					29						
183												
184	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					39.86
185												
186	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
187	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
188	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
189												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG12								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Benzo(a)anthracene											
10												
11						General Statistics						
12						Number of Valid Data	35			Number of Detected Data		25
13						Number of Distinct Detected Data	19			Number of Non-Detect Data		10
14										Percent Non-Detects		28.57%
15												
16				Raw Statistics						Log-transformed Statistics		
17						Minimum Detected	26			Minimum Detected		3.258
18						Maximum Detected	1500			Maximum Detected		7.313
19						Mean of Detected	315.2			Mean of Detected		5.351
20						SD of Detected	355.2			SD of Detected		0.887
21						Minimum Non-Detect	12			Minimum Non-Detect		2.485
22						Maximum Non-Detect	410			Maximum Non-Detect		6.016
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		30
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		85.71%
27												
28						UCL Statistics						
29				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
30						Shapiro Wilk Test Statistic	0.65			Shapiro Wilk Test Statistic		0.961
31						5% Shapiro Wilk Critical Value	0.918			5% Shapiro Wilk Critical Value		0.918
32				Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
33												
34				Assuming Normal Distribution						Assuming Lognormal Distribution		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	234			Mean		4.584
37						SD	327.2			SD		1.526
38						95% DL/2 (t) UCL	327.5			95% H-Stat (DL/2) UCL		719
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41				MLE yields a negative mean						Mean in Log Scale		4.838
42										SD in Log Scale		1.126
43										Mean in Original Scale		236
44										SD in Original Scale		324.6
45										95% t UCL		328.8
46										95% Percentile Bootstrap UCL		330.9
47										95% BCA Bootstrap UCL		351.8
48										95% H-UCL		393.9
49												
50				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
51						k star (bias corrected)	1.245			Data Follow Appr. Gamma Distribution at 5% Significance Level		
52						Theta Star	253.2					
53						nu star	62.25					
54												
55						A-D Test Statistic	0.981			Nonparametric Statistics		
56						5% A-D Critical Value	0.764			Kaplan-Meier (KM) Method		
57						K-S Test Statistic	0.764			Mean		235.6
58						5% K-S Critical Value	0.178			SD		320.9
59				Data follow Appr. Gamma Distribution at 5% Significance Level						SE of Mean		55.43

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% KM (t) UCL	329.3
61				Assuming Gamma Distribution							95% KM (z) UCL	326.7
62				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	323.4
63					Minimum	0.000001					95% KM (bootstrap t) UCL	406.2
64					Maximum	1500					95% KM (BCA) UCL	356.1
65					Mean	226.9					95% KM (Percentile Bootstrap) UCL	338.5
66					Median	120					95% KM (Chebyshev) UCL	477.2
67					SD	330.5					97.5% KM (Chebyshev) UCL	581.7
68					k star	0.158					99% KM (Chebyshev) UCL	787.1
69					Theta star	1434						
70					Nu star	11.08			Potential UCLs to Use			
71					AppChi2	4.626					95% KM (Percentile Bootstrap) UCL	338.5
72					95% Gamma Approximate UCL (Use when n >= 40)	543.5						
73					95% Adjusted Gamma UCL (Use when n < 40)	567.7						
74	Note: DL/2 is not a recommended method.											
75												
76	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
77	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
78	For additional insight, the user may want to consult a statistician.											
79												
80												
81	Benzo(a)pyrene											
82												
83					General Statistics							
84					Number of Valid Data	35					Number of Detected Data	28
85					Number of Distinct Detected Data	22					Number of Non-Detect Data	7
86											Percent Non-Detects	20.00%
87												
88				Raw Statistics					Log-transformed Statistics			
89					Minimum Detected	28					Minimum Detected	3.332
90					Maximum Detected	2100					Maximum Detected	7.65
91					Mean of Detected	322.1					Mean of Detected	5.206
92					SD of Detected	448.8					SD of Detected	1.063
93					Minimum Non-Detect	12					Minimum Non-Detect	2.485
94					Maximum Non-Detect	410					Maximum Non-Detect	6.016
95												
96	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	29
97	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	6
98	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	82.86%
99												
100					UCL Statistics							
101				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
102					Shapiro Wilk Test Statistic	0.587					Shapiro Wilk Test Statistic	0.961
103					5% Shapiro Wilk Critical Value	0.924					5% Shapiro Wilk Critical Value	0.924
104				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
105												
106				Assuming Normal Distribution					Assuming Lognormal Distribution			
107					DL/2 Substitution Method						DL/2 Substitution Method	
108					Mean	265					Mean	4.684
109					SD	417.5					SD	1.512
110					95% DL/2 (t) UCL	384.4					95% H-Stat (DL/2) UCL	768.6
111												
112					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
113				MLE yields a negative mean							Mean in Log Scale	4.792
114											SD in Log Scale	1.292
115											Mean in Original Scale	263.4
116											SD in Original Scale	417.4
117											95% t UCL	382.7
118											95% Percentile Bootstrap UCL	387.1

	A	B	C	D	E	F	G	H	I	J	K	L
119											95% BCA Bootstrap UCL	425.5
120											95% H-UCL	521.1
121												
122				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
123					k star (bias corrected)	0.929			Data Follow Appr. Gamma Distribution at 5% Significance Level			
124					Theta Star	346.8						
125					nu star	52						
126												
127					A-D Test Statistic	0.868			Nonparametric Statistics			
128					5% A-D Critical Value	0.773					Kaplan-Meier (KM) Method	
129					K-S Test Statistic	0.773					Mean	266.2
130					5% K-S Critical Value	0.17					SD	410.4
131				Data follow Appr. Gamma Distribution at 5% Significance Level							SE of Mean	70.7
132											95% KM (t) UCL	385.8
133				Assuming Gamma Distribution							95% KM (z) UCL	382.5
134					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	384.9
135					Minimum	0.000001					95% KM (bootstrap t) UCL	550.5
136					Maximum	2100					95% KM (BCA) UCL	394.7
137					Mean	260.1					95% KM (Percentile Bootstrap) UCL	400.1
138					Median	120					95% KM (Chebyshev) UCL	574.4
139					SD	419.4					97.5% KM (Chebyshev) UCL	707.8
140					k star	0.204					99% KM (Chebyshev) UCL	969.7
141					Theta star	1277						
142					Nu star	14.26			Potential UCLs to Use			
143					AppChi2	6.751					95% KM (Chebyshev) UCL	574.4
144					95% Gamma Approximate UCL (Use when n >= 40)	549.5						
145					95% Adjusted Gamma UCL (Use when n < 40)	570.2						
146	Note: DL/2 is not a recommended method.											
147												
148				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
149				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
150				For additional insight, the user may want to consult a statistician.								
151												
152												
153	Benzo(b)fluoranthene											
154												
155					General Statistics							
156					Number of Valid Data	35					Number of Detected Data	27
157					Number of Distinct Detected Data	24					Number of Non-Detect Data	8
158											Percent Non-Detects	22.86%
159												
160				Raw Statistics					Log-transformed Statistics			
161					Minimum Detected	57					Minimum Detected	4.043
162					Maximum Detected	3900					Maximum Detected	8.269
163					Mean of Detected	608.1					Mean of Detected	5.798
164					SD of Detected	904					SD of Detected	1.073
165					Minimum Non-Detect	23					Minimum Non-Detect	3.135
166					Maximum Non-Detect	46					Maximum Non-Detect	3.829
167												
168	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	8
169	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	27
170	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	22.86%
171												
172					UCL Statistics							
173				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
174					Shapiro Wilk Test Statistic	0.557					Shapiro Wilk Test Statistic	0.956
175					5% Shapiro Wilk Critical Value	0.923					5% Shapiro Wilk Critical Value	0.923
176				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
177												

	A	B	C	D	E	F	G	H	I	J	K	L
178	Assuming Normal Distribution						Assuming Lognormal Distribution					
179					DL/2 Substitution Method						DL/2 Substitution Method	
180					Mean	472.6					Mean	5.086
181					SD	829.9					SD	1.629
182					95% DL/2 (t) UCL	709.8					95% H-Stat (DL/2) UCL	1541
183												
184				Maximum Likelihood Estimate(MLE) Method							Log ROS Method	
185					Mean	323.3					Mean in Log Scale	5.248
186					SD	973.1					SD in Log Scale	1.391
187					95% MLE (t) UCL	601.5					Mean in Original Scale	476
188					95% MLE (Tiku) UCL	600.6					SD in Original Scale	828
189											95% t UCL	712.7
190											95% Percentile Bootstrap UCL	718.9
191											95% BCA Bootstrap UCL	809.8
192											95% H UCL	1019
193												
194	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
195					k star (bias corrected)	0.867	Data Follow Appr. Gamma Distribution at 5% Significance Level					
196					Theta Star	701.1						
197					nu star	46.84						
198												
199					A-D Test Statistic	1.087	Nonparametric Statistics					
200					5% A-D Critical Value	0.775					Kaplan-Meier (KM) Method	
201					K-S Test Statistic	0.775					Mean	482.2
202					5% K-S Critical Value	0.173					SD	812.8
203	Data follow Appr. Gamma Distribution at 5% Significance Level										SE of Mean	140
204											95% KM (t) UCL	718.9
205	Assuming Gamma Distribution										95% KM (z) UCL	712.5
206				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	716.9
207					Minimum	0.000001					95% KM (bootstrap t) UCL	1120
208					Maximum	3900					95% KM (BCA) UCL	736.9
209					Mean	469.1					95% KM (Percentile Bootstrap) UCL	732.8
210					Median	220					95% KM (Chebyshev) UCL	1092
211					SD	831.9					97.5% KM (Chebyshev) UCL	1356
212					k star	0.163					99% KM (Chebyshev) UCL	1875
213					Theta star	2873						
214					Nu star	11.43	Potential UCLs to Use					
215					AppChi2	4.854					95% KM (Chebyshev) UCL	1092
216				95% Gamma Approximate UCL (Use when n >= 40)		1105						
217				95% Adjusted Gamma UCL (Use when n < 40)		1153						
218	Note: DL/2 is not a recommended method.											
219												
220	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
221	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
222	For additional insight, the user may want to consult a statistician.											
223												
224												
225	Dibenz(a,h)anthracene											
226												
227	General Statistics											
228					Number of Valid Data	35					Number of Detected Data	16
229					Number of Distinct Detected Data	15					Number of Non-Detect Data	19
230											Percent Non-Detects	54.29%
231												
232	Raw Statistics						Log-transformed Statistics					
233					Minimum Detected	9.1					Minimum Detected	2.208
234					Maximum Detected	660					Maximum Detected	6.492
235					Mean of Detected	118.2					Mean of Detected	4.168
236					SD of Detected	162.3					SD of Detected	1.142

	A	B	C	D	E	F	G	H	I	J	K	L
237					Minimum Non-Detect	6.4					Minimum Non-Detect	1.856
238					Maximum Non-Detect	1600					Maximum Non-Detect	7.378
239												
240	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	35
241	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
242	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
243												
244					UCL Statistics							
245				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
246					Shapiro Wilk Test Statistic	0.613					Shapiro Wilk Test Statistic	0.954
247					5% Shapiro Wilk Critical Value	0.887					5% Shapiro Wilk Critical Value	0.887
248				Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
249												
250				Assuming Normal Distribution						Assuming Lognormal Distribution		
251					DL/2 Substitution Method						DL/2 Substitution Method	
252					Mean	141.1					Mean	3.954
253					SD	196.7					SD	1.549
254					95% DL/2 (t) UCL	197.4					95% H-Stat (DL/2) UCL	405.2
255												
256					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
257				MLE method failed to converge properly							Mean in Log Scale	3.278
258											SD in Log Scale	1.233
259											Mean in Original Scale	62.29
260											SD in Original Scale	119.8
261											95% t UCL	96.55
262											95% Percentile Bootstrap UCL	97.84
263											95% BCA Bootstrap UCL	119.4
264											95% H-UCL	101.6
265												
266				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
267					k star (bias corrected)	0.822				Data appear Gamma Distributed at 5% Significance Level		
268					Theta Star	143.8						
269					nu star	26.3						
270												
271					A-D Test Statistic	0.603				Nonparametric Statistics		
272					5% A-D Critical Value	0.765					Kaplan-Meier (KM) Method	
273					K-S Test Statistic	0.765					Mean	70.42
274					5% K-S Critical Value	0.221					SD	122.9
275				Data appear Gamma Distributed at 5% Significance Level							SE of Mean	22.82
276											95% KM (t) UCL	109
277				Assuming Gamma Distribution							95% KM (z) UCL	108
278					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	107.9
279					Minimum	0.000001					95% KM (bootstrap t) UCL	160.4
280					Maximum	660					95% KM (BCA) UCL	112.3
281					Mean	56.43					95% KM (Percentile Bootstrap) UCL	109.9
282					Median	9.1					95% KM (Chebyshev) UCL	169.9
283					SD	122.2					97.5% KM (Chebyshev) UCL	212.9
284					k star	0.14					99% KM (Chebyshev) UCL	297.4
285					Theta star	404.5						
286					Nu star	9.766				Potential UCLs to Use		
287					AppChi2	3.796					95% KM (t) UCL	109
288					95% Gamma Approximate UCL (Use when n >= 40)	145.2						
289					95% Adjusted Gamma UCL (Use when n < 40)	152.2						
290	Note: DL/2 is not a recommended method.											
291												
292				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
293				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
294				For additional insight, the user may want to consult a statistician.								
295												

	A	B	C	D	E	F	G	H	I	J	K	L
296												
297	Indeno(1,2,3-cd)pyrene											
298												
299						General Statistics						
300					Number of Valid Data	35				Number of Detected Data		23
301					Number of Distinct Detected Data	22				Number of Non-Detect Data		12
302										Percent Non-Detects		34.29%
303												
304				Raw Statistics						Log-transformed Statistics		
305					Minimum Detected	34				Minimum Detected		3.526
306					Maximum Detected	2800				Maximum Detected		7.937
307					Mean of Detected	375.4				Mean of Detected		5.266
308					SD of Detected	612.9				SD of Detected		1.071
309					Minimum Non-Detect	7.1				Minimum Non-Detect		1.96
310					Maximum Non-Detect	600				Maximum Non-Detect		6.397
311												
312	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		32
313	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
314	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		91.43%
315												
316						UCL Statistics						
317				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
318					Shapiro Wilk Test Statistic	0.535				Shapiro Wilk Test Statistic		0.959
319					5% Shapiro Wilk Critical Value	0.914				5% Shapiro Wilk Critical Value		0.914
320				Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level		
321												
322				Assuming Normal Distribution						Assuming Lognormal Distribution		
323					DL/2 Substitution Method					DL/2 Substitution Method		
324					Mean	271.5				Mean		4.49
325					SD	518.3				SD		1.662
326					95% DL/2 (t) UCL	419.6				95% H-Stat (DL/2) UCL		927.6
327												
328					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
329				MLE yields a negative mean						Mean in Log Scale		4.58
330										SD in Log Scale		1.348
331										Mean in Original Scale		258.1
332										SD in Original Scale		520.1
333										95% t UCL		406.7
334										95% Percentile Bootstrap UCL		413.9
335										95% BCA Bootstrap UCL		480.5
336										95% H-UCL		474.3
337												
338				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
339					k star (bias corrected)	0.798				Data appear Lognormal at 5% Significance Level		
340					Theta Star	470.4						
341					nu star	36.71						
342												
343					A-D Test Statistic	1.22				Nonparametric Statistics		
344					5% A-D Critical Value	0.775				Kaplan-Meier (KM) Method		
345					K-S Test Statistic	0.775				Mean		266.8
346					5% K-S Critical Value	0.188				SD		510.4
347				Data not Gamma Distributed at 5% Significance Level						SE of Mean		88.43
348										95% KM (t) UCL		416.4
349				Assuming Gamma Distribution						95% KM (z) UCL		412.3
350					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		412.9
351					Minimum	0.000001				95% KM (bootstrap t) UCL		686.2
352					Maximum	2800				95% KM (BCA) UCL		450.3
353					Mean	246.7				95% KM (Percentile Bootstrap) UCL		426
354					Median	95				95% KM (Chebyshev) UCL		652.3

	A	B	C	D	E	F	G	H	I	J	K	L
355					SD	525.1				97.5% KM (Chebyshev) UCL		819.1
356					k star	0.126				99% KM (Chebyshev) UCL		1147
357					Theta star	1954						
358					Nu star	8.837			Potential UCLs to Use			
359					AppChi2	3.229				97.5% KM (Chebyshev) UCL		819.1
360				95% Gamma Approximate UCL (Use when n >= 40)		675.1						
361				95% Adjusted Gamma UCL (Use when n < 40)		710.2						
362	Note: DL/2 is not a recommended method.											
363												
364	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
365	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
366	For additional insight, the user may want to consult a statistician.											
367												
368												
369	Aroclor-1254											
370												
371					General Statistics							
372				Number of Valid Data		35			Number of Detected Data			7
373				Number of Distinct Detected Data		7			Number of Non-Detect Data			28
374									Percent Non-Detects			80.00%
375												
376				Raw Statistics					Log-transformed Statistics			
377				Minimum Detected		240			Minimum Detected			5.481
378				Maximum Detected		21000			Maximum Detected			9.952
379				Mean of Detected		4586			Mean of Detected			7.017
380				SD of Detected		7896			SD of Detected			1.767
381				Minimum Non-Detect		11			Minimum Non-Detect			2.398
382				Maximum Non-Detect		78			Maximum Non-Detect			4.357
383												
384	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			28
385	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			7
386	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			80.00%
387												
388	Warning: There are only 7 Detected Values in this data											
389	Note: It should be noted that even though bootstrap may be performed on this data set											
390	the resulting calculations may not be reliable enough to draw conclusions											
391												
392	It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.											
393												
394												
395					UCL Statistics							
396	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
397				Shapiro Wilk Test Statistic		0.648			Shapiro Wilk Test Statistic			0.801
398				5% Shapiro Wilk Critical Value		0.803			5% Shapiro Wilk Critical Value			0.803
399	Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level					
400												
401	Assuming Normal Distribution						Assuming Lognormal Distribution					
402				DL/2 Substitution Method					DL/2 Substitution Method			
403				Mean		930.3			Mean			3.539
404				SD		3800			SD			1.968
405				95% DL/2 (t) UCL		2016			95% H-Stat (DL/2) UCL			871.2
406												
407				Maximum Likelihood Estimate(MLE) Method		N/A			Log ROS Method			
408				MLE yields a negative mean					Mean in Log Scale			1.002
409									SD in Log Scale			3.427
410									Mean in Original Scale			918.5
411									SD in Original Scale			3803
412									95% t UCL			2006
413									95% Percentile Bootstrap UCL			2110

	A	B	C	D	E	F	G	H	I	J	K	L
414											95% BCA Bootstrap UCL	2732
415											95% H-UCL	37386
416												
417				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
418					k star (bias corrected)	0.356			Data do not follow a Discernable Distribution (0.05)			
419					Theta Star	12893						
420					nu star	4.98						
421												
422					A-D Test Statistic	0.951			Nonparametric Statistics			
423					5% A-D Critical Value	0.759					Kaplan-Meier (KM) Method	
424					K-S Test Statistic	0.759					Mean	1109
425					5% K-S Critical Value	0.329					SD	3703
426				Data not Gamma Distributed at 5% Significance Level							SE of Mean	676
427											95% KM (t) UCL	2252
428				Assuming Gamma Distribution							95% KM (z) UCL	2221
429					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	2161
430					Minimum	0.000001					95% KM (bootstrap t) UCL	32971
431					Maximum	21000					95% KM (BCA) UCL	2543
432					Mean	917.1					95% KM (Percentile Bootstrap) UCL	2298
433					Median	0.000001					95% KM (Chebyshev) UCL	4056
434					SD	3803					97.5% KM (Chebyshev) UCL	5331
435					k star	0.0674					99% KM (Chebyshev) UCL	7835
436					Theta star	13612						
437					Nu star	4.717			Potential UCLs to Use			
438					AppChi2	1.024					97.5% KM (Chebyshev) UCL	5331
439					95% Gamma Approximate UCL (Use when n >= 40)	4226						
440					95% Adjusted Gamma UCL (Use when n < 40)	4571						
441	Note: DL/2 is not a recommended method.											
442												
443				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
444				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
445				For additional insight, the user may want to consult a statistician.								
446												
447												
448	Aroclor-1260											
449												
450					General Statistics							
451					Number of Valid Data	35					Number of Detected Data	30
452					Number of Distinct Detected Data	28					Number of Non-Detect Data	5
453											Percent Non-Detects	14.29%
454												
455				Raw Statistics					Log-transformed Statistics			
456					Minimum Detected	7.9					Minimum Detected	2.067
457					Maximum Detected	2400					Maximum Detected	7.783
458					Mean of Detected	556.6					Mean of Detected	5.276
459					SD of Detected	750.2					SD of Detected	1.623
460					Minimum Non-Detect	22					Minimum Non-Detect	3.091
461					Maximum Non-Detect	280					Maximum Non-Detect	5.635
462												
463	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	24
464	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	11
465	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	68.57%
466												
467					UCL Statistics							
468				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
469					Shapiro Wilk Test Statistic	0.719					Shapiro Wilk Test Statistic	0.96
470					5% Shapiro Wilk Critical Value	0.927					5% Shapiro Wilk Critical Value	0.927
471				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
472												

	A	B	C	D	E	F	G	H	I	J	K	L
473				Assuming Normal Distribution					Assuming Lognormal Distribution			
474					DL/2 Substitution Method						DL/2 Substitution Method	
475					Mean	484.7					Mean	5.039
476					SD	715.7					SD	1.643
477					95% DL/2 (t) UCL	689.3					95% H-Stat (DL/2) UCL	1526
478												
479					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
480				MLE yields a negative mean							Mean in Log Scale	5.004
481											SD in Log Scale	1.66
482											Mean in Original Scale	482
483											SD in Original Scale	717.2
484											95% t UCL	687
485											95% Percentile Bootstrap UCL	682.8
486											95% BCA Bootstrap UCL	721.5
487											95% H-UCL	1541
488												
489				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
490					k star (bias corrected)	0.555			Data appear Gamma Distributed at 5% Significance Level			
491					Theta Star	1003						
492					nu star	33.3						
493												
494					A-D Test Statistic	0.786			Nonparametric Statistics			
495					5% A-D Critical Value	0.801					Kaplan-Meier (KM) Method	
496					K-S Test Statistic	0.801					Mean	482.8
497					5% K-S Critical Value	0.168					SD	706.6
498				Data appear Gamma Distributed at 5% Significance Level							SE of Mean	121.5
499											95% KM (t) UCL	688.3
500				Assuming Gamma Distribution							95% KM (z) UCL	682.7
501					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	687.8
502					Minimum	0.000001					95% KM (bootstrap t) UCL	760.9
503					Maximum	2400					95% KM (BCA) UCL	687.8
504					Mean	477.1					95% KM (Percentile Bootstrap) UCL	685.8
505					Median	160					95% KM (Chebyshev) UCL	1012
506					SD	720.5					97.5% KM (Chebyshev) UCL	1242
507					k star	0.205					99% KM (Chebyshev) UCL	1692
508					Theta star	2332						
509					Nu star	14.32			Potential UCLs to Use			
510					AppChi2	6.79					95% KM (Chebyshev) UCL	1012
511					95% Gamma Approximate UCL (Use when n >= 40)	1006						
512					95% Adjusted Gamma UCL (Use when n < 40)	1044						
513	Note: DL/2 is not a recommended method.											
514												
515				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
516				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
517				For additional insight, the user may want to consult a statistician.								
518												
519												
520	Dieldrin											
521												
522					General Statistics							
523					Number of Valid Data	24					Number of Detected Data	6
524					Number of Distinct Detected Data	6					Number of Non-Detect Data	18
525											Percent Non-Detects	75.00%
526												
527				Raw Statistics					Log-transformed Statistics			
528					Minimum Detected	1.7					Minimum Detected	0.531
529					Maximum Detected	1400					Maximum Detected	7.244
530					Mean of Detected	342.3					Mean of Detected	3.306
531					SD of Detected	569.1					SD of Detected	2.993

	A	B	C	D	E	F	G	H	I	J	K	L
532					Minimum Non-Detect	2.4					Minimum Non-Detect	0.875
533					Maximum Non-Detect	14					Maximum Non-Detect	2.639
534												
535	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	21
536	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
537	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	87.50%
538												
539					Warning: There are only 6 Detected Values in this data							
540					Note: It should be noted that even though bootstrap may be performed on this data set							
541					the resulting calculations may not be reliable enough to draw conclusions							
542												
543					It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.							
544												
545												
546					UCL Statistics							
547					Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only	
548					Shapiro Wilk Test Statistic	0.708					Shapiro Wilk Test Statistic	0.852
549					5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788
550					Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level	
551												
552					Assuming Normal Distribution						Assuming Lognormal Distribution	
553					DL/2 Substitution Method						DL/2 Substitution Method	
554					Mean	87.58					Mean	1.511
555					SD	304.9					SD	1.777
556					95% DL/2 (t) UCL	194.2					95% H-Stat (DL/2) UCL	87.14
557												
558					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
559					MLE yields a negative mean						Mean in Log Scale	1.49
560											SD in Log Scale	1.868
561											Mean in Original Scale	87.92
562											SD in Original Scale	304.8
563											95% t UCL	194.6
564											95% Percentile Bootstrap UCL	202.4
565											95% BCA Bootstrap UCL	264.2
566											95% H-UCL	114.7
567												
568					Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only	
569					k star (bias corrected)	0.249					Data appear Gamma Distributed at 5% Significance Level	
570					Theta Star	1374						
571					nu star	2.991						
572												
573					A-D Test Statistic	0.533					Nonparametric Statistics	
574					5% A-D Critical Value	0.775					Kaplan-Meier (KM) Method	
575					K-S Test Statistic	0.775					Mean	87.18
576					5% K-S Critical Value	0.358					SD	298.6
577					Data appear Gamma Distributed at 5% Significance Level						SE of Mean	66.77
578											95% KM (t) UCL	201.6
579					Assuming Gamma Distribution						95% KM (z) UCL	197
580					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	193.9
581					Minimum	0.000001					95% KM (bootstrap t) UCL	2704
582					Maximum	1400					95% KM (BCA) UCL	228.5
583					Mean	87.5					95% KM (Percentile Bootstrap) UCL	221.8
584					Median	0.000001					95% KM (Chebyshev) UCL	378.2
585					SD	305.1					97.5% KM (Chebyshev) UCL	504.2
586					k star	0.0841					99% KM (Chebyshev) UCL	751.5
587					Theta star	1041						
588					Nu star	4.036					Potential UCLs to Use	
589					AppChi2	0.736					95% KM (t) UCL	201.6
590					95% Gamma Approximate UCL (Use when n >= 40)	479.8						

	A	B	C	D	E	F	G	H	I	J	K	L
591					95% Adjusted Gamma UCL (Use when n < 40)	546.4						
592	Note: DL/2 is not a recommended method.											
593												
594	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
595	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
596	For additional insight, the user may want to consult a statistician.											
597												
598												
599	Heptachlor epoxide											
600												
601	General Statistics											
602					Number of Valid Data	24			Number of Detected Data			3
603					Number of Distinct Detected Data	3			Number of Non-Detect Data			21
604									Percent Non-Detects			87.50%
605												
606	Raw Statistics						Log-transformed Statistics					
607					Minimum Detected	0.71			Minimum Detected			-0.342
608					Maximum Detected	540			Maximum Detected			6.292
609					Mean of Detected	256.9			Mean of Detected			3.796
610					SD of Detected	270.6			SD of Detected			3.609
611					Minimum Non-Detect	2			Minimum Non-Detect			0.693
612					Maximum Non-Detect	7.1			Maximum Non-Detect			1.96
613												
614	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			22
615	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
616	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			91.67%
617												
618	Warning: There are only 3 Distinct Detected Values in this data set											
619	The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.											
620	Those methods will return a 'N/A' value on your output display!											
621												
622	It is necessary to have 4 or more Distinct Values for bootstrap methods.											
623	However, results obtained using 4 to 9 distinct values may not be reliable.											
624	It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.											
625												
626												
627	UCL Statistics											
628	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
629					Shapiro Wilk Test Statistic	0.993			Shapiro Wilk Test Statistic			0.845
630					5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value			0.767
631	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
632												
633	Assuming Normal Distribution						Assuming Lognormal Distribution					
634					DL/2 Substitution Method				DL/2 Substitution Method			
635					Mean	33.32			Mean			0.715
636					SD	117.6			SD			1.617
637					95% DL/2 (t) UCL	74.45			95% H-Stat (DL/2) UCL			24.27
638												
639					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
640	MLE method failed to converge properly								Mean in Log Scale			0.164
641									SD in Log Scale			2.177
642									Mean in Original Scale			33.48
643									SD in Original Scale			117.5
644									95% t UCL			74.6
645									95% Percentile Bootstrap UCL			77.7
646									95% BCA Bootstrap UCL			100.7
647									95% H-UCL			92.42
648												
649	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					

	A	B	C	D	E	F	G	H	I	J	K	L
650					k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level					
651					Theta Star	N/A						
652					nu star	N/A						
653												
654					A-D Test Statistic	N/A	Nonparametric Statistics					
655					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
656					K-S Test Statistic	N/A					Mean	32.73
657					5% K-S Critical Value	N/A					SD	115.3
658		Data not Gamma Distributed at 5% Significance Level									SE of Mean	28.81
659											95% KM (t) UCL	82.12
660			Assuming Gamma Distribution								95% KM (z) UCL	80.13
661				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	180.8
662					Minimum	N/A					95% KM (bootstrap t) UCL	57.65
663					Maximum	N/A					95% KM (BCA) UCL	540
664					Mean	N/A					95% KM (Percentile Bootstrap) UCL	540
665					Median	N/A					95% KM (Chebyshev) UCL	158.3
666					SD	N/A					97.5% KM (Chebyshev) UCL	212.7
667					k star	N/A					99% KM (Chebyshev) UCL	319.4
668					Theta star	N/A						
669					Nu star	N/A	Potential UCLs to Use					
670					AppChi2	N/A					95% KM (t) UCL	82.12
671				95% Gamma Approximate UCL (Use when n >= 40)		N/A					95% KM (Percentile Bootstrap) UCL	540
672				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
673	Note: DL/2 is not a recommended method.											
674												
675			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
676			These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).									
677			For additional insight, the user may want to consult a statistician.									
678												
679												
680	Arsenic											
681												
682				General Statistics								
683				Number of Valid Observations		35					Number of Distinct Observations	32
684												
685			Raw Statistics				Log-transformed Statistics					
686				Minimum		0.98					Minimum of Log Data	-0.0202
687				Maximum		111					Maximum of Log Data	4.71
688				Mean		14.57					Mean of log Data	2.171
689				Geometric Mean		8.765					SD of log Data	1.015
690				Median		8.8						
691				SD		19.56						
692				Std. Error of Mean		3.307						
693				Coefficient of Variation		1.343						
694				Skewness		3.853						
695												
696				Relevant UCL Statistics								
697			Normal Distribution Test				Lognormal Distribution Test					
698				Shapiro Wilk Test Statistic		0.584					Shapiro Wilk Test Statistic	0.983
699				Shapiro Wilk Critical Value		0.934					Shapiro Wilk Critical Value	0.934
700			Data not Normal at 5% Significance Level				Data appear Lognormal at 5% Significance Level					
701												
702			Assuming Normal Distribution				Assuming Lognormal Distribution					
703				95% Student's-t UCL		20.16					95% H-UCL	22.58
704			95% UCLs (Adjusted for Skewness)								95% Chebyshev (MVUE) UCL	26.86
705				95% Adjusted-CLT UCL (Chen-1995)		22.31					97.5% Chebyshev (MVUE) UCL	32.26
706				95% Modified-t UCL (Johnson-1978)		20.52					99% Chebyshev (MVUE) UCL	42.88
707												
708			Gamma Distribution Test				Data Distribution					

	A	B	C	D	E	F	G	H	I	J	K	L
709					k star (bias corrected)	1.044	Data appear Gamma Distributed at 5% Significance Level					
710					Theta Star	13.96						
711					MLE of Mean	14.57						
712					MLE of Standard Deviation	14.26						
713					nu star	73.08						
714					Approximate Chi Square Value (.05)	54.4	Nonparametric Statistics					
715					Adjusted Level of Significance	0.0425					95% CLT UCL	20.01
716					Adjusted Chi Square Value	53.63					95% Jackknife UCL	20.16
717											95% Standard Bootstrap UCL	20.03
718					Anderson-Darling Test Statistic	0.677					95% Bootstrap-t UCL	25.87
719					Anderson-Darling 5% Critical Value	0.773					95% Hall's Bootstrap UCL	42.22
720					Kolmogorov-Smirnov Test Statistic	0.137					95% Percentile Bootstrap UCL	20.19
721					Kolmogorov-Smirnov 5% Critical Value	0.153					95% BCA Bootstrap UCL	22.89
722			Data appear Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL	28.98
723											97.5% Chebyshev(Mean, Sd) UCL	35.22
724			Assuming Gamma Distribution								99% Chebyshev(Mean, Sd) UCL	47.47
725					95% Approximate Gamma UCL (Use when n >= 40)	19.58						
726					95% Adjusted Gamma UCL (Use when n < 40)	19.86						
727												
728			Potential UCL to Use								Use 95% Approximate Gamma UCL	19.58
729												
730			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.									
731			These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)									
732			and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.									
733												
734												
735	Chromium											
736												
737					General Statistics							
738					Number of Valid Observations	35					Number of Distinct Observations	35
739												
740			Raw Statistics				Log-transformed Statistics					
741					Minimum	5.5					Minimum of Log Data	1.705
742					Maximum	57					Maximum of Log Data	4.043
743					Mean	23.13					Mean of log Data	2.947
744					Geometric Mean	19.05					SD of log Data	0.654
745					Median	18.8						
746					SD	14.02						
747					Std. Error of Mean	2.37						
748					Coefficient of Variation	0.606						
749					Skewness	0.697						
750												
751					Relevant UCL Statistics							
752			Normal Distribution Test				Lognormal Distribution Test					
753					Shapiro Wilk Test Statistic	0.918					Shapiro Wilk Test Statistic	0.949
754					Shapiro Wilk Critical Value	0.934					Shapiro Wilk Critical Value	0.934
755			Data not Normal at 5% Significance Level				Data appear Lognormal at 5% Significance Level					
756												
757			Assuming Normal Distribution				Assuming Lognormal Distribution					
758					95% Student's-t UCL	27.14					95% H-UCL	29.77
759			95% UCLs (Adjusted for Skewness)								95% Chebyshev (MVUE) UCL	35.55
760					95% Adjusted-CLT UCL (Chen-1995)	27.33					97.5% Chebyshev (MVUE) UCL	40.8
761					95% Modified-t UCL (Johnson-1978)	27.19					99% Chebyshev (MVUE) UCL	51.12
762												
763			Gamma Distribution Test				Data Distribution					
764					k star (bias corrected)	2.515	Data appear Gamma Distributed at 5% Significance Level					
765					Theta Star	9.198						
766					MLE of Mean	23.13						
767					MLE of Standard Deviation	14.59						

	A	B	C	D	E	F	G	H	I	J	K	L
768					nu star	176						
769					Approximate Chi Square Value (.05)	146.3			Nonparametric Statistics			
770					Adjusted Level of Significance	0.0425					95% CLT UCL	27.03
771					Adjusted Chi Square Value	145.1					95% Jackknife UCL	27.14
772											95% Standard Bootstrap UCL	27.04
773					Anderson-Darling Test Statistic	0.506					95% Bootstrap-t UCL	27.5
774					Anderson-Darling 5% Critical Value	0.755					95% Hall's Bootstrap UCL	27.39
775					Kolmogorov-Smirnov Test Statistic	0.115					95% Percentile Bootstrap UCL	27
776					Kolmogorov-Smirnov 5% Critical Value	0.15					95% BCA Bootstrap UCL	27.42
777			Data appear Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL	33.46
778											97.5% Chebyshev(Mean, Sd) UCL	37.93
779				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	46.72
780				95% Approximate Gamma UCL (Use when n >= 40)		27.82						
781				95% Adjusted Gamma UCL (Use when n < 40)		28.07						
782												
783				Potential UCL to Use							Use 95% Approximate Gamma UCL	27.82
784												
785												
786												
787												
788												
789												
790	Lead											
791												
792					General Statistics							
793					Number of Valid Observations	35					Number of Distinct Observations	34
794												
795				Raw Statistics					Log-transformed Statistics			
796					Minimum	4.2					Minimum of Log Data	1.435
797					Maximum	417					Maximum of Log Data	6.033
798					Mean	60.14					Mean of log Data	3.433
799					Geometric Mean	30.96					SD of log Data	1.128
800					Median	27.2						
801					SD	86.35						
802					Std. Error of Mean	14.6						
803					Coefficient of Variation	1.436						
804					Skewness	2.764						
805												
806					Relevant UCL Statistics							
807				Normal Distribution Test					Lognormal Distribution Test			
808					Shapiro Wilk Test Statistic	0.627					Shapiro Wilk Test Statistic	0.969
809					Shapiro Wilk Critical Value	0.934					Shapiro Wilk Critical Value	0.934
810				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
811												
812				Assuming Normal Distribution					Assuming Lognormal Distribution			
813					95% Student's-t UCL	84.82					95% H-UCL	97.03
814				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	113.2
815					95% Adjusted-CLT UCL (Chen-1995)	91.43					97.5% Chebyshev (MVUE) UCL	137.5
816					95% Modified-t UCL (Johnson-1978)	85.95					99% Chebyshev (MVUE) UCL	185.4
817												
818				Gamma Distribution Test					Data Distribution			
819					k star (bias corrected)	0.826			Data appear Lognormal at 5% Significance Level			
820					Theta Star	72.78						
821					MLE of Mean	60.14						
822					MLE of Standard Deviation	66.16						
823					nu star	57.84						
824					Approximate Chi Square Value (.05)	41.35			Nonparametric Statistics			
825					Adjusted Level of Significance	0.0425					95% CLT UCL	84.15
826					Adjusted Chi Square Value	40.69					95% Jackknife UCL	84.82

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

	A	B	C	D	E	F	G	H	I	J	K	L
827											95% Standard Bootstrap UCL	83.99
828					Anderson-Darling Test Statistic	1.338					95% Bootstrap-t UCL	101.6
829					Anderson-Darling 5% Critical Value	0.781					95% Hall's Bootstrap UCL	96.36
830					Kolmogorov-Smirnov Test Statistic	0.17					95% Percentile Bootstrap UCL	85.61
831					Kolmogorov-Smirnov 5% Critical Value	0.154					95% BCA Bootstrap UCL	94.61
832			**Data not Gamma Distributed at 5% Significance Level**								95% Chebyshev(Mean, Sd) UCL	123.8
833											97.5% Chebyshev(Mean, Sd) UCL	151.3
834			**Assuming Gamma Distribution**								99% Chebyshev(Mean, Sd) UCL	205.4
835			95% Approximate Gamma UCL (Use when n >= 40)			84.11						
836			95% Adjusted Gamma UCL (Use when n < 40)			85.47						
837												
838			**Potential UCL to Use**								Use 95% H-UCL	97.03
839												
840	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
841	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
842	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
843	**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
844												
845	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
846	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
847	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
848												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - Surface and Subsurface Sediment - Youth Pond								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Benzo(a)anthracene											
10												
11						General Statistics						
12						Number of Valid Data	26			Number of Detected Data		19
13						Number of Distinct Detected Data	17			Number of Non-Detect Data		7
14										Percent Non-Detects		26.92%
15												
16				Raw Statistics						Log-transformed Statistics		
17						Minimum Detected	25			Minimum Detected		3.219
18						Maximum Detected	2400			Maximum Detected		7.783
19						Mean of Detected	262.2			Mean of Detected		4.523
20						SD of Detected	590.2			SD of Detected		1.175
21						Minimum Non-Detect	36			Minimum Non-Detect		3.584
22						Maximum Non-Detect	150			Maximum Non-Detect		5.011
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		23
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		88.46%
27												
28						UCL Statistics						
29				Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only		
30						Shapiro Wilk Test Statistic	0.427			Shapiro Wilk Test Statistic		0.803
31						5% Shapiro Wilk Critical Value	0.901			5% Shapiro Wilk Critical Value		0.901
32				Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level		
33												
34				Assuming Normal Distribution						Assuming Lognormal Distribution		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	203.1			Mean		4.283
37						SD	510.6			SD		1.107
38						95% DL/2 (t) UCL	374.1			95% H-Stat (DL/2) UCL		240.3
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41				MLE yields a negative mean						Mean in Log Scale		4.277
42										SD in Log Scale		1.099
43										Mean in Original Scale		202.3
44										SD in Original Scale		510.8
45										95% t UCL		373.5
46										95% Percentile Bootstrap UCL		378.4
47										95% BCA Bootstrap UCL		504.8
48										95% H-UCL		235.3
49												
50				Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only		
51						k star (bias corrected)	0.533			Data do not follow a Discernable Distribution (0.05)		
52						Theta Star	491.6					
53						nu star	20.27					
54												
55						A-D Test Statistic	2.957			Nonparametric Statistics		
56						5% A-D Critical Value	0.794			Kaplan-Meier (KM) Method		
57						K-S Test Statistic	0.794			Mean		203.5
58						5% K-S Critical Value	0.209			SD		500.6
59				Data not Gamma Distributed at 5% Significance Level						SE of Mean		100.9

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% KM (t) UCL	375.8
61				Assuming Gamma Distribution							95% KM (z) UCL	369.5
62					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	374.6
63					Minimum	0.000001					95% KM (bootstrap t) UCL	2028
64					Maximum	2400					95% KM (BCA) UCL	392.5
65					Mean	192.7					95% KM (Percentile Bootstrap) UCL	382.3
66					Median	53.5					95% KM (Chebyshev) UCL	643.3
67					SD	514.2					97.5% KM (Chebyshev) UCL	833.6
68					k star	0.161					99% KM (Chebyshev) UCL	1207
69					Theta star	1198						
70					Nu star	8.362			Potential UCLs to Use			
71					AppChi2	2.947					97.5% KM (Chebyshev) UCL	833.6
72					95% Gamma Approximate UCL (Use when n >= 40)	546.8						
73					95% Adjusted Gamma UCL (Use when n < 40)	588.6						
74	Note: DL/2 is not a recommended method.											
75												
76				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
77				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
78				For additional insight, the user may want to consult a statistician.								
79												
80												
81	Benzo(a)pyrene											
82												
83					General Statistics							
84					Number of Valid Data	26					Number of Detected Data	17
85					Number of Distinct Detected Data	17					Number of Non-Detect Data	9
86											Percent Non-Detects	34.62%
87												
88				Raw Statistics					Log-transformed Statistics			
89					Minimum Detected	19					Minimum Detected	2.944
90					Maximum Detected	2700					Maximum Detected	7.901
91					Mean of Detected	302					Mean of Detected	4.477
92					SD of Detected	698					SD of Detected	1.301
93					Minimum Non-Detect	36					Minimum Non-Detect	3.584
94					Maximum Non-Detect	150					Maximum Non-Detect	5.011
95												
96	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	23
97	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
98	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	88.46%
99												
100					UCL Statistics							
101				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
102					Shapiro Wilk Test Statistic	0.44					Shapiro Wilk Test Statistic	0.805
103					5% Shapiro Wilk Critical Value	0.892					5% Shapiro Wilk Critical Value	0.892
104				Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level			
105												
106				Assuming Normal Distribution					Assuming Lognormal Distribution			
107					DL/2 Substitution Method						DL/2 Substitution Method	
108					Mean	211.6					Mean	4.177
109					SD	572.7					SD	1.155
110					95% DL/2 (t) UCL	403.5					95% H-Stat (DL/2) UCL	237.5
111												
112					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
113				MLE yields a negative mean							Mean in Log Scale	4.143
114											SD in Log Scale	1.162
115											Mean in Original Scale	209.8
116											SD in Original Scale	573.2
117											95% t UCL	401.8
118											95% Percentile Bootstrap UCL	411.1

	A	B	C	D	E	F	G	H	I	J	K	L
119											95% BCA Bootstrap UCL	516.5
120											95% H-UCL	232.9
121												
122				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
123					k star (bias corrected)	0.462			Data do not follow a Discernable Distribution (0.05)			
124					Theta Star	654.1						
125					nu star	15.7						
126												
127					A-D Test Statistic	2.734			Nonparametric Statistics			
128					5% A-D Critical Value	0.797					Kaplan-Meier (KM) Method	
129					K-S Test Statistic	0.797					Mean	211.2
130					5% K-S Critical Value	0.221					SD	561.7
131				Data not Gamma Distributed at 5% Significance Level							SE of Mean	113.6
132											95% KM (t) UCL	405.2
133				Assuming Gamma Distribution							95% KM (z) UCL	398
134					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	403.2
135					Minimum	0.000001					95% KM (bootstrap t) UCL	2552
136					Maximum	2700					95% KM (BCA) UCL	413.4
137					Mean	197.5					95% KM (Percentile Bootstrap) UCL	415.6
138					Median	43.5					95% KM (Chebyshev) UCL	706.3
139					SD	577.3					97.5% KM (Chebyshev) UCL	920.5
140					k star	0.125					99% KM (Chebyshev) UCL	1341
141					Theta star	1582						
142					Nu star	6.489			Potential UCLs to Use			
143					AppChi2	1.895					97.5% KM (Chebyshev) UCL	920.5
144					95% Gamma Approximate UCL (Use when n >= 40)	676.3						
145					95% Adjusted Gamma UCL (Use when n < 40)	738.3						
146	Note: DL/2 is not a recommended method.											
147												
148				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
149				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
150				For additional insight, the user may want to consult a statistician.								
151												
152												
153	Benzo(b)fluoranthene											
154												
155					General Statistics							
156					Number of Valid Data	26					Number of Detected Data	17
157					Number of Distinct Detected Data	17					Number of Non-Detect Data	9
158											Percent Non-Detects	34.62%
159												
160				Raw Statistics					Log-transformed Statistics			
161					Minimum Detected	32					Minimum Detected	3.466
162					Maximum Detected	3700					Maximum Detected	8.216
163					Mean of Detected	443.5					Mean of Detected	5.077
164					SD of Detected	934.7					SD of Detected	1.229
165					Minimum Non-Detect	36					Minimum Non-Detect	3.584
166					Maximum Non-Detect	150					Maximum Non-Detect	5.011
167												
168	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	19
169	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	7
170	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	73.08%
171												
172					UCL Statistics							
173				Normal Distribution Test with Detected Values Only					Lognormal Distribution Test with Detected Values Only			
174					Shapiro Wilk Test Statistic	0.466					Shapiro Wilk Test Statistic	0.874
175					5% Shapiro Wilk Critical Value	0.892					5% Shapiro Wilk Critical Value	0.892
176				Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level			
177												

	A	B	C	D	E	F	G	H	I	J	K	L
178				Assuming Normal Distribution					Assuming Lognormal Distribution			
179					DL/2 Substitution Method						DL/2 Substitution Method	
180					Mean	304.1					Mean	4.569
181					SD	772.9					SD	1.244
182					95% DL/2 (t) UCL	563					95% H-Stat (DL/2) UCL	423.4
183												
184					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
185				MLE yields a negative mean							Mean in Log Scale	4.484
186											SD in Log Scale	1.31
187											Mean in Original Scale	300.8
188											SD in Original Scale	774.1
189											95% t UCL	560.1
190											95% Percentile Bootstrap UCL	581.5
191											95% BCA Bootstrap UCL	776.4
192											95% H-UCL	451
193												
194				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
195					k star (bias corrected)	0.538			Data do not follow a Discernable Distribution (0.05)			
196					Theta Star	823.6						
197					nu star	18.31						
198												
199					A-D Test Statistic	2.071			Nonparametric Statistics			
200					5% A-D Critical Value	0.789					Kaplan-Meier (KM) Method	
201					K-S Test Statistic	0.789					Mean	305.9
202					5% K-S Critical Value	0.219					SD	757.4
203				Data not Gamma Distributed at 5% Significance Level							SE of Mean	153.1
204											95% KM (t) UCL	567.4
205				Assuming Gamma Distribution							95% KM (z) UCL	557.7
206					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	562.6
207					Minimum	0.000001					95% KM (bootstrap t) UCL	2453
208					Maximum	3700					95% KM (BCA) UCL	578.3
209					Mean	290					95% KM (Percentile Bootstrap) UCL	582.4
210					Median	76.5					95% KM (Chebyshev) UCL	973.3
211					SD	778.1					97.5% KM (Chebyshev) UCL	1262
212					k star	0.125					99% KM (Chebyshev) UCL	1829
213					Theta star	2322						
214					Nu star	6.494			Potential UCLs to Use			
215					AppChi2	1.897					97.5% KM (Chebyshev) UCL	1262
216					95% Gamma Approximate UCL (Use when n >= 40)	992.5						
217					95% Adjusted Gamma UCL (Use when n < 40)	1083						
218	Note: DL/2 is not a recommended method.											
219												
220				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
221				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
222				For additional insight, the user may want to consult a statistician.								
223												
224												
225	Dibenz(a,h)anthracene											
226												
227					General Statistics							
228					Number of Valid Data	26					Number of Detected Data	2
229					Number of Distinct Detected Data	2					Number of Non-Detect Data	24
230											Percent Non-Detects	92.31%
231												
232				Raw Statistics					Log-transformed Statistics			
233					Minimum Detected	170					Minimum Detected	5.136
234					Maximum Detected	400					Maximum Detected	5.991
235					Mean of Detected	285					Mean of Detected	5.564
236					SD of Detected	162.6					SD of Detected	0.605

	A	B	C	D	E	F	G	H	I	J	K	L
237					Minimum Non-Detect	32					Minimum Non-Detect	3.466
238					Maximum Non-Detect	150					Maximum Non-Detect	5.011
239												
240	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	24
241	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	2
242	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	92.31%
243												
244	**Warning: Data set has only 2 Distinct Detected Values.**											
245	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
246	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
247												
248	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
249												
250	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
251	**Those methods will return a 'N/A' value on your output display!**											
252												
253	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
254	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
255	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
256												
257												
258	**UCL Statistics**											
259	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
260					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
261					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
262	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
263												
264	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
265					DL/2 Substitution Method						DL/2 Substitution Method	
266					Mean	55.46					Mean	3.667
267					SD	76.39					SD	0.703
268					95% DL/2 (t) UCL	81.05					95% H-Stat (DL/2) UCL	67.78
269												
270					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
271	**MLE method failed to converge properly**										Mean in Log Scale	N/A
272											SD in Log Scale	N/A
273											Mean in Original Scale	N/A
274											SD in Original Scale	N/A
275											95% t UCL	N/A
276											95% Percentile Bootstrap UCL	N/A
277											95% BCA Bootstrap UCL	N/A
278											95% H-UCL	N/A
279												
280	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
281					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
282					Theta Star	N/A						
283					nu star	N/A						
284												
285					A-D Test Statistic	N/A	**Nonparametric Statistics**					
286					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
287					K-S Test Statistic	N/A					Mean	178.8
288					5% K-S Critical Value	N/A					SD	44.23
289	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	12.27
290											95% KM (t) UCL	199.8
291	**Assuming Gamma Distribution**										95% KM (z) UCL	199
292					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	330.1
293					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
294					Maximum	N/A					95% KM (BCA) UCL	400
295					Mean	N/A					95% KM (Percentile Bootstrap) UCL	400

	A	B	C	D	E	F	G	H	I	J	K	L
296					Median	N/A				95% KM (Chebyshev) UCL		232.3
297					SD	N/A				97.5% KM (Chebyshev) UCL		255.5
298					k star	N/A				99% KM (Chebyshev) UCL		300.9
299					Theta star	N/A						
300					Nu star	N/A			**Potential UCLs to Use**			
301					AppChi2	N/A				95% KM (t) UCL		199.8
302				95% Gamma Approximate UCL (Use when n >= 40)		N/A				95% KM (% Bootstrap) UCL		400
303				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
304	**Note: DL/2 is not a recommended method.**											
305												
306	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
307	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
308	**For additional insight, the user may want to consult a statistician.**											
309												
310												
311	**Indeno(1,2,3-cd)pyrene**											
312												
313					**General Statistics**							
314					Number of Valid Data	26				Number of Detected Data		7
315					Number of Distinct Detected Data	7				Number of Non-Detect Data		19
316										Percent Non-Detects		73.08%
317												
318					**Raw Statistics**				**Log-transformed Statistics**			
319					Minimum Detected	27				Minimum Detected		3.296
320					Maximum Detected	1500				Maximum Detected		7.313
321					Mean of Detected	350.7				Mean of Detected		4.819
322					SD of Detected	554.5				SD of Detected		1.5
323					Minimum Non-Detect	33				Minimum Non-Detect		3.497
324					Maximum Non-Detect	150				Maximum Non-Detect		5.011
325												
326	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		24
327	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
328	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.31%
329												
330	**Warning: There are only 7 Detected Values in this data**											
331	**Note: It should be noted that even though bootstrap may be performed on this data set**											
332	**the resulting calculations may not be reliable enough to draw conclusions**											
333												
334	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
335												
336												
337					**UCL Statistics**							
338					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
339					Shapiro Wilk Test Statistic	0.669				Shapiro Wilk Test Statistic		0.865
340					5% Shapiro Wilk Critical Value	0.803				5% Shapiro Wilk Critical Value		0.803
341					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
342												
343					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
344					DL/2 Substitution Method					DL/2 Substitution Method		
345					Mean	121.5				Mean		3.873
346					SD	306.8				SD		1.01
347					95% DL/2 (t) UCL	224.3				95% H-Stat (DL/2) UCL		133.2
348												
349					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
350					**MLE method failed to converge properly**					Mean in Log Scale		3.447
351										SD in Log Scale		1.162
352										Mean in Original Scale		109
353										SD in Original Scale		310.2
354										95% t UCL		212.9

	A	B	C	D	E	F	G	H	I	J	K	L
355											95% Percentile Bootstrap UCL	219.2
356											95% BCA Bootstrap UCL	310.3
357											95% H-UCL	116.1
358												
359				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
360					k star (bias corrected)	0.435			Data appear Lognormal at 5% Significance Level			
361					Theta Star	806.6						
362					nu star	6.087						
363												
364					A-D Test Statistic	0.774			Nonparametric Statistics			
365					5% A-D Critical Value	0.746					Kaplan-Meier (KM) Method	
366					K-S Test Statistic	0.746					Mean	118.6
367					5% K-S Critical Value	0.326					SD	301.5
368				Data not Gamma Distributed at 5% Significance Level							SE of Mean	63.96
369											95% KM (t) UCL	227.9
370				Assuming Gamma Distribution							95% KM (z) UCL	223.8
371					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	216.9
372					Minimum	0.000001					95% KM (bootstrap t) UCL	1165
373					Maximum	1500					95% KM (BCA) UCL	264.1
374					Mean	94.42					95% KM (Percentile Bootstrap) UCL	237.2
375					Median	0.000001					95% KM (Chebyshev) UCL	397.4
376					SD	314.6					97.5% KM (Chebyshev) UCL	518
377					k star	0.0823					99% KM (Chebyshev) UCL	755
378					Theta star	1148						
379					Nu star	4.279			Potential UCLs to Use			
380					AppChi2	0.835					95% KM (BCA) UCL	264.1
381					95% Gamma Approximate UCL (Use when n >= 40)	484						
382					95% Adjusted Gamma UCL (Use when n < 40)	544.2						
383	Note: DL/2 is not a recommended method.											
384												
385				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
386				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
387				For additional insight, the user may want to consult a statistician.								
388												
389												
390	Arsenic											
391												
392					General Statistics							
393					Number of Valid Observations	26					Number of Distinct Observations	25
394												
395				Raw Statistics					Log-transformed Statistics			
396					Minimum	0.975					Minimum of Log Data	-0.0253
397					Maximum	265					Maximum of Log Data	5.58
398					Mean	35.59					Mean of log Data	2.513
399					Geometric Mean	12.34					SD of log Data	1.384
400					Median	12.05						
401					SD	65.01						
402					Std. Error of Mean	12.75						
403					Coefficient of Variation	1.827						
404					Skewness	2.604						
405												
406					Relevant UCL Statistics							
407				Normal Distribution Test					Lognormal Distribution Test			
408					Shapiro Wilk Test Statistic	0.552					Shapiro Wilk Test Statistic	0.929
409					Shapiro Wilk Critical Value	0.92					Shapiro Wilk Critical Value	0.92
410				Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level			
411												
412				Assuming Normal Distribution					Assuming Lognormal Distribution			
413					95% Student's-t UCL	57.37					95% H-UCL	74.6

	A	B	C	D	E	F	G	H	I	J	K	L
414					95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL	73.49
415					95% Adjusted-CLT UCL (Chen-1995)	63.52					97.5% Chebyshev (MVUE) UCL	92.27
416					95% Modified-t UCL (Johnson-1978)	58.45					99% Chebyshev (MVUE) UCL	129.2
417												
418					Gamma Distribution Test					Data Distribution		
419					k star (bias corrected)	0.543				Data appear Lognormal at 5% Significance Level		
420					Theta Star	65.49						
421					MLE of Mean	35.59						
422					MLE of Standard Deviation	48.28						
423					nu star	28.26						
424					Approximate Chi Square Value (.05)	17.13				Nonparametric Statistics		
425					Adjusted Level of Significance	0.0398					95% CLT UCL	56.56
426					Adjusted Chi Square Value	16.56					95% Jackknife UCL	57.37
427											95% Standard Bootstrap UCL	56.11
428					Anderson-Darling Test Statistic	2.193					95% Bootstrap-t UCL	78.34
429					Anderson-Darling 5% Critical Value	0.8					95% Hall's Bootstrap UCL	62.71
430					Kolmogorov-Smirnov Test Statistic	0.309					95% Percentile Bootstrap UCL	56.87
431					Kolmogorov-Smirnov 5% Critical Value	0.18					95% BCA Bootstrap UCL	65.77
432					Data not Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL	91.16
433											97.5% Chebyshev(Mean, Sd) UCL	115.2
434					Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL	162.4
435					95% Approximate Gamma UCL (Use when n >= 40)	58.71						
436					95% Adjusted Gamma UCL (Use when n < 40)	60.74						
437												
438					Potential UCL to Use						Use 95% H-UCL	74.6
439												
440					ProUCL computes and outputs H-statistic based UCLs for historical reasons only.							
441					H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.							
442					It is therefore recommended to avoid the use of H-statistic based 95% UCLs.							
443					Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.							
444												
445					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
446					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
447					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
448												
449												
450	Chromium											
451												
452					General Statistics							
453					Number of Valid Observations	26					Number of Distinct Observations	25
454												
455					Raw Statistics					Log-transformed Statistics		
456					Minimum	3.14					Minimum of Log Data	1.144
457					Maximum	35					Maximum of Log Data	3.555
458					Mean	17.25					Mean of log Data	2.687
459					Geometric Mean	14.69					SD of log Data	0.617
460					Median	17.95						
461					SD	9.027						
462					Std. Error of Mean	1.77						
463					Coefficient of Variation	0.523						
464					Skewness	0.258						
465												
466					Relevant UCL Statistics							
467					Normal Distribution Test					Lognormal Distribution Test		
468					Shapiro Wilk Test Statistic	0.909					Shapiro Wilk Test Statistic	0.907
469					Shapiro Wilk Critical Value	0.92					Shapiro Wilk Critical Value	0.92
470					Data not Normal at 5% Significance Level					Data not Lognormal at 5% Significance Level		
471												
472					Assuming Normal Distribution					Assuming Lognormal Distribution		

	A	B	C	D	E	F	G	H	I	J	K	L
473					95% Student's-t UCL	20.28					95% H-UCL	22.95
474				95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL	27.48
475					95% Adjusted-CLT UCL (Chen-1995)	20.26					97.5% Chebyshev (MVUE) UCL	31.75
476					95% Modified-t UCL (Johnson-1978)	20.29					99% Chebyshev (MVUE) UCL	40.14
477												
478				Gamma Distribution Test						Data Distribution		
479					k star (bias corrected)	2.917				Data do not follow a Discernable Distribution (0.05)		
480					Theta Star	5.916						
481					MLE of Mean	17.25						
482					MLE of Standard Deviation	10.1						
483					nu star	151.7						
484					Approximate Chi Square Value (.05)	124.2				Nonparametric Statistics		
485					Adjusted Level of Significance	0.0398					95% CLT UCL	20.17
486					Adjusted Chi Square Value	122.6					95% Jackknife UCL	20.28
487											95% Standard Bootstrap UCL	20.14
488					Anderson-Darling Test Statistic	1.01					95% Bootstrap-t UCL	20.58
489					Anderson-Darling 5% Critical Value	0.75					95% Hall's Bootstrap UCL	20.09
490					Kolmogorov-Smirnov Test Statistic	0.217					95% Percentile Bootstrap UCL	20.12
491					Kolmogorov-Smirnov 5% Critical Value	0.172					95% BCA Bootstrap UCL	20.37
492				Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL	24.97
493											97.5% Chebyshev(Mean, Sd) UCL	28.31
494				Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL	34.87
495					95% Approximate Gamma UCL (Use when n >= 40)	21.07						
496					95% Adjusted Gamma UCL (Use when n < 40)	21.35						
497												
498				Potential UCL to Use							Use 95% Chebyshev (Mean, Sd) UCL	24.97
499												
500				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
501				These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)								
502				and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.								
503												
504												
505	Thallium											
506												
507				General Statistics								
508					Number of Valid Data	26					Number of Detected Data	5
509					Number of Distinct Detected Data	5					Number of Non-Detect Data	21
510											Percent Non-Detects	80.77%
511												
512				Raw Statistics						Log-transformed Statistics		
513					Minimum Detected	0.529					Minimum Detected	-0.637
514					Maximum Detected	1.86					Maximum Detected	0.621
515					Mean of Detected	1.098					Mean of Detected	0.0109
516					SD of Detected	0.494					SD of Detected	0.461
517					Minimum Non-Detect	1.49					Minimum Non-Detect	0.399
518					Maximum Non-Detect	10.1					Maximum Non-Detect	2.313
519												
520	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	26
521	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
522	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
523												
524				Warning: There are only 5 Detected Values in this data								
525				Note: It should be noted that even though bootstrap may be performed on this data set								
526				the resulting calculations may not be reliable enough to draw conclusions								
527												
528				It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.								
529												
530												
531				UCL Statistics								

	A	B	C	D	E	F	G	H	I	J	K	L
532	Normal Distribution Test with Detected Values Only						Lognormal Distribution Test with Detected Values Only					
533					Shapiro Wilk Test Statistic	0.949					Shapiro Wilk Test Statistic	0.98
534					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
535	Data appear Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level					
536												
537	Assuming Normal Distribution						Assuming Lognormal Distribution					
538					DL/2 Substitution Method						DL/2 Substitution Method	
539					Mean	1.855					Mean	0.481
540					SD	1.046					SD	0.533
541					95% DL/2 (t) UCL	2.206					95% H-Stat (DL/2) UCL	2.305
542												
543					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
544	MLE method failed to converge properly										Mean in Log Scale	-0.046
545											SD in Log Scale	0.197
546											Mean in Original Scale	0.974
547											SD in Original Scale	0.216
548											95% t UCL	1.046
549											95% Percentile Bootstrap UCL	1.045
550											95% BCA Bootstrap UCL	1.069
551											95% H-UCL	1.044
552												
553	Gamma Distribution Test with Detected Values Only						Data Distribution Test with Detected Values Only					
554					k star (bias corrected)	2.619	Data appear Normal at 5% Significance Level					
555					Theta Star	0.419						
556					nu star	26.19						
557												
558					A-D Test Statistic	0.219	Nonparametric Statistics					
559					5% A-D Critical Value	0.68					Kaplan-Meier (KM) Method	
560					K-S Test Statistic	0.68					Mean	1.044
561					5% K-S Critical Value	0.358					SD	0.405
562	Data appear Gamma Distributed at 5% Significance Level										SE of Mean	0.185
563											95% KM (t) UCL	1.359
564	Assuming Gamma Distribution										95% KM (z) UCL	1.347
565					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.382
566					Minimum	0.529					95% KM (bootstrap t) UCL	1.437
567					Maximum	1.86					95% KM (BCA) UCL	1.351
568					Mean	1.099					95% KM (Percentile Bootstrap) UCL	1.36
569					Median	1.113					95% KM (Chebyshev) UCL	1.849
570					SD	0.213					97.5% KM (Chebyshev) UCL	2.197
571					k star	23.94					99% KM (Chebyshev) UCL	2.881
572					Theta star	0.0459						
573					Nu star	1245	Potential UCLs to Use					
574					AppChi2	1164					95% KM (t) UCL	1.359
575					95% Gamma Approximate UCL (Use when n >= 40)	1.176					95% KM (Percentile Bootstrap) UCL	1.36
576					95% Adjusted Gamma UCL (Use when n < 40)	1.181						
577	Note: DL/2 is not a recommended method.											
578												
579	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
580	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
581	For additional insight, the user may want to consult a statistician.											
582												

	A	B	C	D	E	F	G	H	I	J	K	L
1				Lognormal UCL Statistics for Full Data Sets - Surface and Subsurface Sediment - Youth Pond								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Arsenic											
10												
11			Number of Valid Observations			26						
12			Number of Distinct Observations			25						
13			Minimum of log data			-0.0253						
14			Maximum of log data			5.58						
15			Mean of log data			2.513						
16			SD of log data			1.384						
17			Variance of log data			1.915						
18			Coefficient of Variation of raw data			1.827						
19			Skewness of raw data			2.604						
20												
21			Shapiro Wilk Test Statistic			0.929						
22			Shapiro Wilk 5% Critical Value			0.92						
23			Data appear Lognormal at 5% Significance Level									
24												
25			95% UCL (Assuming Normal Distribution)									
26			95% Student's-t UCL			57.37						
27												
28			ML Estimates Assuming Lognormal Distribution									
29			Mean			32.15						
30			SD			77.34						
31			Coefficient of Variation			2.406						
32			Skewness			21.15						
33			Median			12.34						
34			80% Quantile			39.55						
35			90% Quantile			72.7						
36			95% Quantile			120.2						
37			99% Quantile			308.6						
38												
39			MVU Estimate of Median			11.89						
40			MVU Estimate of Mean			30.1						
41			MVU Estimate of SD			57.61						
42			MVU Estimate of Standard Error of Mean			9.956						
43												
44			Non-Parametric UCLs									
45			95% Adjusted-CLT UCL (Adjusted for Skewness, Chen-1995)			63.52						
46			95% Modified-t UCL (Adjusted for Skewness, Johnson-1978))			58.45						
47			95% Hall's Bootstrap UCL			63.72						
48			95% Bootstrap t UCL			75.17						
49			95% BCA Bootstrap UCL			65.02						
50			95% Chebyshev (Mean, Sd) UCL			91.16						
51			97.5% Chebyshev (Mean, Sd) UCL			115.2						
52			99% Chebyshev (Mean, Sd) UCL			162.4						
53												
54			UCLs (Assuming Lognormal Distribution)									
55			95% H-UCL			74.6						
56			95% Chebyshev (MVUE) UCL			73.49						
57			97.5% Chebyshev (MVUE) UCL			92.27						
58			99% Chebyshev (MVUE) UCL			129.2						
59												

	A	B	C	D	E	F	G	H	I	J	K	L
60	Potential UCL to Use											
61					Use 95% H-UCL	74.6						
62												
63	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
64	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
65	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
66	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
67												
68	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
69	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
70	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
71												

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Data Sets with Non-Detects - DG11								
2			User Selected Options									
3			From File	ProUCL.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	Benzo(a)pyrene											
10												
11						General Statistics						
12						Number of Valid Data	8			Number of Detected Data		2
13						Number of Distinct Detected Data	2			Number of Non-Detect Data		6
14										Percent Non-Detects		75.00%
15												
16						Raw Statistics				Log-transformed Statistics		
17						Minimum Detected	0.073			Minimum Detected		-2.617
18						Maximum Detected	0.24			Maximum Detected		-1.427
19						Mean of Detected	0.157			Mean of Detected		-2.022
20						SD of Detected	0.118			SD of Detected		0.842
21						Minimum Non-Detect	0.19			Minimum Non-Detect		-1.661
22						Maximum Non-Detect	0.2			Maximum Non-Detect		-1.609
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		7
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		87.50%
27												
28						Warning: Data set has only 2 Distinct Detected Values.						
29						This may not be adequate enough to compute meaningful and reliable test statistics and estimates.						
30						The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).						
31												
32						Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.						
33												
34						The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.						
35						Those methods will return a 'N/A' value on your output display!						
36												
37						It is necessary to have 4 or more Distinct Values for bootstrap methods.						
38						However, results obtained using 4 to 9 distinct values may not be reliable.						
39						It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.						
40												
41												
42						UCL Statistics						
43						Normal Distribution Test with Detected Values Only				Lognormal Distribution Test with Detected Values Only		
44						Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic		N/A
45						5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value		N/A
46						Data not Normal at 5% Significance Level				Data not Lognormal at 5% Significance Level		
47												
48						Assuming Normal Distribution				Assuming Lognormal Distribution		
49						DL/2 Substitution Method				DL/2 Substitution Method		
50						Mean	0.111			Mean		-2.265
51						SD	0.0528			SD		0.352
52						95% DL/2 (t) UCL	0.146			95% H-Stat (DL/2) UCL		0.147
53												
54						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
55						MLE method failed to converge properly				Mean in Log Scale		N/A
56										SD in Log Scale		N/A
57										Mean in Original Scale		N/A
58										SD in Original Scale		N/A
59										95% t UCL		N/A

	A	B	C	D	E	F	G	H	I	J	K	L
60											95% Percentile Bootstrap UCL	N/A
61											95% BCA Bootstrap UCL	N/A
62											95% H-UCL	N/A
63												
64				Gamma Distribution Test with Detected Values Only					Data Distribution Test with Detected Values Only			
65					k star (bias corrected)	N/A			Data do not follow a Discernable Distribution (0.05)			
66					Theta Star	N/A						
67					nu star	N/A						
68												
69					A-D Test Statistic	N/A			Nonparametric Statistics			
70					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
71					K-S Test Statistic	N/A					Mean	0.0939
72					5% K-S Critical Value	N/A					SD	0.0552
73				Data not Gamma Distributed at 5% Significance Level							SE of Mean	0.0276
74											95% KM (t) UCL	0.146
75				Assuming Gamma Distribution							95% KM (z) UCL	0.139
76					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.215
77					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
78					Maximum	N/A					95% KM (BCA) UCL	0.24
79					Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A
80					Median	N/A					95% KM (Chebyshev) UCL	0.214
81					SD	N/A					97.5% KM (Chebyshev) UCL	0.266
82					k star	N/A					99% KM (Chebyshev) UCL	0.369
83					Theta star	N/A						
84					Nu star	N/A			Potential UCLs to Use			
85					AppChi2	N/A					95% KM (t) UCL	0.146
86					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (% Bootstrap) UCL	N/A
87					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
88	Note: DL/2 is not a recommended method.											
89												
90				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
91				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
92				For additional insight, the user may want to consult a statistician.								
93												
94												
95	Arsenic											
96												
97						General Statistics						
98					Number of Valid Data	8					Number of Detected Data	1
99					Number of Distinct Detected Data	1					Number of Non-Detect Data	7
100											Percent Non-Detects	87.50%
101												
102				Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!								
103				It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).								
104												
105				The data set for variable Arsenic was not processed!								
106												
107												
108												
109	Iron											
110												
111						General Statistics						
112					Number of Valid Observations	8					Number of Distinct Observations	8
113												
114				Raw Statistics					Log-transformed Statistics			
115					Minimum	1070					Minimum of Log Data	6.975
116					Maximum	19000					Maximum of Log Data	9.852
117					Mean	3874					Mean of log Data	7.715
118					Geometric Mean	2242					SD of log Data	0.905

	A	B	C	D	E	F	G	H	I	J	K	L
119					Median	1760						
120					SD	6129						
121					Std. Error of Mean	2167						
122					Coefficient of Variation	1.582						
123					Skewness	2.797						
124												
125												
126					Warning: There are only 8 Values in this data							
127					Note: It should be noted that even though bootstrap methods may be performed on this data set,							
128					the resulting calculations may not be reliable enough to draw conclusions							
129												
130					The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.							
131												
132					Relevant UCL Statistics							
133					Normal Distribution Test				Lognormal Distribution Test			
134					Shapiro Wilk Test Statistic	0.49			Shapiro Wilk Test Statistic			0.709
135					Shapiro Wilk Critical Value	0.818			Shapiro Wilk Critical Value			0.818
136					Data not Normal at 5% Significance Level				Data not Lognormal at 5% Significance Level			
137												
138					Assuming Normal Distribution				Assuming Lognormal Distribution			
139					95% Student's-t UCL	7979			95% H-UCL			10076
140					95% UCLs (Adjusted for Skewness)				95% Chebyshev (MVUE) UCL			7673
141					95% Adjusted-CLT UCL (Chen-1995)	9728			97.5% Chebyshev (MVUE) UCL			9623
142					95% Modified-t UCL (Johnson-1978)	8336			99% Chebyshev (MVUE) UCL			13453
143												
144					Gamma Distribution Test				Data Distribution			
145					k star (bias corrected)	0.739			Data do not follow a Discernable Distribution (0.05)			
146					Theta Star	5240						
147					MLE of Mean	3874						
148					MLE of Standard Deviation	4505						
149					nu star	11.83						
150					Approximate Chi Square Value (.05)	5.114			Nonparametric Statistics			
151					Adjusted Level of Significance	0.0195			95% CLT UCL			7438
152					Adjusted Chi Square Value	4.055			95% Jackknife UCL			7979
153									95% Standard Bootstrap UCL			7188
154					Anderson-Darling Test Statistic	1.518			95% Bootstrap-t UCL			42048
155					Anderson-Darling 5% Critical Value	0.735			95% Hall's Bootstrap UCL			29727
156					Kolmogorov-Smirnov Test Statistic	0.419			95% Percentile Bootstrap UCL			8108
157					Kolmogorov-Smirnov 5% Critical Value	0.301			95% BCA Bootstrap UCL			10323
158					Data not Gamma Distributed at 5% Significance Level				95% Chebyshev(Mean, Sd) UCL			13319
159									97.5% Chebyshev(Mean, Sd) UCL			17406
160					Assuming Gamma Distribution				99% Chebyshev(Mean, Sd) UCL			25434
161					95% Approximate Gamma UCL (Use when n >= 40)	8959						
162					95% Adjusted Gamma UCL (Use when n < 40)	11299						
163												
164					Potential UCL to Use				Use 95% Chebyshev (Mean, Sd) UCL			13319
165												
166					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
167					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
168					and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.							
169												

Appendix L
Baseline Ecological Risk Assessment

APPENDIX L

Baseline Ecological Risk Assessment

This appendix contains an evaluation of potential risks to ecological receptors inhabiting Site 4 and Youth Pond. This ecological risk assessment (ERA) considers data collected as part of previous evaluations of Site 4 and data collected specifically for this ERA. This report constitutes a baseline ERA (BERA) and is completed through Step 7 of the 8-step ERA process (USEPA, 1997a). The results of this BERA will be used to determine the scope of any Step 8 (risk management) activities that may be required for site media to address any unacceptable risks to ecological receptors. Step 8 activities, if needed, will be conducted as part of a future evaluation.

The most recent previous ecological risk evaluation of Site 4 was conducted as part of the Site Inspection (SI) report (CH2M HILL, 2011a) and consisted of an ecological risk screening, constituting a Screening ERA (SERA) and an abbreviated version of BERA Step 3A (see **Section L.1**). This screening involved a comparison of surface water, sediment, and surface soil data collected in 1999 and 2009 with medium-specific screening values, as well as food web evaluations. The results of the SI ecological risk screening were used to develop the sampling and analysis plan (SAP) for this Remedial Investigation (RI) (CH2M HILL, 2012a; 2012b). The data evaluated as part of the 2011 SI are also included in this BERA, in addition to analytical, toxicological, and biological data collected in 2012 to support this RI and BERA.

A formal ecological risk evaluation has not been conducted at Youth Pond. However, in 2001, two surface water and two sediment samples collected during the 2000 Pond Study (CH2M HILL and Baker, 2001) were compared to ecological screening values. The results of the Pond Study, plus the hydrological connection between Site 4 water bodies and Youth Pond, resulted in the inclusion of Youth Pond in this RI and BERA.

L.1 Ecological Risk Assessment Process

This BERA was conducted in accordance with the *Navy Policy for Conducting Ecological Risk Assessments* (CNO, 1999) and the Navy guidance for implementing this ERA policy (NAVFAC, 2003; 2012). The Navy ERA policy and guidance, which describe a process consisting of eight steps organized into three tiers, are conceptually similar to the 8-step ERA process outlined in USEPA ERA guidance for the Superfund program (USEPA, 1997a). For both sets of guidance, Steps 1 and 2 involve conducting a SERA using very conservative assumptions. The BERA represents Steps 3 through 7. The BERA uses less conservative (but more realistic) assumptions and site-specific data to refine the risk estimates from the SERA for components that fail the initial screening. Step 8 addresses risk management issues. The major differences between the Navy ERA policy/guidance and the USEPA ERA guidance are:

- Navy policy/guidance provides clearly defined criteria for exiting the ERA process at specific points
- Navy policy/guidance divides Step 3 (the first step of the BERA) into two distinct sub-steps (Steps 3A and 3B), with a potential exit point after Step 3A
- Navy policy/guidance incorporates risk management considerations throughout all tiers of the ERA process

ERAs are conducted using a tiered, step-wise approach and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where agreement on conclusions, actions, or methodologies is needed so that the ERA process can continue (or terminate) in a technically defensible manner. The results of the ERA at a particular SMDP are used to determine how the ERA process should proceed, for example, to the next step in the process or directly to a later step. The process continues until a final decision has been reached (for example, remedial action if unacceptable risks are identified, or no further action if risks are acceptable). The process can also be iterative if data needs are identified at any step; the needed data are collected and the process starts again at the point appropriate to the type of data collected.

The screening (preliminary) problem formulation is the first step of an ERA and establishes the goals, scope, and focus of the SERA. Step 1 of the ERA process is intended to answer two main questions:

- Do complete exposure pathways exist?
- Are sufficient data available to conduct the SERA?

If no complete exposure pathways exist, the ERA process terminates at Step 1 with a conclusion of negligible (acceptable) risk because exposure, and thus potential risk, can only occur if complete exposure pathways exist. If one or more complete exposure pathways are known to exist, or are likely to exist, the ERA process continues to Step 2 but only evaluates those exposure pathways that have been determined to be "critical" (ecologically important), that is, represent exposures to sensitive receptors that are associated with the predominant fate and transport mechanisms at the site (USEPA, 1997a). An evaluation of the available data is then conducted to determine if they are adequate to support the SERA. If not, additional data are collected before the ERA process continues. The second step of the ERA process involves conducting a screening exposure assessment, a screening effects assessment, and a screening risk calculation (risk characterization).

The results of the SERA are used to evaluate the potential for unacceptable ecological risks based on very conservative assumptions. If the results of the SERA suggest that further ecological risk evaluation is warranted, the ERA process proceeds to the BERA (Steps 3 through 7), which is a more detailed phase of the ERA process, for the exposure pathways, chemicals, receptors, and areas identified in the SERA. As previously indicated, the first step of the BERA (Step 3) is divided into two distinct sub-steps (3A and 3B) in Navy ERA guidance.

Step 3 of the USEPA ERA guidance consists of the following activities (USEPA, 1997a):

1. Refinement of the chemicals of potential concern (COPCs) from the SERA
2. Further characterizing the potential ecological effects of contaminants
3. Refining information on contaminant fate and transport, complete exposure pathways, and receptors potentially at risk
4. Selecting assessment endpoints
5. Refining the conceptual site model and risk hypotheses from the SERA

Step 3A of the Navy policy/guidance (refinement of conservative exposure assumptions) corresponds to the first activity, previously listed, for the USEPA ERA guidance. In Step 3A, a refined evaluation of exposure estimates is conducted using less conservative (but more realistic) assumptions and additional methods relative to those used in the SERA, which is intended to be a very conservative assessment (NAVFAC, 2003). Examples of less conservative (but more realistic) exposure assumptions include using central tendency (such as means or medians) estimates (rather than maximums) for media concentrations, bioaccumulation factors (BAFs), and/or exposure parameters. Examples of additional methods include the consideration of background concentrations, bioavailability, and detection frequency (CNO, 1999; NAVFAC, 2003; 2012).

If risk estimates (and their associated uncertainty) are acceptable following Step 3A, the site will meet the conditions of the exit criterion specified in the Navy policy/guidance. If the Step 3A evaluation does not support a determination of acceptable risk within acceptable uncertainty, the site continues to Step 3B.

Step 3B of the Navy policy/guidance (problem formulation) corresponds conceptually to the last four activities, previously listed, for Step 3 of the USEPA ERA guidance. In Step 3B, the preliminary conceptual site model (CSM) from the SERA is refined based on the results of the Step 3A evaluation to develop a revised list of key receptors, critical exposure pathways, key COPCs, assessment endpoints, measurement endpoints, and risk hypotheses. Based on the refined CSM, the lines of evidence to be used in characterizing risk are determined. Agreement on the refined CSM, COPCs, exposure pathways, endpoints, and risk hypotheses constitutes the SMDP at the end of Step 3 in both Navy and USEPA ERA guidance.

Following the completion of Step 3, a decision point is reached with two potential outcomes. If the refined risk estimates are acceptable for each selected assessment endpoint, the investigation proceeds to risk characterization (Step 7) to document this conclusion, and the ERA process terminates. If the uncertainties associated with the refined risk estimates are unacceptable and/or the risk estimates indicate that unacceptable

risks may exist, site-specific studies might be required and the ERA process continues (Steps 4 through 6). Step 4 is a work planning step where additional site-specific studies are scoped and designed. Step 5 consists of the verification of the field sampling design developed in Step 4 while Step 6 constitutes the site investigation and data analysis phase of the process. The scope (the spatial extent of sampling) and components (for example, the collection of biological data such as tissue samples and toxicity testing) of any site-specific studies are determined by the conclusions of Step 3 and the pathways/endpoints associated with the potential unacceptable risks.

Step 7 consists of the documentation and synthesis of the information and data identified in Steps 1 through 3 (no additional study) or Steps 1 through 6 (additional study). In this step, ecological risk is evaluated and characterized using both quantitative and qualitative methods. Conclusions are made as to whether or not there is a reasonable potential for unacceptable ecological risk, and if there is a potential for unacceptable ecological risk, the magnitude of that risk. The results of the completed BERA (Step 7) are used to make any necessary risk management decisions (Step 8) related to current or future risks. Possible decisions include:

- Adequate information is available to conclude that no unacceptable ecological risks exist. The assessment should stop at Step 7.
- Adequate information is available to conclude that unacceptable ecological risks exist for which remedial actions or controls are warranted. Whether remedial actions or controls are taken, and the specific actions or controls taken, will depend on a number of risk management factors such as the results of any human health risk assessments (if applicable) and the potential impact of the remedial action or control itself on the habitats and biota present. This analysis would occur as part of Step 8.
- Adequate information is not available to estimate risk or the risk estimate is believed to be too conservative or uncertain to recommend remediation. The assessment should be refined.

This BERA is completed through Step 7 of the ERA process. However, because additional analytical data were collected for this BERA, SERA (Step 2) exposure estimates are also calculated to present the entire range of potential ecological risks at the site.

L.2 Problem Formulation

Problem formulation establishes the goals, scope, and focus of the ERA. As part of problem formulation, the ecological setting of Site 4 and Youth Pond is characterized in terms of the habitats and biota known or likely to be present. The types and concentrations of chemicals that are present in ecologically relevant media are also described based on available analytical data. Surface soil (0 to 6 inches bgs) is the primary ecologically relevant terrestrial medium at the site. Subsurface soils (6 to 24 inches bgs) are also evaluated, per Region 3 BTAG guidance, because some ecological receptors may be exposed to soils at these depths. Surface water and surface sediment (0 to 4 inches bgs) are the ecologically relevant aquatic media at the site. Subsurface sediments (4 to 8 inches bgs) are also evaluated, primarily from a fate and transport perspective.

A CSM is developed that describes source areas, transport pathways and exposure media, exposure pathways and routes, and receptors. Assessment endpoints, measurement endpoints, and risk hypotheses are developed to evaluate those receptors for which critical exposure pathways exist. The fate, transport, and toxicological properties of the chemicals present at Site 4 and Youth Pond, particularly the potential for bioaccumulation, are also considered during this process.

L.2.1 Environmental Setting

Site 4 is approximately 2 acres in size and includes a small (0.5 acre) freshwater pond (Upstream Pond) (**Figure L-1**). Area of Concern (AOC) 3, historically a distinct area, is now included within the boundary of Site 4. Historically, various types of waste material were disposed of at Site 4 (including AOC 3), and some of this material remains on the ground surface, while some of it is buried. Surface debris includes railroad ties, metal debris, and general trash, as well as construction materials scattered across the site. A surface debris pile with approximate dimensions of 20 feet by 20 feet by 10 feet high is located in the north-central portion of the site, adjacent to

(west of) Upstream Pond (**Figure L-2**). The surface debris pile contains metal banding, a few empty drums, and charred wood.

In total, 42 test pits and six test holes (**Figure L-2**) were excavated during various investigations to delineate the horizontal and vertical extent of buried debris within the two burial investigation areas that are located within the Site 4 study area. Buried debris, including asphalt, bricks, concrete, metal, construction and wood debris, automotive parts, dark tarpaper, shingles, and a 55-gallon drum, was encountered in Burial Area 1 between the ground surface and depths greater than 8 feet bgs. Additional buried debris may exist at depths greater than 8 feet bgs; however, due to the depth of water encountered in test pits located closest to Upstream Pond, the vertical depth of debris could not be confirmed. Buried debris, including medical supplies (such as syringes, sharps, tubing, and bottles), metal, and construction/fill debris, was encountered in Burial Area 2 between the ground surface and 7.5 feet bgs.

In May 1998, approximately 200 pounds of surface debris and 13 pounds of sharps (metal and plastic) were removed from the site. Surface debris removed included IV injection sets, many contained in aluminum or plastic bags, and small quantities (15 containers) of injectable drugs. The injectable drug containers contained either residue or small volumes of liquid and had either no labels or labels that were not legible. Additional surface debris, including metal banding, railroad ties, metal debris, corroded 55-gallon drums, and beverage containers, was observed at the site, but not removed.

There are no known disposal activities associated with Youth Pond. Youth Pond is, however, hydrologically connected with Upstream Pond via a culvert under D Street (**Figure L-1**).

L.2.1.1 Habitats

Site 4 is currently a wooded area located between Buildings 11 and 12 (**Figure L-1**). Future land use at Site 4 is not expected to change and it will likely continue as a wooded area in the foreseeable future. Buildings 11 and 12 are currently used for general warehousing and storage. According to the CAX inventory, there are four aboveground storage tanks (AST) located outside of Building 12, one 1,000 gallon kerosene AST, one 1,000 gallon diesel AST, one 600 gallon used oil AST, and one 1,000 gallon used oil AST. Other materials, including garbage, gasoline, cleaners, generators, vehicles, paint, and miscellaneous wood and metal, are stored outside of Building 12. The topography slopes down from Building 12 towards Upstream Pond.

Youth Pond is open to recreational use for base personnel (but not the general public) and contains a fishing pier. Youth Pond lies between Site 4 and the York River (**Figure L-1**).

Site 4 is heavily vegetated, containing mature mixed forest (an approximate 100 foot canopy height) with nearly full canopy cover in terrestrial areas but more open near Upstream Pond. The overstory is dominated by sweetgum (*Lireodendron tuliperifa*), oaks (*Quercus rubra*), and loblolly pine (*Pinus taeda*). The understory is dominated by sassafras (*Sassafras albidum*), *Viburnum spp.*, common waxmyrtle (*Myrica cerifera*), and dogwood (*Cornus floridanum*); willow (*Salix nigra*) is common along the western shore of Upstream Pond. Ground cover is relatively sparse, with patches of herbaceous growth in scattered areas. Many large downed trees are present; some of these are partly to mostly in Upstream Pond. Surrounding areas are developed (buildings to the north and south; a parking lot to the west; and D Street to the east; **Figure L-1**). East of D Street is Youth Pond. Youth Pond is mostly surrounded by mature mixed forest (similar to that found on Site 4). The York River lies east of Youth Pond (**Figure L-1**).

In general, soils at Site 4 are predominately brown and gray silty sand. Surface soil pH ranges from 3.90 to 8.80. **Table L-1** contains physical parameter measurements for soils at the site.

In general, the topography of Site 4 slopes to the east or northeast towards D Street and Upstream Pond. Drainage from Outfall 2 (which drains developed upgradient areas) and runoff from the areas surrounding Buildings 11 and 12 (including the parking area located west of Site 4), flows through the Site 4 drainage channels (**Figure L-2**) and into Upstream Pond. During periods with high water levels, surface water in Upstream Pond flows through a culvert under D Street and into Youth Pond.

Surface water from the surrounding area enters Youth Pond from either Upstream Pond (from the drainage culvert that flows under D Street) or a drainage channel that runs parallel to D Street from Outfall 34 (**Figure L-1**). The surface water runoff from the drainage channel parallel to D Street originates from several storm water drains, one located between Buildings 12 and 13, one at the corner of Building 12 and D Street, and one possibly from a storm water drain located inside the fenced area of Building 12. Surface water from these drains flows to Outfall 34 (which is regulated under a state storm water permit), which ultimately discharges to Youth Pond through a culvert and drainage channel that connects Outfall 34 and Youth Pond. When surface water within Youth Pond reaches a certain height, it flows into a flood control structure within Youth Pond and ultimately discharges down the slope and into the adjacent tidal York River through Outfall 30 (which is regulated under a state storm water permit).

Upstream Pond is a small (about 0.5 acres) and shallow pond; average water depth during October 2012 sampling was 2 feet. The pond contained a large amount of large woody debris (downed trees), snags, and green algae. Along the pond periphery occur woody shrubs and small trees (such as willow), and emergent species such as water smartweed (*Polygonum punctatum*), rice cutgrass (*Leersia oryzoides*), and sedges (*Carex spp*). Open water areas were generally limited to the center portions of the pond. Waters were generally stagnant, except when water levels are high enough to allow flow through the system, but were slightly to moderately turbid (**Table L-2**). Sediments within the pond were dark gray/black mud/muck, with mostly silts and some fine sand in the upper 6 inches, and interspersed organic material (detritus), and grade to a fine sandy layer at depths deeper than 6 inches. Total organic carbon averaged about 6 percent (**Table L-3**). The input streams entering the pond from the west (**Figure L-2**) were high gradient, particularly at the western end of Site 4, with well defined banks. These banks were much less cut as they approach the pond. Channel width was generally 5 to 10 feet and flow is highly variable. The substrate was firm and generally sandy, with rip-rap occurring at the Outfall 2 discharge pipe.

Youth Pond is approximately 2 acres in size with an average water depth during October 2012 sampling of about 3 feet; portions of the pond were as deep as 6 feet. The pond contained some large woody debris and a large amount of emergent vegetation and filamentous green algae near the shores. Open water occupied only about 20 percent of the pond. Emergent species included false nettle (*Boehmeria cylindrical*), rice cutgrass (*Leersia oryzoides*), and sedges (*Carex spp*). Waters are generally stagnant, except when water levels are high enough to allow flow through the system, but were slightly turbid (**Table L-2**). Sediments within the pond were brownish-gray mud/muck, with mostly silts and some fine sand, and interspersed organic material (detritus). Total organic carbon averaged 7.35 percent (**Table L-3**). Sediments grade to thicker mud/muck silt with lots of organic material near the shorelines. Vegetation mats as thick as 3 feet occurred in some areas.

L.2.1.2 Biota

No known federal or state-listed endangered or threatened species currently occur on the site. The upland areas are utilized by common woodland bird species such as downy woodpecker (*Picoides pubescens*) and mammalian species such as white-tailed deer (*Odocoileus viginianus*). The two ponds are utilized by common mammalian species such as raccoon (*Procyon lotor*) and by common aquatic birds such as great blue heron (*Ardea herodias*) and great egret (*Ardea alba*). Two species of frogs (see below) were observed, as were aquatic snakes and turtles. Fish were generally common (see below).

A reconnaissance-level biological survey of fish and other aquatic organisms (such as frogs/tadpoles) was conducted in Upstream and Youth Ponds, as well as in a reference pond (Cheatham Pond, located about 0.5 miles northwest of Upstream and Youth Ponds) in October 2012 to determine the presence and type of aquatic community existing within these water bodies. The results of this survey were used to characterize the ecological receptors that are present in Upstream and Youth Ponds and to guide the collection of fish and frog tissue samples. In addition, a semi-quantitative survey of aquatic/ benthic macroinvertebrates was conducted in Upstream Pond (10 locations) and Youth Pond (11 locations), as well as in the reference pond (10 locations) to characterize the type of community that was present.

Benthic invertebrates were collected for a semi-quantitative, reconnaissance-level evaluation of community characteristics (such as number and type of taxa, relative abundance) in support of the BERA. Methods and level

of taxonomic identification generally followed Rapid Bioassessment Protocol (RBP) Level I procedures (Plafkin et al. 1989; Barbour et al., 1999). The organisms were collected as follows:

- Deeper water areas without large amounts of rooted vegetation were sampled with a petite Ponar (6 x 6 inch) dredge; a single grab sample was collected. Shallow vegetated areas were sampled with a D-frame dip net (U.S. Standard No. 30 mesh [500 µm]). The net was jabbed/swept in a standardized motion (with each jab/sweep covering a linear distance of about 0.5 meter) through the rooted vegetation to collect a single invertebrate sample within an area of approximately 2 square meters. This level-of-effort was standardized among all locations where this sampling method was employed (across water bodies, including the reference pond).
- Three subsamples were collected around each sediment sampling location, each five feet from the center point and 120 degrees apart, and composited into a single sample. Depending upon habitat conditions present at the sampling location, the composite sample may have been composed of both grab (dredge) and net (jab/sweep) sub-samples or may have been totally composed of one or the other sub-sample type. The resulting composite sample was sieved through a U.S. Standard No. 30 mesh screen or screened wash bucket (500 µm opening size).
- The contents of each sieved sample were identified and enumerated in the field. Samples were not preserved.

A variety of methods were used to sample fish and amphibians (adult frogs/tadpoles) including:

- Boat-mounted electroshockers, the primary sampling method. A total of 1,326 seconds of shock time was employed in Upstream Pond and 1,277 seconds in Youth Pond.
- Gill nets, including G1, G2, and G3 nets in Youth Pond, and G3 nets in Upstream Pond
- Seines
- Baited minnow traps
- Dip nets (frogs)

The locations of all set nets and traps were documented with a GPS unit. All fish and frogs/tadpoles trapped or collected during the survey were identified, weighed (to the nearest gram), and their total length was measured (to the nearest centimeter). In addition, all fish/ frogs were visually examined for abnormalities in terms of gross external morphology.

Table L-4 summarizes the results of the benthic invertebrate surveys. Based on this survey, the communities were very similar between Youth and Upstream Ponds. A total of 163 organisms from 17 taxa were found in the 11 Youth Pond samples, while a total of 149 organisms from 14 taxa were found in the 10 Upstream Pond samples. The dominant organisms in Youth Pond were chironomids (midges), dragonflies (Anisoptera), oligochaetes (worms), and damselflies (Zygoptera). The dominant organisms in Upstream Pond were chironomids (midges), dragonflies (Anisoptera), beetles (Coleoptera), damselflies (Zygoptera), and oligochaetes (worms). These data are evaluated in **Section L.5.4.4**, including a comparison to the reference pond samples.

In Youth Pond, the dense macrophyte beds made electrofishing difficult and gill nets were used to prevent fish from escaping the field of the electroshocker. Two species of frogs, American bullfrog (*Lithobates catesbeinanus*; 16 specimens) and leopard frog (*Lithobates sphenocephalus*; 2 specimens), were collected (**Table L-5**). Mosquitofish (*Gambusia holbrooki*) were the most numerous fish present; American eel (*Anguilla rostrata*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), and largemouth bass (*Micropterus salmoides*) were also collected. None of the fish and frog specimens had any observed external abnormalities, deformities, or anomalies.

In Upstream Pond, fish were predominately found in the deeper pools in the center of the pond, except for mosquitofish, which occurred throughout the pond system (including at the headwaters of the streams). Two species of frogs, American bullfrog (27 adult specimens and 37 tadpole specimens) and leopard frog (1 specimen), were collected (**Table L-5**), mostly from the southern end of the pond. Mosquitofish were the most numerous fish

present; American eel, bluegill, brown bullhead (*Ameirus nebulosus*), golden shiner (*Notemigonus crysoleucas*), and largemouth bass were also collected. None of the fish and frog specimens had any observed external abnormalities, deformities, or anomalies. The number and diversity of fish species was surprising, particularly the presence of large-sized largemouth bass, given the small size and relative isolation of Upstream Pond, and the presence of a large population of bullfrogs. It is likely that some fish species (such as largemouth bass) move between Upstream and Youth Ponds via the connecting culvert. While it is not known if Youth Pond was ever officially stocked with fish, there is anecdotal evidence that small numbers of fish (sport fish species, but specific species not known) were unofficially moved from Cheatham Pond to Youth Pond for recreational purposes. Currently, fishing at both Youth and Cheatham Ponds is catch-and-release. Thus, it is highly likely that current fish populations in Upstream and Youth Ponds represent reproducing populations since there is little, if any, natural colonization potential from other areas. The presence of frog tadpoles also indicates that the frog population is actively reproducing.

L.2.2 Analytical Data Used in the ERA

Both historical Site 4/AOC 3 soil, surface water, and sediment samples (from 1999 and 2009) and soil, surface water, and sediment samples collected as part of the RI (in 2012) were quantitatively evaluated in this BERA. Since ecological exposures are generally confined to the top two feet of the soil column, the soil data used in this BERA were confined to this depth range but were evaluated separately as surface samples (0 to 6 inches) and subsurface samples (typically 6 to 24 inches); food web exposures only considered the surface samples. Soil data from deeper depths (below 24 inches) were available but were not considered in this BERA per Region 3 BTAG guidance. Sediment data were also available from two depths (0 to 4 inches and 4 to 8 inches). As for soil, these two depth strata were evaluated separately and only the surface samples were used in food web models.

Earthworm tissue from Site 4, whole-body fish and frog tissue from Upstream and Youth Ponds (as well as reference areas), and sediment toxicity test data from Upstream Pond (as well as reference areas) collected in 2012 were also used in this BERA. Reference surface water and sediment data were also collected from portions of Cheatham Pond and are discussed further in **Appendix M**. In addition, background soil UTLs from the Yorktown-CAX background study (CH2M HILL, 2011b) were also considered in the BERA.

The samples used in this BERA are listed in **Table L-6** and locations are shown on **Figure L-1**. The analytical results for these samples can be found in **Appendix I.**

L.2.3 Conceptual Site Model

The conceptual site model (CSM) relates potentially exposed receptor populations with potential source areas based on physical site characteristics and complete exposure pathways. Important components of the CSM are the identification of potential source areas, transport pathways, exposure media, exposure pathways and routes, and receptors. Actual or potential exposures of ecological receptors associated with a site are determined by identifying the most likely, and most important, mechanisms and pathways of contaminant release and transport. A complete exposure pathway has three components: (1) a source or sources of contamination that results in a release to the environment; (2) a pathway and mechanism of chemical transport through an environmental medium; and (3) an exposure or contact point for an ecological receptor. **Figure L-3** illustrates a diagrammatic CSM for Site 4 and Youth Pond. Key components of this CSM are discussed in the following subsections.

L.2.3.1 Source Areas

The site-related sources of potential contamination at Site 4 are the historical waste and debris areas, as discussed in **Section L.2.1**. There are no specific source areas directly related to Youth Pond. Both Upstream Pond and Youth Pond receive runoff, via surface flow and the storm water sewer system, from non-site-related developed and industrial areas of the base.

L.2.3.2 Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby site-related chemicals, once released, may be transported from a source to ecologically relevant media (such as surface sediment) where exposures may occur. These transport pathways are shown on **Figure L-3**.

The primary release mechanisms and transport pathways at the site include:

- Surface runoff from site-related source areas to other terrestrial areas of Site 4 and to Upstream Pond
- Surface runoff from non-site-related developed/industrial areas to the storm water system and subsequent discharge to Upstream Pond via Outfall 2 or to Youth Pond via Outfall 34
- Infiltration, percolation, and leaching of contaminants to groundwater and subsequent discharge to the surface water and sediment of Upstream Pond
- Uptake from the surface soil and accumulation in the tissues of terrestrial biota
- Surface flow from Upstream Pond to Youth Pond via the connecting culvert
- Uptake from the surface water and sediment of Upstream and Youth Ponds and accumulation in the tissues of aquatic biota
- Surface flow from Youth Pond to the York River drainage ditch via the connecting culvert/flood control structure (Outfall 30)

Concentration gradients from potential source areas through the appropriate pathway(s) are evaluated in order to determine if there are any links between site contamination and potential ecological receptors (habitats and biota).

Exposure media for ecological receptors are typically limited to surface water, surface sediment, and surface soil. Subsurface soils (typically 6 to 24 inches bgs) are also evaluated because some ecological receptors may be exposed to soils at these depths. Subsurface sediments (4 to 8 inches bgs) are also evaluated but primarily from a fate and transport perspective. Groundwater is generally considered only as a transport medium since there are no ecological exposures to groundwater until it discharges to a water body or surfaces as a seep; groundwater data are not quantitatively evaluated in the BERA. Air is not addressed in this BERA since this medium is not likely to result in significant contributions to total exposures for metals, PAHs, and PCBs (the key COPCs from the SI ecological risk screening).

L.2.3.3 Exposure Pathways and Routes

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. **Figure L-3** shows the potentially complete exposure pathways to ecological receptors associated with Site 4 and Youth Pond.

Complete exposure pathways exist to lower trophic level terrestrial receptors (plants, soil invertebrates, and reptiles) from direct contact with surface soil, and to terrestrial upper trophic level receptors (birds, mammals, and reptiles) from incidental ingestion of surface soils and exposure via terrestrial food webs. There is the potential for transport, primarily through surface runoff, from Site 4 source areas to Upstream Pond and, via the culvert connecting them, to Youth Pond, and subsequent exposure, via direct contact and/or direct ingestion of surface water and surface sediment, to lower trophic level aquatic receptors (wetland and aquatic plants, aquatic and benthic invertebrates, fish, amphibians, and reptiles), as well as to upper trophic level aquatic receptors (birds, mammals, fish, amphibians, and reptiles) via direct ingestion (water), incidental ingestion (sediment), and exposure via aquatic food webs. Ecological receptors (and their prey) are not exposed directly to groundwater at this site.

An exposure route describes the specific mechanism(s) by which a receptor is exposed to a chemical present in an environmental medium. The most common exposure routes are dermal contact, direct uptake, ingestion, and inhalation. Terrestrial plants may be exposed to chemicals present in surface soils through their root surfaces during water and nutrient uptake. Unrooted, floating aquatic plants, rooted submerged vascular aquatic plants, and algae may be exposed to chemicals directly from the water or (for rooted plants) from sediment. Terrestrial and aquatic/benthic invertebrates may be exposed to chemicals in surface soil, surface sediment, and/or surface water through direct contact and ingestion.

Animals may be exposed to chemicals through the: (1) inhalation of gaseous chemicals or of chemicals adhered to airborne particulate matter; (2) incidental ingestion of contaminated abiotic media (soil and/or sediment) during feeding or preening activities; (3) ingestion of contaminated water; (4) ingestion of contaminated plant and/or animal tissues for chemicals that have entered food webs; and/or (5) dermal contact with contaminated abiotic media. These routes, where applicable, are depicted on **Figure L-3**.

Direct contact is the primary exposure route for lower trophic level receptors (plants, invertebrates, reptiles, and amphibians) at the site. Incidental ingestion of soil/sediment and exposure via food webs are the primary exposure routes for upper trophic level receptors (birds, mammals, fish, amphibians, and reptiles). The contribution to the total dose from the inhalation route is generally insignificant for upper trophic level ecological receptors relative to ingestion pathways. Thus, the inhalation pathway is not generally considered for ecological receptors and was not evaluated in this BERA. Exposure to chemicals present in surface soil and surface sediment via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. Thus, dermal contact was not evaluated for upper trophic level receptors in this BERA. Incidental ingestion of surface soil or surface sediment during feeding, preening, or grooming activities was, however, considered in the risk estimates. Direct contact was considered for lower trophic level receptors (soil and benthic invertebrates).

Direct ingestion of drinking water is only considered when a permanent or semi-permanent source of water with a salinity below 15 parts per thousand (ppt), the approximate toxic threshold for wildlife receptors (Humphreys, 1988), exists on a site. Upstream Pond, the streams that enter Upstream Pond from the west, and Youth Pond all meet these criteria. Thus, exposure via direct ingestion of drinking water from these water bodies was included in the BERA; Upstream Pond and Site 4 stream surface water was also included (as drinking water) in the evaluation of terrestrial food web exposures for Site 4.

L.2.3.4 Receptors

Because of the complexity of natural systems, it is generally not practical to directly assess the potential impacts to all ecological receptors present at a site. Therefore, specific receptor species (such as red-tailed hawk) or species groups (such as plants) are selected as surrogates to evaluate potential risks to larger components of the ecological community (guilds; such as carnivorous birds) used to represent the assessment endpoints (such as survival and reproduction of carnivorous birds). Selection criteria typically include those species that:

- Are known to occur, or are likely to occur, at the site
- Have a particular ecological, economic, or aesthetic value
- Are representative of taxonomic groups, life history traits, and/or trophic levels in the habitats present for which complete exposure pathways are likely to exist
- Can, because of toxicological sensitivity or potential exposure magnitude, be expected to represent potentially sensitive populations

The following upper trophic level receptor species have been chosen for exposure modeling in terrestrial habitats based on the previously listed criteria and the habitats present on the site:

- Mourning dove (*Zenaida macroura*) – terrestrial avian herbivore
- American robin (*Turdus migratorius*) – terrestrial avian omnivore/invertivore (modeled as both)
- Red-tailed hawk (*Buteo jamaicensis*) – terrestrial avian carnivore
- Meadow vole (*Microtus pennsylvanicus*) – terrestrial mammalian herbivore
- Short-tailed shrew (*Blarina brevicauda*) – terrestrial mammalian invertivore
- White footed mouse (*Peromyscus leucopus*) – terrestrial mammalian omnivore
- Red fox (*Vulpes vulpes*) – terrestrial mammalian carnivore

The following upper trophic level receptors have been selected for exposure modeling in wetland/aquatic habitats based on the previously listed criteria and the habitats present on the site:

- Mallard (*Anas platyrhynchos*) – aquatic/wetland avian omnivore
- Belted kingfisher (*Ceryle alcyon*) – aquatic/wetland avian piscivore/invertivore
- Great blue heron (*Ardea herodias*) – aquatic/wetland avian piscivore
- Osprey (*Pandion haliaetus*) – aquatic/wetland avian piscivore
- Tree swallow (*Tachycineta bicolor*) – avian aerial insectivore
- Muskrat (*Ondatra zibethicus*) – aquatic/wetland mammalian herbivore
- Raccoon (*Procyon lotor*) – aquatic/wetland mammalian omnivore
- Mink (*Mustela vison*) – aquatic/wetland mammalian piscivore

Upper trophic level receptors quantitatively evaluated in the BERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. Lower trophic level receptors were evaluated based on those taxonomic groupings for which medium-specific ecological screening values (ESVs) have been developed. As such, specific species of aquatic biota were not chosen as receptors because of the limited information available for specific species and because aquatic biota (fish, benthic invertebrates, amphibians, and reptiles) were evaluated on a community level via a comparison of surface water and sediment concentrations with medium-specific ESVs. Similarly, specific species of terrestrial biota (plants and soil invertebrates) were not chosen as receptors because of the limited information available for specific species and because these receptors were evaluated on a community level via a comparison of chemical concentrations in soil to soil ESVs developed for these groups.

Amphibians and reptiles are also applicable receptor groups. Individual species of amphibians and reptiles were not, however, selected for evaluation because of the general lack of available toxicological information for these taxonomic groups for direct effects (reptiles) and effects from exposures via food webs (reptiles and amphibians). Potential risks to amphibians and reptiles from food web exposures were evaluated using other fauna (birds and mammals) as surrogates. Similarly, potential risks to these groups from direct exposures to surface soil, surface water, and/or surface sediment were evaluated using ESVs developed for other taxonomic groups (described above), the results of toxicity tests with other (non-amphibian and non-reptilian) aquatic species, and a comparison of frog tissue concentrations with literature-based tissue ESVs. This is discussed further in **Section L.6** (uncertainties).

L.2.3.5 Endpoints and Risk Hypotheses

The conclusion of the problem formulation includes the selection of ecological endpoints and risk hypotheses, which are based on the CSM. Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process (USEPA, 1997a). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in USEPA (1997a) and discussed in detail in Suter (1989; 1990; 1993). Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants.

Endpoints define ecological attributes that are to be protected (assessment endpoints) and measurable characteristics of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals attributable to a site (USEPA, 1997a). Assessment endpoints contain an entity (such as hawk population) and an attribute of that entity (such as survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or contaminant sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself. Effects on individual organisms are important for some receptors, such as rare and endangered species; population- and community-level effects are typically more

relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level. In addition, use of criteria values designed to protect the majority of the components of a community (such as the Ambient Water Quality Criteria [AWQC] for the Protection of Aquatic Life) can be useful in evaluating potential community- and/or population-level effects.

Table L-7 shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the BERA. **Table L-7** also shows the receptors associated with each endpoint.

L.3 Exposure Assessment

The principal activity associated with the exposure assessment is the estimation of chemical concentrations in applicable media, termed exposure point concentrations (EPCs), to which the receptors may be exposed. This is accomplished through the selection of appropriate sets of the available analytical data using a set of criteria (such as validation status and sampling date). Once the analytical data sets are selected, EPCs are calculated as a particular point on the distribution of concentrations. At the screening level (SERA; Step 2), the EPC is the maximum detected concentration. At the baseline level (BERA; Step 7), EPCs are central tendency estimates (such as the arithmetic mean). EPCs are then used in bioaccumulation and food web models, along with measured tissue concentrations, to estimate exposures to upper trophic level receptors.

For conservatism, the maximum (SERA) and mean (BERA) reporting limits for chemicals analyzed for but not detected were also compared to medium-specific ESVs and (where applicable) used for food web exposure modeling. This was done to determine if reporting limits were less than chemical concentrations at which potential adverse effects to ecological receptors may occur.

L.3.1 Selection Criteria for Analytical Data

Available analytical data (**Section L.2.2**) were selected for use in the BERA based on the following:

- Data must have been validated by a qualified data validator using acceptable data validation methods. Rejected (R) values were not used in the BERA. Unqualified data and data qualified as J (estimated), L (biased low), or K (biased high) were treated as detected. Tissue data (PCB congeners) qualified as X (estimated maximum possible concentration) were treated as detected. Data qualified as U (undetected) or B (blank contamination) were treated as non-detected.
- For samples with duplicate analyses, the higher of the two concentrations was used, for conservatism, when both values were detects or when both values were non-detects. In cases where one result was a detection and the other a non-detect, the detected value was used in the assessment.
- For non-detected results, the sample quantitation (reporting) limit (SQL) was used to represent the concentration. When calculating statistics (such as the arithmetic mean), one-half of the SQL was used for non-detected results.

L.3.2 Data Groupings

Soil, surface water, sediment, and tissue data were partitioned into the following spatial groups (**Table L-6; Figure L-1**):

- **Soil –** Soil samples were partitioned into the following groups:
  - Site 4
    - Site 4 – Northwest (NW)
    - Site 4 – South
    - Site 4 – East
  - Youth Pond

    - Developed Area
    - Northern Ditch

- **Surface water –** Surface water samples were partitioned into the following groups:
  - Site 4
    - Upstream Pond
    - Site 4 Streams
  - Youth Pond
- **Sediment –** Sediment samples were partitioned into the following groups:
  - Site 4
    - Upstream Pond
    - Site 4 Streams
  - Youth Pond
    - York River Ditch
    - Northern Ditch
- **Tissue –** Whole-body fish and frog tissue samples were partitioned into the following groups:
  - Upstream Pond
  - Youth Pond

The tissue results for all whole-body fish species were pooled when calculating EPCs. Large-sized largemouth bass for which split fillet and offal samples were collected were mathematically (using a weighted average) reconstituted to a whole-body concentration using the chemical concentrations and weight for each part of the sample (fillet and offal) but, due to their large size, were only used in the osprey food web model.

Facility-wide background surface soil and subsurface soil data (upper tolerance limits [UTLs]) were also used in the BERA to help evaluate the site-relatedness of the chemicals detected in site soil samples (**Table L-8**). In addition, surface water and sediment data from the reference pond (Cheatham Pond) were used to calculate reference (background) UTLs for these media (**Table L-8; Appendix M**). Reference tissue data for frogs and fish are summarized in **Tables L-9 and L-10**, respectively; maximum concentrations in reference samples were used to represent background concentrations in these media.

L.3.3 Exposure Point Concentrations

EPCs are calculated as a particular point on the distribution of concentrations. At the screening level (SERA; Step 2), the EPC is the maximum detected concentration. At the baseline level (BERA; Step 7), EPCs are central tendency estimates, which provide a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints). In this BERA, the maximum, arithmetic mean, and 95% upper confidence limit (UCL) of the arithmetic mean concentrations were evaluated for direct exposures. Exposures via food webs also utilized the maximum, arithmetic mean, and 95% UCL of the arithmetic mean.

The calculated 95% UCL and/or mean concentrations for some chemicals in some media were greater than the maximum detected concentration as a result of elevated detection limits in some of the non-detect samples. In these instances, the maximum detected concentration was used in place of the 95% UCL and/or mean concentrations.

When direct measures of chemical concentrations in the tissues of dietary items were not available, these three medium-specific EPCs were also used in bioaccumulation and food web models to estimate exposures to upper trophic level receptors. Dietary items for which tissue concentrations were modeled included terrestrial and aquatic plants, benthic invertebrates, and small mammals. Measured tissue concentrations were available for soil invertebrates (earthworms), fish, and frogs (adults and tadpoles) for key chemical groups (PCBs and metals).

These data are summarized (on a dry-weight basis) in **Tables L-11** (earthworms), **L-12** (whole-body frogs), **L-13** (whole-body fish), and **L-14** (fillet/offal whole-body fish), including for the spatial groupings used in the food web modeling. **Table L-15** shows the species, number, size (length), and weight of the organisms comprising each tissue sample.

Incidental ingestion of surface soil and surface sediment, and ingestion of drinking water, were included when calculating the total dietary exposure. The models and parameter values used for calculating the tissue concentrations are outlined in the following subsections.

Not all chemicals were evaluated for food web exposures. Only those chemicals with the potential to bioaccumulate to a significant extent, as defined in Table 4-2 of USEPA (2000a), were evaluated. This list of bioaccumulating chemicals is provided in **Table L-16** for chemicals relevant to Site 4 and Youth Pond.

For the screening (SERA) exposure estimates, the uptake of chemicals from the abiotic media into food items was based on conservative (e.g., 90th percentile) bioconcentration factors (BCFs) or bioaccumulation factors (BAFs) from the literature, where available. The 90th percentile is generally recommended to provide for a conservative screening assessment (Sample et al., 1998a; 1998b; Bechtel Jacobs, 1998b). If 90th percentile values were not available in the cited reference, the maximum value was used, if available. If only central tendency (such as median) values were reported, they were used for both the SERA and BERA. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from maximum surface soil or surface sediment concentrations using available literature-based regression models. If measured tissue concentrations were available, maximum values were used in place of modeled values (after converting from wet weight to dry weight).

BCFs and BAFs used for baseline (BERA) exposure estimates were based on, or modeled from, central tendency estimates (such as median or mean). Baseline values considered both the distribution of the data (normal or log normal) and the recommendations in the cited reference. Geometric means were preferred for log normal distributions and arithmetic means for normal distributions. In some cases, neither distribution was applicable or the distribution was biased by an outlying value. In these cases, point estimates like the median were then considered. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from mean and 95% UCL surface soil or surface sediment concentrations using available literature-based regression models. If measured tissue concentrations were available, mean and 95% UCL values were used in place of modeled values (after converting from wet weight to dry weight).

In the BERA, using central tendency estimates (rather than high-end values or maximums) for exposure parameters such as BAFs provides a more representative estimate of potential exposures and risks to receptor populations (which are the focus of the selected assessment endpoints) of upper trophic level receptors. Since these upper trophic level species are highly mobile, they would be expected to effectively average their exposure over time as they forage within the area defining their home range. Average prey concentrations are most appropriately estimated using central tendency estimates of media concentrations and accumulation factors. For example, the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (USEPA, 1993a) specify the calculation of an average daily dose. Increasing the representativeness of the exposure estimates relative to population-level effects is consistent with the intent of the BERA. In cases where adequate spatial sampling coverage exists, mean concentrations are also appropriate for evaluating potential risks to populations of lower trophic level receptors because the members of the population are expected to be found throughout a site (where suitable habitat is present), rather than concentrated in one particular area. While effects on individual organisms might be important for some receptors, such as rare and endangered species, population- and community-level effects are typically more relevant to ecosystems. For this BERA, the receptor populations of interest are those that utilize all or part of the site, but such use is not necessarily exclusive to the

site for the entire population. However, the exposure estimates in this BERA assume that the receptors receive 100 percent of their exposure from the site.

For direct exposures to sediment, individual PAHs were evaluated but PAHs were also evaluated based on the sum total concentration of the individual constituents. For direct exposures to soil, PAHs were evaluated based on the sum total concentration of the individual constituents for the high molecular weight (HMW) and low molecular weight (LMW) fractions. For direct exposures to fish and frogs (tissue residues) and exposure via food webs, total PCBs in tissue were evaluated as the sum total of the detections in each of the 10 homologue groups.

For direct exposures to fish and frogs (tissue residues) and exposure via food webs, dioxins-like PCBs in tissue were evaluated as a single group using the toxicity equivalency quotient (TEQ) approach and the toxicity equivalence factors (TEFs) listed in **Table L-17** (Van den Berg et al., 1998; 2006). Fish TEFs were used to calculate concentrations for comparison to tissue ESVs. Mammalian and bird TEFs were used to calculate the concentrations used in the food web models for mammalian and bird receptors, respectively.

L.3.3.1 Terrestrial Plants

For most chemicals, tissue concentrations in the aboveground vegetative portion of terrestrial plants were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-plant BAFs obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table L-18**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-19**.

The BAF values used were based on root uptake from soil and on the ratio between dry-weight soil and dry-weight plant tissue. Literature values based on the ratio between dry-weight soil and wet-weight plant tissue were converted to a dry-weight basis by dividing the wet-weight BAF by an estimated solids content for terrestrial plants (15 percent [0.15] [Sample et al., 1997]).

For inorganic chemicals lacking literature-based, chemical-specific BAFs or applicable algorithms, a soil-to-plant BAF of 1.0 was used. For non-ionic organic chemicals (with a log K_{ow} of between 3 and 8) without literature-based BAFs, soil-to-plant BAFs were estimated using the rinsed foliage algorithm provided on Figure 5B of USEPA (2007j):

$$\log BAF = (-0.4057)(\log K_{ow}) + 1.781$$

where:

BAF = Soil-to-plant BAF (unitless; dry-weight basis)
K_{ow} = Octanol-water partitioning coefficient (unitless)

The log K_{ow} values used in this equation are listed in **Table L-16**.

L.3.3.2 Soil Invertebrates (Earthworms)

For most chemicals, tissue concentrations in soil invertebrates (earthworms) were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-invertebrate BCFs or BAFs obtained from the literature. These BCF/BAF values, for both the SERA and BERA, are listed in **Table L-20**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-19**.

BCFs are calculated by dividing the concentration of a chemical in earthworm tissue by the concentration of that same chemical in the surrounding environmental medium (surface soil) without accounting for uptake via the diet. BAFs consider both direct exposure to soil and exposure via the diet. Because earthworms consume soil, BAFs are more appropriate values and were used when available. BAFs based on depurated analyses (soil was purged from the gut of the earthworm prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of soil is accounted for separately in the food web model.

The BCF/BAF values selected were based on the ratio between dry-weight soil and dry-weight earthworm tissue. Literature values based on the ratio between dry-weight soil and wet-weight earthworm tissue were converted to

a dry-weight basis by dividing the wet-weight BCF/BAF by the estimated solids content for earthworms (16 percent [0.16]; USEPA, 1993a). For chemicals without available measured BAFs/BCFs, an earthworm BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed.

Measured earthworm tissue concentrations were available for PCBs and metals (**Table L-11**). These concentrations were based on a single composite sample collected from three locations on Site 4 near the confluence of the two Site 4 streams and within Buried Debris Area 2 (**Figure L-2**).

L.3.3.3 Small Mammals

Whole-body tissue concentrations in small mammals (omnivores, herbivores, and insectivores) were estimated using one of two methodologies. For chemicals with literature-based soil-to-small mammal BAFs, the small mammal tissue concentration was calculated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by a chemical-specific soil-to-small mammal BAF obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Tables L-21 through L-23**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-19**.

The BAF values selected were based on the ratio between dry-weight soil and whole-body dry-weight tissue. Literature values based on the ratio between dry-weight soil and wet-weight tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for small mammals (32 percent [0.32] [USEPA, 1993a]).

For chemicals without soil-to-small mammal BAF values or algorithms, an alternate approach was used to estimate whole-body tissue concentrations. Because most chemical exposure for these small mammals is via the diet, it was assumed that the concentration of each bioaccumulative chemical in the small mammal's tissues was equal to the chemical concentration in its diet multiplied by a diet to whole-body BAF derived from the literature. The small mammal tissue concentration was calculated as follows:

$$TC_x = [[\sum_i (FC_{xi})(PDF_i)] + [(SC_x)(PDS)]] \, (BAF_{diet\text{-}whole\ body})$$

where:

TC_x = Small mammal tissue concentration for chemical x (mg/kg, dryweight)
FC_{xi} = Concentration of chemical x in food item i (mg/kg, dry weight)
PDF_i = Proportion of diet composed of food item i (dry weight basis)
SC_x = Concentration of chemical x in soil (mg/kg, dry weight)
PDS = Proportion of diet composed of soil (dry weight basis)
BAF = Diet to whole-body BAF (unitless, dry weight basis)

This equation is basically a weighted average of the chemical concentration in the various dietary components (including soil ingestion) for the small mammal (vole, shrew, and mouse, weighted equally), multiplied by a diet-to-whole body BAF, and thus excludes water ingestion.

For chemicals lacking diet to whole-body BAF values (not to be confused with the soil-to-small mammal BAFs listed in **Tables L-21 through L-23**), a diet to whole-body BAF of one was assumed. The use of a diet to whole-body BAF of one is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food webs and a reasonable estimate of chemical concentrations for chemicals that are known to bioaccumulate or biomagnify, based on reported literature values. For example, a maximum diet to whole-body BAF value of 1.0 was reported by Simmons and McKee (1992) for PCBs based on laboratory studies with white-footed mice. Menzie et al. (1992) reported diet to whole-body BAF values for DDT of 0.3 for voles and 0.2 for short-tailed shrews. Reported diet to whole-body BAF values for dioxin were only slightly above 1 (1.4) for the deer mouse (USEPA, 1990).

L.3.3.4 Aquatic Plants

Tissue concentrations in the above-ground vegetative portion of rooted wetland/aquatic plants were estimated by multiplying the surface sediment concentration for each chemical by chemical-specific soil-to-plant BCFs (extrapolated to sediments) obtained from the literature (see **Section L.3.3.1**).

The BCF values were based on root uptake from sediment and on the ratio between dry-weight sediment and dry-weight plant tissue. Literature values based on the ratio between dry-weight sediment and wet-weight plant tissue were converted to a dry-weight basis by dividing the wet-weight BCF by the estimated solids content for plants (15 percent [0.15]; Sample et al., 1997).

L.3.3.5 Benthic Invertebrates

Tissue concentrations in benthic invertebrates were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface sediment concentration for each chemical by chemical-specific sediment-to-invertebrate BAF or biota-sediment accumulation factor (BSAF) values obtained from the literature. BSAF (wet-weight) values were converted to BAF values (dry-weight) for use in the food web models using the percent lipid and percent solid values listed in **Table L-24** and the measured site-wide surface sediment total organic carbon (TOC) concentration (4.97 percent); this TOC value was adjusted, as appropriate, when smaller spatial areas of the site were evaluated. These BSAF/BAF values, for both the SERA and BERA, are listed in **Table L-24**. For some chemicals, tissue concentrations were directly estimated from surface sediment concentrations using regression equations; these algorithms are listed in **Table L-19**. For PCBs, algorithms for both infauna (used for all invertivorous receptors except the tree swallow) and emerging (adult) insects (used for the tree swallow) were obtained.

The BAF values selected were based on the ratio between dry-weight sediment and dry-weight invertebrate tissue. BAFs based on depurated analyses (sediment was purged from the gut of the organism prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of sediment is accounted for separately in the food web model. However, in some cases, the depurated data set was limited or highly variable, and the pooled or undepurated data were considered.

Literature values based on the ratio between dry-weight sediment and wet-weight invertebrate tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for benthic invertebrates (21 percent [0.21]; USEPA, 1993a). For chemicals without available measured BAFs, a BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed.

L.3.3.6 Fish and Frogs

Tissue concentrations in whole-body fish and frogs were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) sediment concentration for each chemical by chemical-specific sediment-to-fish BAF or BSAF values obtained from the literature. BSAF (wet-weight) values were converted to BAF values (dry-weight) for use in the food web models using the percent lipid and percent solid values listed in **Table L-25** (which were based on mean measured values from site fish tissue samples), and the measured site-wide surface sediment TOC (4.97 percent); this TOC value was adjusted, as appropriate, when smaller spatial areas of the site were evaluated. These BSAF/BAF values, for both the SERA and BERA are listed in **Table L-25**.

Measured fish and frog tissue concentrations were available for PCBs and metals (**Tables L-12 through L-14**). The tissue results for all whole-body fish species were pooled when calculating EPCs. Large-sized largemouth bass for which split fillet and offal samples were collected were mathematically (using a weighted average) reconstituted to a whole-body concentration using the chemical concentrations and weight for each part of the sample (fillet and offal) but, due to their large size, were only used in the osprey food web model.

The BAF values were based on the ratio between dry-weight sediment and dry-weight fish tissue. Literature values based on the ratio between dry-weight sediment and wet-weight fish tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for fish (25 percent [0.25]; USEPA, 1993a). For chemicals without literature-based sediment-to-fish BAFs, a BAF was estimated using data for similar chemicals or a BAF of 1.0 was assumed.

L.3.3.7 Dietary Intakes

Upper trophic level receptor exposures via food webs to chemicals present in surface soil, surface water, surface sediment, and biological tissues were determined using estimated chemical concentrations in each relevant dietary component for each upper trophic level receptor, as described in the previous subsection. Incidental ingestion of surface soil and surface sediment was also included when calculating the total dose. Drinking water exposures were also included.

Dietary intakes for each upper trophic level receptor were calculated using the following formula (modified from USEPA [1993a]):

$$DI_x = \frac{[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]}{BW}$$

where:

DI_x = Dietary intake for chemical x (mg chemical/kg body weight/day)
FIR = Food ingestion rate (kg/day, dry-weight)
FC_{xi} = Concentration of chemical x in food item i (mg/kg, dry-weight)
PDF_i = Proportion of diet composed of food item i (dry-weight basis)
SC_x = Concentration of chemical x in soil or sediment (mg/kg, dry-weight)
PDS = Proportion of diet composed of soil or sediment (dry-weight basis)
WIR = Water ingestion rate (L/day)
WC_x = Concentration of chemical x in water (mg/L)
BW = Body weight (kg)

Incidental ingestion of soil/sediment was modeled as a dietary component rather than using a separate soil/sediment ingestion rate. Parameter values for the selected receptors are listed in **Tables L-26** (SERA) and **L-27** (BERA). When measured food ingestion rates were not available for a receptor from the literature, the rates were estimated using allometric equations from Nagy (2001). When measured water ingestion rates were not available for a receptor from the literature, the rates were estimated using allometric equations from USEPA (1993a). For receptors that consume small mammals (red fox and red-tailed hawk), it was assumed that the small mammal portion of the diet was composed of equal parts voles (herbivores), shrews (insectivores), and mice (omnivores). It was assumed that osprey consumed only the large-sized largemouth bass and no frogs. It was assumed that equal proportions of fish and frogs were consumed by the raccoon and great blue heron. It was assumed that the belted kingfisher and mink consumed fish and frogs at a 3:1 ratio.

The exposure parameter values were selected to provide for a conservative evaluation at the screening level (Step 2). Examples of these conservative assumptions include:

- All of the dietary items consumed by the receptor are obtained from the site (an Area Use Factor [AUF] of 1 was assumed) at the point of maximum concentration
- Chemicals are 100 percent bioavailable
- Maximum food ingestion rates were used (calculated maximum ingestion rates using allometric equations were based on the maximum adult body weight)
- Minimum adult body weights were used. The selection focused on the most geographically appropriate values available from standard literature sources (such as USEPA, 1993a).

For the baseline (Step 7) estimates:

- Central tendency estimates (such as mean, median, or midpoint) for adult body weight and ingestion rates were used. Central tendency estimates for these exposure parameters are more relevant for a BERA because they better represent the characteristics of a greater proportion of the individuals in the population.

Populations or communities (rather than individual organisms) were emphasized when developing the assessment endpoints for the BERA.

An AUF of 1.0 was retained in the BERA.

L.4 Effects Assessment

One of the purpose of the effects assessment is to establish chemical exposure levels (ecological screening values; ESVs) that represent conservative thresholds for adverse ecological effects. Typically, one set of ESVs is developed for each selected assessment endpoint. Based on the CSM, direct exposure to surface soil, surface water, and surface sediment, and exposure via terrestrial and aquatic food webs, are the complete pathways at the site.

The effects assessment defines the methods and data used to define an adverse ecological effect. Effects data are available from multiple lines of evidence, which are reflected in the measurement endpoints, and include:

- **Ecological Screening Values (ESVs) for Surface Water, Sediment, Soil, and Fish/Frog Tissue** – Analytical data are compared to the medium-specific ESVs developed in **Section L.4.1**.
- **Toxicity Reference Values (TRVs) for Ingestion Exposures** – Food web exposure estimates are compared to the ingestion-based TRVs developed in **Section L.4.2** for upper trophic level receptors.
- **Toxicity Testing** – Laboratory toxicity tests (bioassays) were conducted using split samples of surface sediment collected from Upstream Pond. Amphipods (*Hyalella azteca*) were the test organisms and a total of eight tests were conducted, two of which were on reference area samples.
- **Biological Survey Data** – The results of the biological surveys of benthic invertebrate communities are used to qualitatively determine if impacts are occurring in Upstream and Youth Ponds.
- **Bioavailability Measures** - Additional data were collected to help evaluate chemical-specific bioavailability in soil, surface water, sediment, and tissues.

In addition, a comparison of site concentrations to facility-wide background (soil) and site-specific reference (surface water, sediment, and tissue) concentrations was conducted as an additional line of evidence (see **Sections L.5.3 and L.5.4**).

L.4.1 Medium-Specific ESVs

Medium-specific ESVs were established for each ecologically relevant medium. Based on the CSM (**Figure L-3**), direct exposure to soil, surface water, and sediment are potentially complete pathways.

L.4.1.1 Soil ESVs

The soil ESVs used in the BERA are summarized in **Table L-28**.When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected.

L.4.1.2 Surface Water ESVs

Upstream Pond and Youth Pond are both fresh water bodies so freshwater ESVs were used. The surface water ESVs used in the BERA considered Region 3 BTAG screening values (USEPA, 2006b) as well as other ESVs available from the literature. When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected.

For surface water, the ESVs for chemicals known to bioaccumulate in aquatic food webs were based on the final chronic value (rather than the final residue value) as per USEPA (1996b, 2009a) and Suter and Tsao (1996). The use of final chronic values is intended to protect aquatic receptors from direct exposures to chemicals in surface water, rather than from exposure via food webs. Potential risks to upper trophic level receptors from food web exposures (tissue residues) were evaluated separately using the ingestion-based TRVs outlined in **Section L.4.2**.

Surface water ESVs for several divalent metals require site-specific adjustment based on water hardness. Measured hardness values from individual water bodies were used for this adjustment. For metals, both unfiltered (total) and filtered (dissolved) concentrations were included in the ESV comparison. The surface water

ESVs used in the BERA are listed in **Table L-29**. For illustrative purposes, the hardness-adjusted ESVs are shown at a hardness of 100 mg/L. **Table L-30** shows the hardness values for each relevant data grouping; the adjusted ESVs are shown in the individual surface water screening tables (see **Section L.5.4**).

L.4.1.3 Sediment ESVs

Upstream Pond and Youth Pond are both fresh water bodies so freshwater sediment ESVs were used. The sediment ESVs used in the BERA considered Region 3 BTAG screening values (USEPA, 2006b) as well as other ESVs available from the literature. When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected.

The derivation of sediment ESVs was based on two approaches. The first approach relied on studies that correlate chemical concentrations in sediment with some measure of benthic community impairment. This approach is known as the Screening Level Concentration (SLC) approach. Because SLC-based ESVs do not consider site-specific bioavailability, and correlate effects to each individual chemical without accounting for the possible effects that might be produced by other chemicals present in the sediment samples used to develop the value, their use tends to result in conservative risk estimates. These SLC-based ESVs are listed in **Table L-31**.

The second approach, equilibrium partitioning (EqP), is appropriate for developing sediment ESVs for non-ionic (non-polar) organic chemicals (USEPA, 1993b; 1996b) and incorporates a measure of sediment chemical bioavailability. This method is not generally applicable to polar organic compounds because it tends to result in a value that is overly conservative (Jones et al., 1997). Use of this approach is also not appropriate for sediments with less than 0.2 percent TOC.

EqP theory holds that a non-ionic chemical present in sediment partitions between sediment organic carbon, interstitial (pore) water, and benthic organisms. For these types of chemicals, it has been demonstrated that biological effects are correlated not to the total concentration of a chemical in bulk sediment but to the pore water concentration. Thus, effect levels based on water-only exposures (such as AWQC values) can be used to estimate potential biological effects from sediment exposures when coupled with a measure of the ratio of the concentration in pore water to the concentration in sediment organic carbon (the organic carbon partition coefficient, K_{oc}) using the following formula (USEPA, 1996b; 1999):

$$EqPValue = (f_{oc})(K_{oc})(FCV)$$

where:

EqP Value = Equilibrium partitioning-based value (μg/kg)
f_{oc} = Total organic carbon content (percent, as a fraction)
K_{oc} = Normalized adsorption (partition) coefficient (L/kg)
FCV = Chronic AWQC or its equivalent (μg/L)

The sorption capacity of the sediment is determined by the mass fraction of organic carbon present in the sediment (TOC or f_{oc}). For sediments with a f_{oc} >0.2 percent by weight, the organic carbon appears to be the predominant determinant for chemical sorption. Thus, the amount of organic carbon present in the sediment controls the bioavailability of a non-ionic chemical through sorption. In general, the higher the organic carbon content of the sediment, the lower the bioavailability of the chemical. By using the measured site-specific organic carbon content of a sediment in the above equation, the site-specific bioavailability and toxicity of non-ionic chemicals can be evaluated.

Measured TOC (f_{oc}) values from each sample grouping (see **Tables L-32 and L-33**) were used. K_{oc} values were estimated from K_{ow} values using the formula from USEPA (1996b):

$$\mathrm{Log}_{10}K_{OC} = 0.00028 + 0.983(\mathrm{Log}_{10}K_{OW})$$

The set of EqP-based ESVs used in the BERA is contained in **Table L-31**. For illustrative purposes, the EqP-based ESVs are shown at a TOC of one percent. **Tables L-32 and L-33** show the TOC values for each relevant data

grouping for surface and subsurface sediments, respectively; the adjusted ESVs are shown in the individual sediment screening tables (see **Section L.5.4**).

L.4.1.4 Tissue ESVs

Fish and frog tissue-based ESVs were derived for chemicals that were detected in tissue samples collected from Upstream and Youth Ponds. The fish and frog tissue ESVs used in this BERA (**Tables L-34 and L-35**) were derived using whole-body data (where possible) for freshwater fish and frog species relevant to the habitats present in Upstream and Youth Ponds (where possible).

L.4.2 Ingestion TRVs

Ingestion TRVs for dietary exposures were derived for each bioaccumulative chemical evaluated in the BERA. TRVs were derived for mammalian and avian upper trophic level receptors, the only two taxonomic groups for which sufficient toxicological information was generally available for the range of bioaccumulative chemicals evaluated. Toxicological information from the literature for wildlife species most closely related to the receptor species were used, where available, but were supplemented by laboratory studies of non-wildlife species (e.g., laboratory mice) where necessary. The ingestion TRVs are expressed as milligrams of the chemical per kilogram body weight of the receptor per day (mg/kg-BW/day).

Survival, growth, and reproduction were emphasized as toxicological endpoints because they are the most relevant, ecologically, to maintaining viable populations and because they are generally the most studied toxicological endpoints for ecological receptors. Endpoints based on reproduction were generally preferred to those based on growth which were preferred to those based on survival. If several chronic toxicological studies were available from the literature, the most appropriate study was selected for each receptor based on study design, study methodology, study duration, study endpoint, and test species.

Ingestion TRVs were derived for both chronic No Observed Adverse Effect Level (NOAEL) and chronic Lowest Observed Effect Level (LOAEL) endpoints. The applicable uncertainty factors from **Table L-36** were used to derive these TRVs where appropriate (uncertainty factors were not generally applied to TRVs obtained from Eco-SSL documents because these TRVs often encompassed multiple studies). Because assessment endpoints were based on population- or community-level effects, no intraspecies uncertainty factors were applied. Taxonomic class-type uncertainty factors were also not applied because the TRVs selected were typically derived based on data from a broad range of taxonomic groups. Maximum Acceptable Toxicant Concentrations (MATCs), defined as the geometric mean of the NOAEL and LOAEL, were also calculated.

In terrestrial habitats, Step 2 food web COPCs were selected by first comparing the maximum surface soil concentration with the lower of the available bird and mammal Eco-SSLs (**Table L-37**). Chemicals that exceeded the Eco-SSLs based on the maximum detected surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. The final Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 7, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. Only Step 2 COPCs were evaluated in Step 7. An exceedance of the MATC was generally considered an unacceptable effect at Step 7, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

Ingestion TRVs for mammals and birds are provided in **Tables L-38 and L-39**, respectively. For some chemicals, relevant toxicological information was available for more than one test species that represented different guilds (based on factors such as dietary composition and trophic level). In these instances, the TRV considered most applicable to the target wildlife receptor evaluated at the site was used in the food web model. **Tables L-38 and L-39** specifically indicate which test organism TRV was applied to each target wildlife receptor in the exposure dose calculations (see **Attachments L-1 through L-4**).

L.4.3 Toxicity Testing

Laboratory-based toxicity tests (bioassays) were conducted using split samples of surface sediment collected from Upstream Pond. Toxicity tests were 42 days in duration and used the amphipod *Hyalella azteca*. This organism was selected because it has significant exposure to sediments and information on reproduction can be obtained during the 42-day test period. In addition, this species is tolerant of the sediment conditions present in Upstream Pond. *H. azteca* tolerates a wide range of substrates ranging from more than 90 percent silt- and clay-sized particles to 100 percent sand-sized particles without detrimental effects on either survival or growth (USEPA, 2000b). *H. azteca* tolerated a wide range in grain size and organic matter in 10- and 42-day tests with formulated sediment. Physico-chemical sediment characteristics, including grain size and TOC, are not significantly correlated to the response of *H. azteca* in either fed or unfed tests (USEPA, 2000b). Test endpoints were survival, growth, and reproduction.

The toxicity test report is provided in **Appendix N**. The toxicity test was conducted based on the protocols (standard operating procedures [SOPs]) referenced in the final Site 4 SAP (CH2M HILL, 2012a). The results of the sediment toxicity test helped to directly evaluate the toxicity and bioavailability of chemicals in surface sediment samples from Upstream Pond, which is in close proximity to Site 4 source areas. Lines of evidence for the effects assessment included:

- **Comparison of biological response between site and reference samples** – Statistical comparisons were conducted (by the toxicity laboratory) for each test endpoint (survival, growth, and reproduction) between the six site samples and each of two reference samples, as well as between site/reference samples and the laboratory control. In general, the comparison of site samples to reference samples is more meaningful in evaluating the potential for biological impacts than the control comparison because the control is run with formulated or non-site-specific test media that may not be comparable to site media in physical attributes. The purposes of the control sample are to evaluate test organism viability and the proper functioning of the test apparatus, not to reflect field conditions or exposures. The test results indicate whether organism performance is significantly different when exposed to surface sediment collected from the site relative to the reference samples and/or the control. The absence of a significant difference (at $\alpha = 0.05$) relative to the reference samples is a line of evidence supporting minimal risk. The presence of a significant difference that reflects reduced performance triggered additional evaluation. Although statistical testing against both reference samples and the laboratory control was conducted and is reported in the tables, the reference comparisons were primarily used to determine if a particular site sample was impacted.

L.4.4 Biological Surveys

Although organisms may be exposed to chemicals in their environment, these exposures will not necessarily result in adverse impacts. Direct measures of potential adverse impacts to biological communities are thus useful to quantify or confirm any risks that are predicted in a BERA. These data can also help interpret and confirm the results from laboratory-based toxicity testing.

In October 2012, a qualitative survey of the benthic invertebrate community was conducted in Upstream and Youth Ponds, as well as in a reference pond (Cheatham Pond). The methods and results of this survey were described in **Section L.2.1.2**. The data from this survey are evaluated in **Section L.5.4.4**.

L.4.5 Bioavailability Measures

Data collected to evaluate the potential chemical-specific bioavailability in abiotic media included:

- **Soil** –TOC, pH, and grain size
- **Sediment** – TOC, pH, simultaneously extracted metals/acid-volatile sulfide (SEM/AVS), and grain size
- **Surface Water** – Dissolved metals, hardness, and pH
- **Tissue** – Percent lipids

These data were integrated into the risk characterization and risk evaluation (**Sections L.5.3, L.5.4, and L.5.5**).

L.5 Risk Characterization

The risk characterization portion of the BERA uses the information generated during the three previous parts of the BERA (problem formulation, exposure assessment, and effects assessment) to estimate potential risks to ecological receptors.

L.5.1 SERA Approach

The main objective of risk characterization at the screening level (termed risk calculation) is to derive a list of COPCs. As part of this risk calculation, the maximum exposure concentrations (abiotic media) or maximum exposure doses (upper trophic level receptors) are compared with the corresponding ESVs or TRVs to derive risk estimates using the hazard quotient (HQ) method. HQs are calculated by dividing the chemical concentration in the medium being evaluated by the corresponding medium-specific ESV or by dividing the exposure dose by the corresponding ingestion-based TRV. HQs equaling or exceeding 1 indicate the potential for unacceptable risk since the chemical concentration or dose (exposure) equals or exceeds the ESV or TRV (effect); these chemicals are identified as COPCs at Step 2. However, ESVs/TRVs and exposure estimates are derived using intentionally conservative assumptions at the screening level such that HQs greater than or equal to 1 do not necessarily indicate that unacceptable risks are present. Rather, it identifies chemical-pathway-receptor combinations requiring further evaluation using less conservative (but more realistic) exposure scenarios and assumptions. HQs less than 1 indicate that unacceptable risks are unlikely, enabling a conclusion of negligible (acceptable) risk to be reached with high confidence.

In addition to chemicals that equaled or exceeded medium-specific ESVs based on maximum detected concentrations, or that equaled or exceeded TRVs based on maximum ingestion doses, the following also applied to COPC selection at Step 2:

- Non-detected chemicals were retained as COPCs if the maximum detection limit equaled or exceeded the ESV for that medium or if the ingestion dose calculated using the maximum detection limit equaled or exceeded the TRV.
- All detected chemicals lacking a TRV and/or ESV were retained as COPCs.
- The essential nutrients calcium, magnesium, potassium, and sodium were excluded as potential COPCs since they are essential macronutrients that are needed in relatively high concentrations for normal metabolism, growth, and reproduction.

L.5.2 BERA Approach

COPCs from the SERA were reevaluated in the BERA (Step 7). As discussed previously, this reevaluation involves using less conservative (but more realistic) assumptions about exposures and a comparison of these revised exposure estimates (based on central tendency estimates of media concentrations, BAFs, and/or exposure parameters) with ESVs and TRVs.

In addition to chemicals that equaled or exceeded medium-specific ESVs based on mean and/or 95% UCL detected concentrations, or that equaled or exceeded TRVs based on mean and/or 95% UCL ingestion doses, the following also applied to COPC selection at Step 7:

- All detected chemicals lacking a TRV and/or ESV were retained as COPCs for risk evaluation.
- Ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the MATC was generally considered an unacceptable risk at Step 7, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations. Exceedances of the LOAEL are almost always considered unacceptable and thus do not normally need to be discussed by the risk managers. Dose estimates that are less than the MATC are generally considered acceptable and also normally do not need to be discussed by the risk managers except in limited cases (such as when listed species are present). Thus, it is

generally only those results between the MATC and LOAEL that risk managers need to decide are unacceptable or not.

For Step 7, the following additional factors were also considered, as appropriate:

- **Frequency of Detection.** Frequency of detection was used as a line of evidence in Step 7 but was not used as the sole basis for eliminating a chemical from further evaluation. Chemicals that were detected in less than five percent of the samples in a medium were generally eliminated as COPCs in that medium if at least 20 samples were available (USEPA, 1989). It is unlikely that infrequently detected chemicals represent an unacceptable risk to receptors at the population level, due to limited spatial exposure. However, the magnitude of any ESV exceedances was also considered concurrently with frequency of detection to ensure that "hot spot" areas were not eliminated from consideration based on this screening criterion.
- **Background Concentrations.** Facility-specific background concentrations were also considered in Step 7 for soil. The background evaluation consisted of a direct comparison of site concentrations to the soil UTLs developed for inorganic constituents (the only constituents for which UTLs were derived) in the background study in a manner analogous to the comparison to ESVs. Soil background 95% UTL values have been developed separately for surface and subsurface soils (CH2M HILL, 2011b; **Table L-8**).

  Surface water, sediment, and fish/frog tissue were sampled at the Cheatham Pond reference area and the results were used in a manner analogous to the soil background data. These data are summarized in **Tables L-8 through L-10**. The surface water and sediment 95% UTL derivation is discussed in **Appendix M** and the resulting UTLs are listed in **Table L-8**; UTLs for these media were developed for both inorganics and select organic constituents (e.g., PAHs and pesticides) where available data allowed. For tissue, the maximum reference concentration was used as background.

Step 7 (baseline risk characterization) consists of the documentation and synthesis of the information and data identified in Steps 1 through 6. In this BERA, risk was characterized using both quantitative and qualitative methods and a qualitative weight-of-evidence approach.

Not all available lines of evidence received equal weight in the overall assessment of risks. Some lines of evidence (such as toxicity tests) were the result of site-specific studies that directly measured potential risks or impacts to specific receptors (endpoints). These lines of evidence received more weight than lines of evidence that were based largely on literature data/values that were not site-specific (such as the ESV comparisons). The lines of evidence used in the risk evaluation are, in general order of importance (more important listed first), as follows:

- Sediment toxicity testing
- Food web modeling (using measured tissue concentrations)
- Biological surveys (benthic macroinvertebrates)
- Comparison with background concentrations
- Bioavailability measures
- ESV comparisons (soil, surface water, sediment, and fish/frog tissue)

L.5.3 Terrestrial Habitats

Terrestrial habitats on the site are almost entirely associated with Site 4. At Youth Pond, only a small developed area off of the northwestern corner of Building 12, near the beginning of the drainage ditch (Northern Ditch) that leads to Youth Pond, and the upgradient portion of the ditch, can be considered terrestrial habitat. The Northern Ditch transitions into aquatic habitat as it nears Youth Pond (at a distinct change in elevation between CAYP-SS-4 and CAYP-SD-14; **Figure L-1**) and is also evaluated in **Section L.5.4** (aquatic habitats).

L.5.3.1 Comparison With Ecological Screening Values

As discussed in **Section L.3.3**, the maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were compared with ESVs. Initially, the medium-specific comparisons for surface soil and subsurface soil were conducted for the site as a whole using maximum concentrations. Chemicals were excluded from further consideration in the SERA if the HQ based on the maximum concentration was less than 1. Area-

specific comparisons, using the data groupings from **Section L.3.2**, were then conducted, but only for the chemicals whose maximum concentrations equaled or exceeded ESVs in the initial screen (SERA) or that were detected but lacked an ESV. This constituted the BERA screen. Chemicals were generally excluded from further consideration in the BERA if the HQ based on the 95% UCL was less than 1 and/or if the maximum detected concentration was less than the background UTL.

L.5.3.1.1 Surface Soil

Site-wide surface soil concentrations were first compared to soil ESVs for plants and soil invertebrates. Chemicals that equaled or exceeded ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**.

Site-wide Evaluation. Site-wide maximum surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-40**. **Table L-41** identifies the exceedances of ESVs and background UTLs for each surface soil sample. Twelve metals (aluminum, arsenic, hexavalent chromium [but not total chromium], copper, iron, lead, manganese, mercury, nickel, selenium, thallium, and zinc), 10 pesticides (4,4'-DDT, aldrin, dieldrin, endosulfan I, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, lindane, and gamma-chlordane), 3- and 4-methylphenol, carbazole, dibenzofuran, LMW PAHs, and HMW PAHs equaled or exceeded ESVs based on maximum detected concentrations (**Tables L-40 and L-41**). The ESVs for aluminum and iron were based on soil pH; soil pH data are reported in **Table L-41**. 2-Butanone and acetone were detected in at least one surface soil sample but ESVs were not available. These 29 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation. One pesticide (toxaphene), 17 SVOCs, and four VOCs were not detected but maximum detection limits equaled or exceeded ESVs. These 22 chemicals were also identified as initial (Step 2) COPCs but were not carried into the area-specific evaluations. Instead, they were evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Site 4 NW. Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-42**. **Table L-42** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Three metals (arsenic, lead, and selenium), six pesticides (dieldrin, endosulfan I, endosulfan sulfate, endrin, endrin aldehyde, and lindane), carbazole, dibenzofuran, LMW PAHs, and HMW PAHs had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These 13 chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**).

2-Butanone was detected but a soil ESV was not available. 2-Butanone was detected at a maximum concentration (24.0 µg/kg) that was less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, this chemical was not identified as a COPC for further risk evaluation. Acetone was also detected but a soil ESV was not available. Acetone was detected at a maximum concentration (640 µg/kg) that exceeded soil ESVs for some other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, acetone was identified as a COPC for further risk evaluation.

Area-specific Evaluation – Site 4 South. Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-43**. **Table L-43** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Three metals (mercury, selenium, and zinc) and four pesticides (aldrin, endrin, endrin aldehyde, and endrin ketone) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These seven chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**). While aluminum equaled or exceeded its ESV and background UTL in some samples, it did not exceed both in the same sample. Acetone was detected but a soil ESV was not available. Acetone was detected at a maximum concentration (100 µg/kg) that was less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, acetone was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – Site 4 East. Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-44**. **Table L-44** also contains a comparison

against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. No chemical had a HQ that equaled or exceeded 1 based on detected mean concentrations (UCLs were not used due to small sample sizes) and also equaled or exceeded background UTLs (where available). Aluminum equaled or exceeded both the ESV and background UTL in both samples from this area and was identified as a COPC for further risk evaluation (**Section L.5.5**). Although iron equaled or exceeded its ESV and background UTL in one of the two samples from this area, the maximum ratio to the background UTL was only 1.02 and iron was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – Youth Pond Developed Area. Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-45**. **Table L-45** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Only hexavalent chromium had a HQ that equaled or exceeded 1 based on detected mean concentrations (UCLs were not used due to small sample sizes) and also exceeded background UTLs (where available). However, because the exceedance was of low magnitude (HQ of 1.33) and total chromium did not exceed ESVs, this chemical was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – Youth Pond Northern Ditch. Area-specific maximum, mean, and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-46**. **Table L-46** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Two metals (selenium and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available). These two chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**). 2-Butanone and acetone were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (45.0 and 3.50 µg/kg, respectively) that were less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, these two chemicals were not identified as COPCs for further risk evaluation.

L.5.3.1.2 Subsurface Soil

Site-wide subsurface soil concentrations were first compared to soil ESVs for plants and soil invertebrates. Chemicals that equaled or exceeded ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. Subsurface soil samples from the applicable depth range were only available for areas on Site 4.

Site-wide Evaluation. Site-wide maximum subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-47**. **Table L-48** identifies the exceedances of ESVs and background UTLs for each subsurface soil sample. Seven metals (aluminum, hexavalent chromium [but not total chromium], iron, manganese, mercury, selenium, and zinc), seven pesticides (4,4'-DDT, aldrin, endosulfan II, endosulfan sulfate, endrin, endrin ketone, and gamma-chlordane), bis(2-ethylhexyl)phthalate, and di-n-butylphthalate equaled or exceeded ESVs based on maximum detected concentrations (**Tables L-47 and L-48**). The ESVs for aluminum and iron were based on soil pH; soil pH data are reported in **Table L-48**. 2-Butanone and acetone were detected in at least one subsurface soil sample but ESVs were not available. These 18 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

One pesticide (endrin aldehyde), 19 SVOCs, and four VOCs were not detected but maximum detection limits equaled or exceeded ESVs. These 24 chemicals were also identified as initial (Step 2) COPCs but were not carried into the area-specific evaluations. Instead, they were evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Site 4 NW. Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-49**. **Table L-49** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Only endrin had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations; a background UTL was not available. Although the mean pH was within range, 3 of the 12 samples equaled or exceeded both the aluminum ESV and the background UTL. Thus, endrin and aluminum were identified as COPCs for further risk evaluation (**Section L.5.5**). Acetone was detected but a soil ESV was not available. Acetone was detected at a maximum concentration (240 µg/kg) that was generally less than soil ESVs for other, similar VOCs, which ranged

from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, acetone was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – Site 4 South. Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-50**. **Table L-50** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. Five metals (aluminum, hexavalent chromium, mercury, selenium, and zinc) and two pesticides (aldrin and endrin ketone) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available). Hexavalent chromium exceeded its ESV in only a single surface soil sample at a maximum HQ of 1.08 and did not exceed ESVs based on total chromium. Thus, it was not identified as a COPC for further risk evaluation. Aluminum, mercury, selenium, zinc, aldrin, and endrin ketone were identified as COPCs for further risk evaluation (**Section L.5.5**). 2-Butanone and acetone were detected but soil ESVs were not available. Acetone and 2-butanone were detected at maximum concentrations (120 and 8.00 µg/kg, respectively) that were less than soil ESVs for other, similar VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Thus, these two chemicals were not identified as COPCs for further risk evaluation.

Area-specific Evaluation – Site 4 East. Area-specific maximum, mean, and 95% UCL subsurface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-51**. **Table L-51** also contains a comparison against background UTLs for metals that equaled or exceeded soil ESVs based on 95% UCL concentrations. No chemical had a HQ that equaled or exceeded 1 based on detected mean concentrations (UCLs were not used due to small sample sizes) and also exceeded background UTLs (where available). Aluminum exceeded both the ESV and background UTL in both samples from this area and was identified as a COPC for further risk evaluation (**Section L.5.6**).

L.5.3.2 Terrestrial Food Web Exposures

In terrestrial habitats, Step 2 food web COPCs were selected by first comparing maximum surface soil concentrations with the lower of the available bird and mammal Eco-SSLs for the chemicals listed in **Table L-16**. These Eco-SSL values are listed in **Table L-37**. Chemicals that equaled or exceeded the Eco-SSLs based on the maximum surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. Chemicals that were on the bioaccumulative chemicals list (**Table L-16**) and did not have Eco-SSLs were automatically included in site-specific food web modeling. The final Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 7, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the 95% UCL-based MATC was generally considered an unacceptable risk at Step 7, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

The food web evaluation was only conducted for the terrestrial habitats on Site 4 due to the limited size and quality of the terrestrial habitats at Youth Pond (a small, developed area and a linear ditch). The food web evaluation was only conducted on a site-wide basis (no spatial subgroups were used) because the total size of the terrestrial habitats on Site 4 was only about 1.5 acres, the subareas used for the lower trophic level screening were spatially contiguous, and the habitat did not differ significantly among these areas (but did differ in proximity to source areas).

Table L-52 shows the results of the initial screening against bird and mammal Eco-SSLs. All of the chemicals evaluated, except nickel, equaled or exceeded one or both of the Eco-SSLs based on the maximum detected surface soil concentration and were retained for site-specific food web modeling (see **Attachment L-1**).

HQs based on maximum exposure doses for each upper trophic level terrestrial receptor are listed in **Table L-53** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, seven metals (arsenic, cadmium, chromium, copper, lead, mercury, and selenium), PCBs (Aroclor-1221, Aroclor-1242, Aroclor-1260, total PCBs, and

dioxin-like PCBs), six pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan I, and endrin), 11 PAHs (mostly the higher molecular weight compounds), hexachlorobenzene, and pentachlorophenol had HQs equaling or exceeding 1 for one or more receptors. The exceedances for Aroclor-1221, hexachlorobenzene, and pentachlorophenol were based on maximum reporting limits, which were extremely elevated for hexachlorobenzene and pentachlorophenol. Ingestion TRVs were not available for any receptor for 1,2,4,5-tetrachlorobenzene, 4-bromophenyl-phenylether, and 4-chlorophenyl-phenylether, none of which was detected in surface soil.

HQs based on 95% UCL exposure doses for each upper trophic level terrestrial receptor are listed in **Table L-54** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, three metals (arsenic, cadmium, and selenium), dioxin-like PCBs, one pesticide (dieldrin), two PAHs (chrysene and pyrene), hexachlorobenzene, and pentachlorophenol had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC, only arsenic, dieldrin, dioxin-like PCBs, pyrene (all based on short-tailed shrew exposures), and hexachlorobenzene (American robin invertivore exposures; based on reporting limits) had HQs that equaled or exceeded 1. The LOAEL TRV was only exceeded for dieldrin (short-tailed shrew).

HQs based on the arithmetic mean for each terrestrial upper trophic level receptor are listed in **Table L-55** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, three metals (arsenic, cadmium, and selenium), dioxin-like PCBs, dieldrin, pyrene, and hexachlorobenzene had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC, only arsenic, dieldrin, and dioxin-like PCBs (all based on short-tailed shrew exposures) had HQs that equaled or exceeded 1. The LOAEL TRV was only exceeded for dieldrin (short-tailed shrew).

Based on these results, arsenic, dieldrin, dioxin-like PCBs, and pyrene were identified as COPCs for further risk evaluation. Hexachlorobenzene was not retained because it was not detected in surface soil samples from the site and elevated reporting limits in a few samples were responsible for the observed exceedances.

L.5.4 Aquatic Habitats

Aquatic habitats on the site consist of Upstream Pond (on Site 4), the streams that drain to Upstream Pond from the west (beginning at Outfall 2; **Figure L-2**), Youth Pond, the drainage ditch (Northern Ditch) that drains to Youth Pond (beginning at Outfall 34; **Figure L-1**), and the drainage ditch that connects Youth Pond with the York River (there is a flood control structure at the Youth Pond end of this ditch that controls the water level in Youth Pond). The upgradient portion of the Northern Ditch can be considered terrestrial habitat but the ditch transitions into aquatic habitat as it nears Youth Pond (at a distinct change in elevation between CAYP-SS-4 and CAYP-SD-14; **Figure L-1**) and is also evaluated in **Section L.5.3** (terrestrial habitats).

L.5.4.1 Comparison With Ecological Screening Values

As discussed in **Section L.3.3**, the maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were compared with ESVs. Initially, the medium-specific comparisons for surface water, surface sediment, subsurface sediment, fish tissue, and frog tissue were conducted for the site as a whole (encompassing all site water bodies listed previously) using maximum concentrations. Chemicals were excluded from further consideration in the SERA if the HQ based on the maximum concentration was less than 1. Area-specific comparisons, using the data groupings from **Section L.3.2**, were then conducted, but only for the chemicals whose maximum concentrations equaled or exceeded ESVs in the initial screen (SERA) or that were detected but lacked an ESV. This constituted the BERA screen. Chemicals were generally excluded from further consideration in the BERA if the HQ based on the 95% UCL was less than 1 and/or if the maximum detected concentration was less than the background UTL.

L.5.4.1.1 Surface Water

Site-wide surface water concentrations were first compared to ESVs. Chemicals that exceeded ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. The screening tables include ESV and UTL comparisons for both total and dissolved metals concentrations

and both are used to select COPCs. The role of metal bioavailability is discussed further in the risk evaluation section (**Section L.5.5**).

Site-wide Evaluation. Site-wide maximum surface water concentrations are compared to ESVs in **Table L-56**. **Table L-57** identifies the exceedances of ESVs and background UTLs for each surface water sample. Six metals (aluminum, barium, cadmium, copper, iron, and manganese) equaled or exceeded ESVs based on maximum detected total concentrations. Only barium, iron, and manganese equaled or exceeded ESVs based on maximum detected dissolved concentrations. Two PAHs (benzo[a]pyrene and pyrene) also equaled or exceeded ESVs based on maximum detected concentrations (**Tables L-56 and L-57**). Chrysene was detected in at least one surface water sample but an ESV was not available. These nine chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

One inorganic (cyanide), all seven PCB Aroclors, 12 pesticides, 14 SVOCs, and one VOC (carbon disulfide) were not detected but maximum detection limits equaled or exceeded ESVs. These 35 chemicals were also identified as initial (Step 2) COPCs but were not carried into the area-specific evaluations. Instead, they were evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Upstream Pond. Area-specific maximum, mean, and 95% UCL surface water concentrations are compared to ESVs in **Table L-58**. **Table L-58** also contains a comparison against background UTLs for chemicals that equaled or exceeded ESVs based on 95% UCL concentrations. Four metals (aluminum, barium, cadmium, and iron) equaled or exceeded ESVs based on detected 95% UCL total concentrations and also equaled or exceeded background UTLs (where available). No metal exceeded both the ESV and the background UTL in detected 95% UCL dissolved concentrations. Two PAHs (benzo[a]pyrene and pyrene) also equaled or exceeded ESVs based on detected 95% UCL concentrations. Chrysene was detected in at least one surface water sample but an ESV was not available. These seven chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Area-specific Evaluation – Site 4 Streams. Area-specific maximum, mean, and 95% UCL surface water concentrations are compared to ESVs in **Table L-59**. **Table L-59** also contains a comparison against background UTLs for chemicals that equaled or exceeded ESVs based on 95% UCL concentrations. Four metals (aluminum, barium, iron, and manganese) equaled or exceeded ESVs based on detected 95% UCL total concentrations and also equaled or exceeded background UTLs (where available). Only iron and manganese equaled or exceeded both the ESV and the background UTL in detected 95% UCL dissolved concentrations. Pyrene also equaled or exceeded ESVs based on detected 95% UCL concentrations. These five chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Area-specific Evaluation – Youth Pond. Area-specific maximum, mean, and 95% UCL surface water concentrations are compared to ESVs in **Table L-60**. **Table L-60** also contains a comparison against background UTLs for chemicals that equaled or exceeded ESVs based on 95% UCL concentrations. Two metals (barium and cadmium) equaled or exceeded ESVs based on detected 95% UCL total concentrations and also equaled or exceeded background UTLs (where available). The maximum HQ for cadmium was only 1.03 and this chemical did not exceed ESVs in dissolved samples; thus, cadmium was not identified as a COPC for further risk evaluation. Only barium equaled or exceeded both the ESV and the background UTL in detected 95% UCL dissolved concentrations. Only barium was identified as a COPC for further risk evaluation (**Section L.5.5**).

L.5.4.1.2 Surface Sediment

Site-wide surface sediment concentrations were first compared to SLC ESVs. Chemicals that equaled or exceeded ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. The area-specific screening tables include comparisons to both SLC and EqP ESVs and both are used when selecting COPCs. The role of bioavailability is discussed further in the risk evaluation section (**Section L.5.5**).

Site-wide Evaluation. Site-wide maximum surface sediment concentrations are compared to SLC sediment ESVs in **Table L-61**. **Table L-62** identifies the exceedances of SLC ESVs and background UTLs for each surface sediment

sample. Fifteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, vanadium, and zinc), two PCB Aroclors (1254 and 1260), nine pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, endrin aldehyde, gamma-chlordane, and heptachlor epoxide), bis(2-ethylhexyl)phthalate, and 16 PAHs (plus HMW, LMW, and total PAHs) equaled or exceeded ESVs based on maximum detected concentrations (**Tables L-61 and L-62**). Three inorganics (beryllium, cyanide, and thallium), five pesticides (endosulfan I, endosulfan II, endosulfan sulfate, heptachlor, and methoxychlor), three SVOCs (butylbenzylphthalate, di-n-octylphthalate, and pentachlorophenol), and nine VOCs (2-butanone, acetone, carbon disulfide, ethylbenzene, methyl acetate, methylcyclohexane, tetrachloroethene, toluene, and total xylenes) were detected in at least one surface sediment sample but ESVs were not available. These 66 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

Three PCB Aroclors (1016, 1221, and 1232), four pesticides (alpha-, beta-, and delta-BHC, and endrin ketone), and three SVOCs (diethylphthalate, hexachlorobenzene, and phenol) were not detected but maximum detection limits equaled or exceeded ESVs. These ten chemicals were also identified as initial (Step 2) COPCs but were not carried into the area-specific evaluations. Instead, they were evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Upstream Pond. Area-specific maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-63**. **Table L-63** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Seven metals (arsenic, barium, cadmium, copper, lead, silver, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). Beryllium did not have an ESV but the maximum background UTL ratio exceeded 1. Thus, arsenic, barium, beryllium, cadmium, copper, lead, silver, and zinc were identified as COPCs for further risk evaluation (**Section L.5.5**).

Two PCB Aroclors (1254 and 1260) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as COPCs for further risk evaluation (**Section L.5.5**) although the EqP HQs based on the 95% UCL did not exceed 1 and there was only a single EqP ESV exceedance (for Aroclor-1254). Eleven pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endosulfan II, endrin, endrin aldehyde, gamma-chlordane, heptachlor epoxide, and methoxychlor) had SLC HQs (or EqP HQs if the chemical lacked a SLC ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); all were identified as COPCs for further risk evaluation (**Section L.5.5**). Nine of these 11 pesticides had both SLC and EqP ESVs; the EqP ESV was not exceeded in five of these instances and the 95% UCL HQ was exceeded in only two of these instances.

Fourteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Eight of the 14 individual PAHs also had EqP ESVs and there were no exceedances for six of these values and no 95% UCL exceedances for the two others.

Two VOCs (methyl acetate and methylcyclohexane) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Methyl acetate and methylcyclohexane were detected at maximum concentrations (5.00 and 4.00 µg/kg, respectively) that were generally less than sediment EqP ESVs for other VOCs, which ranged from 0.31 to 56,212 µg/kg, with a median value of 2,139 µg/kg when adjusted for area-specific TOC (**Table L-31**). Thus, these two chemicals were not identified as COPCs for further risk evaluation.

Area-specific Evaluation – Site 4 Streams. Area-specific maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-64**. **Table L-64** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Cadmium was the only metal with a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). It was identified as a COPC for further risk evaluation (**Section L.5.5**).

Two PCB Aroclors (1254 and 1260) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as COPCs for further risk evaluation (**Section L.5.5**) although neither of the EqP

HQs based on the 95% UCL exceeded 1. Four pesticides (4,4'-DDD, 4,4'-DDT, endrin aldehyde, and gamma-chlordane) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); all were identified as COPCs for further risk evaluation (**Section L.5.5**). However, all four of these pesticides had both SLC and EqP ESVs and the EqP ESVs were not exceeded.

Six PAHs (but not HMW, LMW, or total PAHs) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Two of the six also had EqP ESVs and there were no 95% UCL HQ exceedances for either.

Area-specific Evaluation – Youth Pond. Area-specific maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-65**. **Table L-65** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). These eight metals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Aroclor 1260 had a SLC HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a COPC for further risk evaluation (**Section L.5.5**) although the EqP HQ based on the 95% UCL did not exceed 1. Three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as COPCs for further risk evaluation (**Section L.5.5**). All three of these pesticides had both SLC and EqP ESVs; the EqP ESV was not exceeded in two of these instances and the 95% UCL HQ was not exceeded in the third instance.

Two PAHs (but not HMW, LMW, or total PAHs) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were both identified as COPCs for further risk evaluation (**Section L.5.5**). One of the PAHs also had an EqP ESV and it was not exceeded.

Cyanide and di-n-octylphthalate were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Cyanide was identified as a COPC for further risk evaluation (**Section L.5.5**). Di-n-octylphthalate was detected at a maximum concentration (440 µg/kg) that was less than the sediment EqP ESV for di-n-butylphthalate (80,850 µg/kg when adjusted for area-specific TOC; **Table L-31**). Thus, this chemical was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – York River Ditch. Area-specific maximum (means and 95% UCLs were not considered because there was only a single sample in this spatial group) surface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-66**. **Table L-66** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Lead was the only metal that equaled or exceeded ESVs and background UTLs. It was identified as a COPC for further risk evaluation (**Section L.5.5**).

Fourteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also equaled or exceeded background UTLs (where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Eight of the 14 individual PAHs also had EqP ESVs and there were no exceedances for three of these chemicals.

Area-specific Evaluation – Northern Ditch. Area-specific maximum, mean, and 95% UCL surface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-67**. **Table L-67** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Lead and zinc were the only metals with HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available). They were identified as COPCs for further risk evaluation (**Section L.5.5**).

One pesticide (4,4'-DDT) and bis(2-ethylhexyl)phthalate had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were

identified as COPCs for further risk evaluation (**Section L.5.5**). These chemicals had both SLC and EqP ESVs; the EqP ESVs were not exceeded.

Nine PAHs (plus LMW and total PAHs) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Five of the nine individual PAHs also had EqP ESVs and there were no exceedances for two of these PAHs and no 95% UCL exceedances for one other.

L.5.4.1.3 Subsurface Sediment

Site-wide subsurface sediment concentrations were first compared to SLC ESVs. Chemicals that equaled or exceeded ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. The area-specific screening tables include comparisons to both SLC and EqP ESVs and both are used when selecting COPCs. The role of bioavailability is discussed further in the risk evaluation section (**Section L.5.5**). There were no subsurface sediment samples collected in the Northern Ditch.

Site-wide Evaluation. Site-wide maximum subsurface sediment concentrations are compared to SLC sediment ESVs in **Table L-68**. **Table L-69** identifies the exceedances of SLC ESVs and background UTLs for each subsurface sediment sample. Thirteen metals (aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel, silver, vanadium, and zinc), two PCB Aroclors (1254 and 1260), ten pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, endrin aldehyde, endrin ketone, gamma-chlordane, and heptachlor epoxide), di-n-butylphthalate, and 13 PAHs (plus HMW, LMW, and total PAHs) exceeded ESVs based on maximum detected concentrations (**Tables L-68 and L-69**). Three inorganics (beryllium, cyanide, and thallium), four pesticides (endosulfan I, endosulfan II, endosulfan sulfate, and methoxychlor), two SVOCs (butylbenzylphthalate and pentachlorophenol), and nine VOCs (1,2-dichlorobenzene, 1,4-dichlorobenzene, 2-butanone, 4-methyl-2-pentanone, acetone, carbon disulfide, methyl acetate, methylcyclohexane, and tetrachloroethene) were detected in at least one subsurface sediment sample but ESVs were not available. These 60 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

Four PCB Aroclors (1016, 1221, 1232, and 1242), five pesticides (aldrin, alpha-, beta-, and delta-BHC, and lindane), and four SVOCs (2-methylnaphthalene, diethylphthalate, hexachlorobenzene, and phenol) were not detected but maximum detection limits equaled or exceeded ESVs. These 13 chemicals were also identified as initial (Step 2) COPCs but were not carried into the area-specific evaluations. Instead, they were evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Upstream Pond. Area-specific maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-70**. **Table L-70** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Four metals (barium, cadmium, lead, and silver) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded available background UTLs. Beryllium did not have an ESV but the maximum background UTL ratio was only 1.04 and there was only a single background UTL exceedance so it was not retained. Thus, barium, cadmium, lead, and silver were identified as COPCs for further risk evaluation (**Section L.5.5**).

Two PCB Aroclors (1254 and 1260) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and were identified as COPCs for further risk evaluation (**Section L.5.5**) although the EqP HQs based on the 95% UCL did not exceed 1 and there was only a single EqP ESV exceedance (for Aroclor-1254). Eleven pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan II, endrin, endrin aldehyde, endrin ketone, gamma-chlordane, heptachlor epoxide, and methoxychlor) had SLC HQs (or EqP HQs if the chemical lacked a SLC ESV) that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available); all were identified as COPCs for further risk evaluation (**Section L.5.5**). Nine of these 11 pesticides had both SLC and EqP ESVs; the EqP ESV was not exceeded in four of these instances and the 95% UCL HQ was exceeded in only two of these instances.

Five PAHs (plus LMW and total PAHs) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs (where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Two of the five individual PAHs also had EqP ESVs and there were no exceedances for either of these PAHs.

Thallium and two VOCs (methyl acetate and methylcyclohexane) were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Thallium was identified as a COPC for further risk evaluation (**Section L.5.5**). Methyl acetate and methylcyclohexane were detected at maximum concentrations (4.00 and 2.00 µg/kg, respectively) that were generally less than sediment EqP ESVs for other VOCs, which ranged from 0.14 to 24,288 µg/kg, with a median value of 924 µg/kg, when adjusted for area-specific TOC (**Table L-31**). Thus, these two chemicals were not identified as COPCs for further risk evaluation.

Area-specific Evaluation – Site 4 Streams. Area-specific maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-71**. **Table L-71** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Chromium and vanadium were the only metals with HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available). Beryllium, which did not have an ESV, exceeded the background UTL. All three of these metals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Four pesticides (4,4'-DDD, 4,4'-DDT, dieldrin, and endrin aldehyde) had SLC HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available); all were identified as COPCs for further risk evaluation (**Section L.5.5**). However, all four of these pesticides had both SLC and EqP ESVs and the EqP ESVs were not exceeded.

One PAH (but not HMW, LMW, or total PAHs) had a SLC HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs. Dibenz(a,h)anthracene was identified as a COPC for further risk evaluation (**Section L.5.5**).

Area-specific Evaluation – Youth Pond. Area-specific maximum, mean, and 95% UCL subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-72**. **Table L-72** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Two metals (arsenic and barium) had HQs that equaled or exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs. Beryllium, which did not have an ESV, exceeded the background UTL. These three metals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Aroclor 1260 had a SLC HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a COPC for further risk evaluation (**Section L.5.5**) although the EqP ESV was not exceeded. One pesticide (4,4'-DDD) had a SLC HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and was identified as a COPC for further risk evaluation (**Section L.5.5**). This pesticide had both SLC and EqP ESVs; the EqP ESV was not exceeded.

Thallium, cyanide, and methylcyclohexane were detected but neither a SLC ESV, an EqP ESV, nor a background UTL was available. Thallium and cyanide were identified as COPCs for further risk evaluation (**Section L.5.5**). Methylcyclohexane was detected at a maximum concentration (0.70 µg/kg) that was generally less than sediment EqP ESVs for other VOCs, which ranged from 0.28 to 50,508 µg/kg, with a median value of 1,922 µg/kg, when adjusted for area-specific TOC (**Table L-31**). Thus, this chemical was not identified as a COPC for further risk evaluation.

Area-specific Evaluation – York River Ditch. Area-specific maximum (means and 95% UCLs were not considered because there was only a single sample in this spatial group) subsurface sediment concentrations are compared to both SLC and EqP ESVs in **Table L-73**. **Table L-73** also contains a comparison against background UTLs (where available) for chemicals that equaled or exceeded SLC ESVs based on 95% UCL concentrations. Thirteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also exceeded background UTLs

(where available). They were all identified as COPCs for further risk evaluation (**Section L.5.5**). Six of the 13 individual PAHs also had EqP ESVs and they were exceeded for five of the six.

L.5.4.1.4 Frog Tissue

Site-wide whole-body frog tissue concentrations were first compared to ESVs based on No Observed Effect Concentrations (NOECs). Chemicals that exceeded NOEC ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. Total PCBs were evaluated as the sum of the detections in the ten PCB homologue groups. Dioxin-like PCBs were evaluated as the total TEQ calculated using fish TEFs. The area-specific screening tables include comparisons to both NOEC and Lowest Observed Effect Concentration (LOEC) ESVs and both were considered when selecting COPCs.

Site-wide Evaluation. Site-wide maximum frog tissue concentrations are compared to ESVs in **Table L-74**. **Table L-75** identifies the exceedances of ESVs and maximum reference concentrations for each frog tissue sample. Three metals (aluminum, nickel, and zinc) equaled or exceeded ESVs based on maximum detected concentrations. Arsenic, beryllium, chromium, cobalt, manganese, mercury, selenium, silver, vanadium, and dioxin-like PCBs were detected in at least one frog tissue sample but an ESV was not available. These 13 chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

Area-specific Evaluation – Upstream Pond. Area-specific maximum, mean, and 95% UCL frog tissue concentrations are compared to ESVs in **Table L-76**. **Table L-76** also contains a comparison against maximum reference concentrations for chemicals that equaled or exceeded ESVs based on 95% UCL concentrations. Three metals (aluminum, nickel, and zinc) equaled or exceeded NOEC ESVs based on detected 95% UCL concentrations and also equaled or exceeded maximum reference concentrations (where available). Only aluminum equaled or exceeded ESVs based on the LOEC. Aluminum was identified as a COPC for further risk evaluation. Arsenic, beryllium, chromium, cobalt, manganese, mercury, selenium, silver, vanadium, and dioxin-like PCBs were detected in at least one frog tissue sample but an ESV was not available. Where available, each of these ten chemicals also exceeded the maximum reference concentration. These ten chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**).

Area-specific Evaluation – Youth Pond. Area-specific maximum, mean, and 95% UCL frog tissue concentrations are compared to ESVs in **Table L-77**. **Table L-77** also contains a comparison against maximum reference concentrations for chemicals that equaled or exceeded ESVs based on 95% UCL concentrations. Two metals (aluminum and zinc) equaled or exceeded NOEC ESVs based on detected 95% UCL concentrations and also equaled or exceeded maximum reference concentrations. Only aluminum equaled or exceeded ESVs based on the LOEC. Aluminum was identified as a COPC for further risk evaluation. Arsenic, chromium, mercury, selenium, and vanadium were detected in at least one frog tissue sample but an ESV was not available. Where available, each of these chemicals also equaled or exceeded the maximum reference concentration. These five chemicals were identified as COPCs for further risk evaluation (**Section L.5.5**).

L.5.4.1.5 Fish Tissue

Site-wide whole-body fish tissue concentrations were first compared to ESVs based on NOECs. Chemicals that equaled or exceeded NOEC ESVs based on maximum concentrations, on a site-wide basis, were then evaluated using the spatial groupings defined in **Section L.3.2**. Total PCBs were evaluated as the sum of the detections in the ten PCB homologue groups. Dioxin-like PCBs were evaluated as the total TEQ calculated using fish TEFs. The area-specific screening tables include comparisons to both NOEC and LOEC ESVs and both were considered when selecting COPCs.

Site-wide Evaluation. Site-wide maximum fish tissue concentrations are compared to ESVs in **Table L-78**. **Table L-79** identifies the exceedances of ESVs and maximum reference concentrations for each fish tissue sample. Two metals (aluminum and zinc) equaled or exceeded ESVs based on maximum detected concentrations. Barium, cobalt, iron, and manganese were detected in at least one fish tissue sample but an ESV was not available. These six chemicals were identified as initial (Step 2) COPCs for area-specific evaluation.

Silver was not detected but maximum detection limits equaled or exceeded ESVs. Silver was also identified as an initial (Step 2) COPC but was not carried into the area-specific evaluations. Instead, it was evaluated further in the uncertainty section (**Section L.6**).

Area-specific Evaluation – Upstream Pond. Area-specific maximum, mean, and 95% UCL fish tissue concentrations are compared to ESVs in **Table L-80**. **Table L-80** also contains a comparison against maximum reference concentrations for chemicals that equaled or exceeded NOEC ESVs based on 95% UCL concentrations. Only aluminum equaled or exceeded NOEC ESVs based on detected 95% UCL concentrations and also equaled or exceeded maximum reference concentrations. Maximum aluminum concentrations also equaled or exceeded ESVs based on the LOEC. Aluminum was identified as a COPC for further risk evaluation. Barium, iron, and manganese did not have ESVs but each equaled or exceeded its maximum reference concentration. These three metals were also identified as COPCs for further risk evaluation (**Section L.5.5**).

Area-specific Evaluation – Youth Pond. Area-specific maximum, mean, and 95% UCL fish tissue concentrations are compared to ESVs in **Table L-81**. **Table L-81** also contains a comparison against maximum reference concentrations for chemicals that equaled or exceeded NOEC ESVs based on 95% percent UCL concentrations. No chemical equaled or exceeded its NOEC ESV based on detected 95% UCL concentrations and also equaled or exceeded maximum reference concentrations. Barium and manganese did not have ESVs but each equaled or exceeded its maximum reference concentration. These two metals were identified as COPCs for further risk evaluation (**Section L.5.5**).

L.5.4.2 Aquatic Food Web Exposures

Site-wide (Upstream Pond, Site 4 streams, and Youth Pond) aquatic food web exposures were evaluated first. Aquatic food web exposures were also evaluated using the spatial groupings (Upstream Pond/Site 4 streams and Youth Pond) defined in **Section L.3.2**. Total PCBs in tissue were included as the sum of the detections in the ten PCB homologue groups and (for surface water and surface sediment) as the sum total of the detected Aroclors. Dioxin-like PCBs in tissue were evaluated as the total TEQ calculated using bird and mammal TEFs. The site-wide and area-specific summary tables include comparisons based on the maximum, 95% UCL, and mean exposure doses and for the NOAEL, MATC, and LOAEL. For each of the spatial evaluations, Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 7, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the 95% UCL-based MATC was generally considered an unacceptable risk at Step 7, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

Site-wide Evaluation. HQs based on maximum exposure doses for each upper trophic level aquatic receptor are listed in **Table L-82** (calculations are shown in **Attachment L-2**). Based on a comparison to NOAELs, five metals (arsenic, copper, lead, mercury, and selenium), PCBs (Aroclor-1221, Aroclor-1254, Aroclor-1260, total PCBs, and dioxin-like PCBs), nine pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan II, endrin, gamma-chlordane, heptachlor epoxide, and toxaphene), pyrene, and hexachlorobenzene had HQs equaling or exceeding 1 for one or more receptors. The exceedances for Aroclor-1221, toxaphene, and hexachlorobenzene were based on maximum reporting limits, which were elevated for toxaphene and hexachlorobenzene. Ingestion TRVs were not available for any receptor for 1,2,4,5-tetrachlorobenzene, 4-bromophenyl-phenylether, and 4-chlorophenyl-phenylether, none of which was detected in surface water or surface sediment.

HQs based on 95% UCL exposure doses for each upper trophic level aquatic receptor are listed in **Table L-83** (calculations are shown in **Attachment L-2**). Based on a comparison to NOAELs, only PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) and one pesticide (endrin) had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC and LOAEL for any receptor.

HQs based on the arithmetic mean for each aquatic upper trophic level receptor are listed in **Table L-84** (calculations are shown in **Attachment L-2**). Based on a comparison to NOAELs, only PCBs (total PCBs and dioxin-

like PCBs) had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC and LOAEL for any receptor.

Based on these results, no chemicals were identified as COPCs for further risk evaluation.

Upstream Pond and Site 4 Streams. HQs based on maximum exposure doses for each upper trophic level aquatic receptor are listed in **Table L-85** (calculations are shown in **Attachment L-3**). Based on a comparison to NOAELs, four metals (arsenic, copper, lead, and mercury), PCBs (Aroclor-1221, Aroclor-1254, Aroclor-1260, total PCBs, and dioxin-like PCBs), eight pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan II, endrin, gamma-chlordane, and heptachlor epoxide), pyrene, and hexachlorobenzene had HQs equaling or exceeding 1 for one or more receptors. The exceedances for Aroclor-1221 and hexachlorobenzene were based on maximum reporting limits, which were elevated for hexachlorobenzene. Ingestion TRVs were not available for any receptor for 1,2,4,5-tetrachlorobenzene, 4-bromophenyl-phenylether, and 4-chlorophenyl-phenylether, none of which was detected in surface water or surface sediment.

HQs based on 95% UCL exposure doses for each upper trophic level aquatic receptor are listed in **Table L-86** (calculations are shown in **Attachment L-3**). Based on a comparison to NOAELs, only PCBs (Aroclor-1254, Aroclor-1260, total PCBs, and dioxin-like PCBs) and two pesticides (dieldrin and endrin) had HQs equaling or exceeding 1 for one or more receptors. Based on the MATC, PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) and endrin had HQs that equaled or exceeded 1. The LOAEL TRV was not exceeded for any receptor.

HQs based on the arithmetic mean for each aquatic upper trophic level receptor are listed in **Table L-87** (calculations are shown in **Attachment L-3**). Based on a comparison to NOAELs, only PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) and endrin had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC and LOAEL for any receptor.

Based on these results, PCBs and endrin were identified as COPCs for further risk evaluation.

Youth Pond. HQs based on maximum exposure doses for each upper trophic level aquatic receptor are listed in **Table L-88** (calculations are shown in **Attachment L-4**). Based on a comparison to NOAELs, four metals (arsenic, copper, mercury, and selenium), dioxin-like PCBs, three pesticides (4,4'-DDE, 4,4'-DDT, and dieldrin), and pentachlorophenol had HQs equaling or exceeding 1 for one or more receptors. The exceedances for pentachlorophenol were based on maximum reporting limits, which were elevated. Ingestion TRVs were not available for any receptor for 1,2,4,5-tetrachlorobenzene, 4-bromophenyl-phenylether, and 4-chlorophenyl-phenylether, none of which was detected in surface water or surface sediment.

HQs based on 95% UCL exposure doses for each upper trophic level aquatic receptor are listed in **Table L-89** (calculations are shown in **Attachment L-4**). Based on a comparison to NOAELs, only arsenic and dioxin-like PCBs had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC and LOAEL for any receptor.

HQs based on the arithmetic mean for each aquatic upper trophic level receptor are listed in **Table L-90** (calculations are shown in **Attachment L-4**). Based on a comparison to NOAELs, only arsenic and dioxin-like PCBs had HQs equaling or exceeding 1 for one or more receptors. There were no exceedances based on the MATC and LOAEL for any receptor.

Based on these results, no chemicals were identified as COPCs for further risk evaluation.

L.5.4.3 Toxicity Testing

Sediment toxicity tests using the amphipod *Hyallella azteca* were conducted on surface sediment samples collected from Upstream Pond (6 locations) and the Cheatham Pond reference area (2 locations). Day 42 survival exceeded 80 percent in all samples, and growth and reproduction was evident at all site locations (**Table L-91**).

Survival at Day 28 was significantly reduced at one of the reference sites (SD02) relative to the control, and for site sample SD21 relative to one (SD04) of the two reference locations and the control. Survival at SD21, however, was almost 90 percent. There were no other significant differences for Day 28 survival in site samples relative to

either reference location or to the control. Survival at Day 35 and Day 42 was not significantly reduced relative to either reference location or to the control for any site sample (**Tables L-91 and L-92**).

Growth (mean dry weight) was significantly reduced relative to the control at one (SD04) of the two reference locations at Day 28 but not at Day 42 (**Tables L-91 and L-92**). At Day 28, growth (mean dry weight) was significantly reduced in two (SD18 and SD20) of the six site samples relative to the control and at SD18 relative to one of the reference samples (SD02). There were no significant differences for this endpoint at Day 42.

Growth (mean dry biomass) was significantly reduced relative to the control (but not relative to either reference location) at one (SD18) of the site locations at Day 28 but not at Day 42 (**Tables L-91 and L-92**). At Day 42, growth (mean dry biomass) was significantly reduced in three (SD19, SD22, and SD23) of the six site samples relative to one of the reference samples (SD04) but only if one of the replicates in the reference sample (which had disproportionally lower growth) was removed from the statistical analysis.

Day 35 reproduction (mean juveniles per amphipod) was significantly reduced relative to the control at one (SD22) site location and was significantly reduced relative to one of the reference locations (SD04) at two (SD22 and SD23) site locations (**Tables L-91 and L-92**). Total reproduction (Day 35 plus Day 42), however, was not significantly reduced for any of the site samples. Day 42 reproduction (mean juveniles per female) was not significantly reduced for any of the site samples (**Tables L-91 and L-92**). Total reproduction (Day 35 plus Day 42) was also not significantly reduced for any of the site samples.

In summary, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the site locations. At the conclusion of the test (Day 42), there were no significant differences relative to the control or reference locations for any of the endpoints tested.

L.5.4.4 Biological Surveys

Biological surveys for fish, frogs, and benthic macroinvertebrates were conducted at various locations within Upstream and Youth Ponds, as well as in a reference pond (Cheatham Pond). In Youth Pond, the dense macrophyte beds made sampling fish difficult. Two species of frogs, American bullfrog (16 specimens) and leopard frog (2 specimens), were collected (**Table L-5**). Mosquitofish were the most numerous fish present; American eel, bluegill, black crappie, and largemouth bass were also collected. None of the fish and frog specimens had any external abnormalities, deformities, or anomalies.

In Upstream Pond, fish were predominately found in the deeper pools in the center of the pond, except for mosquitofish, which occurred throughout the pond system (including at the headwaters of the streams). Two species of frogs, American bullfrog (27 adult specimens and 37 tadpole specimens) and leopard frog (1 specimen), were collected (**Table L-5**). Mosquitofish were the most numerous fish present; American eel, bluegill, brown bullhead, golden shiner, and largemouth bass were also collected. None of the fish and frog specimens had any external abnormalities, deformities, or anomalies. The number and diversity of fish species was surprising, particularly the presence of large-sized largemouth bass, given the small size and relative isolation of Upstream Pond, and the presence of a large population of bullfrogs. It is likely that some fish species (such as largemouth bass) move between Upstream and Youth Ponds via the connecting culvert. While it is not known if Youth Pond was ever officially stocked with fish, there is anecdotal evidence that small numbers of fish (sport fish species, but specific species not known) were unofficially moved from Cheatham Pond to Youth Pond for recreational purposes. Currently, fishing at both Youth and Cheatham Ponds is catch-and-release. Thus, it is highly likely that current fish populations in Upstream and Youth Ponds represent reproducing populations since there is little, if any, natural colonization potential from other areas. The presence of frog tadpoles also indicates that the frog population is actively reproducing.

Table L-4 summarizes the results of the benthic invertebrate surveys. Based on this survey, the communities were very similar between Youth and Upstream Ponds. A total of 163 organisms from 17 taxa were found in the 11 Youth Pond samples, while a total of 149 organisms from 14 taxa were found in the 10 Upstream Pond samples. The dominant organisms in Youth Pond were chironomids (midges), dragonflies (Anisoptera), oligochaetes

(worms), and damselflies (Zygoptera). The dominant organisms in Upstream Pond were chironomids (midges), dragonflies (Anisoptera), beetles (Coleoptera), damselflies (Zygoptera), and oligochaetes (worms).

Table L-93 compares the results of the benthic invertebrate surveys at the Upstream Pond and Youth Pond locations with those from the reference locations. The Site 4 reference locations were all placed in two embayments of this large pond and consisted of shallow, vegetated habitats. Because open water areas were also present in Upstream and Youth Ponds, but were not reflected in the Site 4 reference area, the reference samples collected for use in the Penniman Lake evaluation, which were collected in deeper open water areas of the reference pond, were also used.

A total of 128 organisms from 15 taxa were found in the five reference pond vegetated area samples, while a total of 52 organisms from 10 taxa were found in the five reference pond open water area samples (**Table L-93**). The dominant organisms (in order of relative abundance) in the reference pond vegetated area samples were chironomids (midges), dragonflies (Anisoptera), beetles (Coleoptera), oligochaetes (worms), and damselflies (Zygoptera). These same groups were the dominant organisms in both Youth and Upstream Ponds but with a slightly different ranking based on relative abundance. The dominant organisms (in order of relative abundance) in Youth Pond vegetated area samples were dragonflies (Anisoptera), oligochaetes (worms), damselflies (Zygoptera), chironomids (midges), and beetles (Coleoptera).The dominant organisms (in order of relative abundance) in Upstream Pond vegetated area samples were dragonflies (Anisoptera), beetles (Coleoptera), chironomids (midges), damselflies (Zygoptera), and oligochaetes (worms). The average (per sample) relative abundance and number of taxa, as compared to the reference area for vegetated habitats, were somewhat lower in Youth Pond (60 and 75 percent of reference) and Upstream Pond (59 and 63 percent of reference) but the two site ponds were very similar to one another. The increased number of taxa, in particular, at the reference area is not surprising because the reference samples were collected from small embayments in a very large lake and, thus, could be colonized much more easily from more diverse surrounding areas. Upstream and Youth Ponds, in contrast, are relatively isolated with inputs only from the storm water system (via underground culverts from mostly developed areas), and a flood control structure isolates them from the York River.

The dominant organisms in reference pond open water area samples were (in order of relative abundance) chironomids (midges) and oligochaetes (worms), as was the case in Youth Pond. In Upstream Pond, midges were numerically dominant (**Table L-93**). The average (per sample) relative abundance and number of taxa, as compared to the reference area for open water habitats, were somewhat higher in Youth Pond (131 and 111 percent of reference) and Upstream Pond (139 and 107 percent of reference) but the two site ponds were very similar to one another.

In summary, there do not appear to be any widespread impacts to the fish, frog, or benthic invertebrate communities in Upstream or Youth Ponds based on the limited, semi-quantitative biological survey that was conducted as part of this BERA.

L.5.5 Risk Evaluation

In this section, the various lines of evidence discussed in the previous section are integrated in order to evaluate the potential for unacceptable risks.

L.5.5.1 Terrestrial Habitats

Ten assessment endpoints were developed for terrestrial habitats on the site (**Table L-7**). Lines of evidence for terrestrial habitats included:

- Comparison of surface soil and shallow subsurface soil concentrations with ESVs
- Comparison of modeled dietary doses (using measured tissue concentrations in earthworms for metals and PCBs) with ingestion TRVs
- Comparison of site soil concentrations with background concentrations

No chemicals were identified as COPCs for further evaluation in the Developed Area northwest of Youth Pond (**Table L-45**). The Northern Ditch is evaluated as part of the aquatic risk evaluation (**Section L.5.5.2**).

In Site 4 surface soil, six metals (aluminum, arsenic, lead, mercury, selenium, and zinc), eight pesticides (aldrin, dieldrin, endosulfan I, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and lindane), PAHs (including the related chemicals carbazole and dibenzofuran), and acetone were identified as COPCs for further risk evaluation (**Tables L-42 through L-44**). Aluminum was only identified as a COPC in the area east of Upstream Pond (and was the only COPC from this area) due largely to the low measured soil pH in this area. The ratios to the background UTL for the two samples in this area were 1.28 and 1.60 so they were not highly elevated relative to background. Thus, potential ecological risks related to aluminum are not expected to be ecologically significant. In subsurface soil (**Tables L-49 through 51**), aluminum exceeded both the ESV and background UTL in seven samples and the maximum ratio to the background UTL for these samples (2.45) was higher than in surface soils (1.60). However, there was no discernible pattern to these subsurface exceedances and most were located outside of the buried waste areas, suggesting that they are not site-related and may reflect background conditions.

Arsenic exceeded ESVs in only a single surface soil sample from CAS04-SS13 (**Figure L-1**), which is within Buried Debris Area 1, but at a high magnitude (HQ of 19.2). A subsurface sample was not available from this location. Thus, arsenic is identified as a chemical of concern (COC) but the spatial extent is limited. Similarly, lead had only one significant exceedance (HQ of 6.61) of its ESV in surface soils, in sample CAA03-SS06 located off of the site next to Building 12. Thus, this exceedance is not site-related but may be related to materials storage that occurs in this area. Lead did not exceed ESVs in three surface soil samples collected on Site 4 downgradient of this location, indicating that it is not migrating onto the site. Also, lead did not exceed ESVs in the subsurface sample from this location. This location also had some of the most significant pesticide and PAH exceedances in surface soil samples.

Mercury equaled or exceeded ESVs in five surface soil samples, particularly in samples HA02, HA04, and HA05, located within Buried Debris Area 2 on the southern portion of the site. Mercury also equaled or exceeded ESVs in four subsurface soil samples, particularly in HA03, HA04, and HA05, in this same area. Thus, mercury was identified as a COC in both surface and subsurface soil, and although likely site-related, the spatial extent is likely limited to the eastern portion of Buried Debris Area 2.

Selenium exceeded ESVs in four surface soil samples from Site 4 but the maximum HQ was less than 2 and the mean HQs in the area-specific evaluations were less than 1. Selenium also exceeded ESVs in one subsurface soil sample but the maximum HQ was 1.50 and the mean HQs in the area-specific evaluations were less than 1. There was no discernible pattern to these exceedances, and the magnitude (HQs less than 2) and spatial extent (4 of 29 samples) of the exceedances was limited.

Zinc exceeded ESVs in five surface soil samples from Site 4; the maximum HQ was less than 3 and the mean HQs in the area-specific evaluations were less than 1. However, the two highest exceedances (HA04 and HA05) were in Buried Debris Area 2. In subsurface soils, the maximum HQ was about 3 and the mean HQs in the area-specific evaluations were less than 1. However, subsurface soil exceedances for zinc also occurred in the same general area as for surface soils. Thus, zinc was identified as a COC in both surface and subsurface soil, and although likely site-related, the spatial extent is likely limited to portions of Buried Debris Area 2.

PAH exceedances in surface soils were confined to CAA03-SS06 (discussed previously) and HA06, located in Buried Debris Area 1 near CAS04-SS13 (**Figure L-1**). There were no exceedances in subsurface samples. The exceedances in sample CAA03-SS06 (located off of the site next to Building 12) are not site-related but may be related to the ASTs or materials storage that occurs in this area. PAHs did not exceed ESVs in three surface samples collected on Site 4 downgradient of this location, indicating that PAHs are not migrating onto the site from this area. The exceedances related to HA06 may be site-related so PAHs are identified as COCs in surface soils.

The notable pesticide exceedances in surface soils were generally clustered in two samples, CAS04-SS06 (located off-site next to Building 12) and HA05 (located in the southern portion of Site 4 near the confluence of the two Site 4 streams). Pesticide ESV exceedances in subsurface soils were uncommon and of lower magnitude than in surface samples, occurring in only a few scattered samples for the three subsurface soil COPCs. This spatial

pattern suggests that pesticides are not site-related but are possibly related to materials storage activities at Building 12 and storm water inputs from Outfall 2.

Acetone was only identified as a COPC for further risk evaluation in the northwestern portion of Site 4 and did not have an available soil ESV or background UTL. Acetone was detected at a maximum concentration (640 µg/kg) that exceeded some soil ESVs for other VOCs, which ranged from 173 to 64,000 µg/kg, with a median value of 1,290 µg/kg (**Table L-28**). Only 2 of 12 surface soil samples had concentrations that exceeded 173 µg/kg, the lowest ESV for other VOCs. The mean soil concentration (140 µg/kg), however, was less than 173 µg/kg. In addition, the USEPA Region 5 soil ESV for acetone (based on back-calculated food web models) is 2,500 µg/kg, which is greater than the maximum detected concentration is surface soils. For these reasons, acetone was not identified as a COC in site soils.

Arsenic, dieldrin, dioxin-like PCBs, and pyrene were identified as COPCs for further risk evaluation in terrestrial food webs based on MATC exceedances of the 95% UCL exposure dose for the short-tailed shrew (**Table L-54**). However, as discussed above, arsenic, dieldrin, and pyrene concentrations were elevated due to high concentrations in single samples (CAS04-SS13 for arsenic, and CAA03-SS06 for dieldrin and pyrene; SS06 was located off-site next to Building 12). Only dieldrin exceeded based on the LOAEL for the 95% UCL exposure dose. None of these chemicals were identified as COCs for terrestrial food web exposures because the spatial distribution of chemical concentrations is unlikely to result in significant exposures, especially for dieldrin and pyrene given the location (developed area) of the high concentrations. PCBs were found in significant concentrations only at HA04 (600 µg/kg in surface soil and 330 µg/kg in subsurface soil for total PCBs) and HA05 (3,700 µg/kg in surface soil and 3,900 µg/kg in subsurface soil for total PCBs). These two samples are located in the southern portion of the site near the confluence of the two Site 4 streams where the only earthworm samples from the site were collected. The 95% UCL MATC HQ was 1.27 (shrew) and the LOAEL HQ was less than one. HQs based on Aroclors and total PCBs did not exceed 1 based on the NOAEL. The likely source of these PCBs is Outfall 2 since PCBs were not detected in subsurface soil samples except in this area (and thus are not site-related) and the PCBs likely were deposited in this area near the stream channel during flood events. PCBs were selected as terrestrial food web COCs for risk management consideration but the magnitude of the exceedances is marginal and PCBs are limited in spatial extent in soil samples.

In summary, arsenic, mercury, zinc, and PAHs were identified as COCs in surface and/or subsurface soils from Site 4 and are likely site-related, although PAHs also had non-site-related sources. Lead and pesticide exceedances are thought not to be site-related. The exceedances for all of these chemicals were spatially limited and likely have a low ecological risk potential on a site-wide and population-level basis. Similarly, PCBs were identified as terrestrial food web COCs but were also not site-related and their distribution in soils was spatially limited. The terrestrial areas of Site 4 consist of relatively mature forested habitats and any decision to conduct intrusive actions in this area should consider the potential impacts to these habitats that such actions would entail relative to the potential risks that have been identified.

L.5.5.2 Aquatic Habitats

Eleven assessment endpoints were developed for aquatic habitats on the site (**Table L-7**). Lines of evidence for aquatic habitats included:

- Sediment toxicity testing
- Comparison of modeled dietary doses (using measured tissue concentrations in frogs and fish for metals and PCBs) with ingestion TRVs
- Biological surveys (fish, frogs, and benthic macroinvertebrates)
- Comparison of site surface water, sediment, and tissue concentrations with background (reference) concentrations
- Bioavailability measures
- Comparison of surface water, sediment, and tissue concentrations with ESVs

The results of bioavailability measures and their potential influence on exposures are integrated into this section. For metals in surface water, the discussion focused on dissolved (filtered) versus total (unfiltered) concentrations. Although both total and dissolved surface water data were included in the screening tables, the dissolved metals data were used to select COCs at the conclusion of Step 7. USEPA (1996b) indicates that the dissolved metal fraction should be preferentially used compared to the total metal fraction in surface water evaluations because dissolved metal concentrations best represent the bioavailable fraction. High levels of suspended solids and sediment-adsorbed metals, which could be present in unfiltered samples, could result in overstating bioavailable surface water concentrations and thus potential exposures and risks. This is reflected in how the most recent Ambient Water Quality Criteria have been developed for many metals, that is, they are based on the dissolved fraction (USEPA, 2009a). The surface water samples from the site were slightly to moderately turbid (**Table L-2**).

For sediment, this discussion focused on the effect of TOC on the bioavailability of organic chemicals (based on equilibrium partitioning) and the effect of SEM/AVS on the bioavailability of certain metals (cadmium, copper, lead, mercury, nickel, silver, and zinc). SEM is the molar sum of the seven listed metals. AVS is the reactive pool of solid-phase sulfide that is available to bind metals and render them unavailable and nontoxic to biota. When AVS exceeds the sum SEM, that is, the ratio of SEM/AVS is less than one, these reactive metals are assumed to exist entirely in the form of metal sulfides, which are not bioavailable to benthic organisms. In addition, the focus of the risk evaluation is on surface sediments because there is typically little, if any, exposure potential to the deeper subsurface sediments (below the redox boundary) for the types of ecological receptors occurring in these types of aquatic habitats. Thus, COCs are selected only for surface sediments although it is noted when contamination for these COCs extends into the subsurface.

Upstream Pond and Site 4 Streams. Upstream Pond serves as a repository for storm water runoff from developed areas within its watershed as well as from the source areas evaluated as part of this RI. The principal source of PCBs, in particular, appears to be Outfall 2. Few chemicals exceeded both ESVs and background UTLs in the surface water of Upstream Pond and the Site 4 streams (**Tables L-58 and L-59**). In Upstream Pond, no metal exceeded both the ESV and the background UTL based on detected 95% UCL dissolved concentrations. In the Site 4 streams, only iron and manganese exceeded both the ESV and the background UTL based on detected 95% UCL dissolved concentrations and only in a single sample (CAS04-SW09) located in a small drainage channel that flows outside of Buried Debris Area 2 and enters the southeastern corner of Upstream Pond (**Figure L-1**). This drainage channel carries runoff primarily from the area near Building 11. Neither iron nor manganese exceeded ESVs and background UTLs in surface sediment samples from either Upstream Pond or the Site 4 streams. Nine PAHs were detected in surface water samples from Upstream Pond and the Site 4 streams, and two (benzo[a]pyrene and pyrene) exceeded ESVs in one or more samples (a third, chrysene, did not have an ESV). The PAH exceedances were likely the result of turbid samples since these PAHs have very low water solubility so would typically be associated with particulates. Thus, they would not be expected to be retained in the water column but be deposited to sediments. PAHs were COPCs in surface sediments from these water bodies.

In Upstream Pond surface sediment, eight metals (arsenic, barium, beryllium, cadmium, copper, lead, silver, and zinc) were identified as COPCs for further risk evaluation; cadmium was the only metal so identified in the Site 4 streams (the maximum HQ was 1.6 and the mean HQ did not exceed one in the streams) (**Tables L-63 and L-64**). Arsenic exceeded ESVs based on the 95% UCL, and beryllium did not have an ESV, but the maximum background UTL ratios were only 1.03 and 1.15, respectively, and there was only a single background UTL exceedance for each metal. Thus, neither of these metals was identified as a COC in Upstream Pond sediment. Barium was generally consistent with background, exceeding the background UTL in 7 of 31 samples but only exceeding by a factor of more than 1.5 in two of these samples from the pond. The maximum ratio (2.21) occurred in sample CAS04-SD04, located near D Street well away from site source areas. The other five metal COPCs were SEM metals. SEM/AVS ratios only exceeded 1 at three of the 14 Upstream Pond locations that had at least one exceedance of both ESVs and background UTLs for these five metals. Thus, the bioavailability of these metals is likely to be low in most of the pond but particularly in areas with the highest metal concentrations. However, relatively high concentrations of each of these metals occurred in some surface sediment samples with SEM/AVS ratios that were greater than 1, such as CAS04-SD03, located in a depositional area in the southern portion of the pond just downstream of

Buried Debris Area 2 and the inflow point of the Site 4 streams. Thus, localized impacts are possible in areas where these metals may be bioavailable and these five metals were identified as COCs in Upstream Pond surface sediment. Three (cadmium, lead, and silver) of these five metals were also identified as COPCs in subsurface sediment (**Tables L-70 and L-71**) so contamination may extend down to subsurface layers (although potential exposure would be very limited).

PCBs (predominantly Aroclors 1254 and 1260) in surface sediment were generally highest in the southern end of the pond (the maximum concentration [21,000 µg/kg for total PCBs] was at CAS04-SD03) although several relatively high concentrations (in excess of 1,000 µg/kg) also occurred in the northwestern corner of the pond (samples CAA03-SD02 and CAS04-SD10). Total PCB concentrations in the Site 4 streams were lower (maximum of 650 µg/kg for total PCBs), likely due to scouring in the upper end of this drainage system and lower TOC concentrations (mean of 2.37 percent in the streams versus 6.11 percent in the pond; **Table L-32**), although no PCB concentration in the streams exceeded the EqP ESV (maximum HQs based on the SLC ESV were about 8). TOC concentrations in the pond were higher and only the maximum PCB concentration exceeded the EqP ESV (HQ of 4.24), suggesting that bioavailability is limited (the maximum SLC HQ exceeded 100). Concentrations in subsurface sediments exceeded 1,000 µg/kg only in the sample where the highest surface concentration was observed. Thus, PCBs were identified as COCs in the sediment of Upstream Pond but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas as discussed previously in the terrestrial risk evaluation.

Eleven pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endosulfan II, endrin, endrin aldehyde, gamma-chlordane, heptachlor epoxide, and methoxychlor) were identified as COPCs for further risk evaluation in Upstream Pond and/or Site 4 stream surface sediment (**Tables L-63 and L-64**). As for PCBs, concentrations were lower in the streams than in the pond, and none of the four stream COPCs exceeded EqP ESVs. The highest surface sediment concentration for most of these pesticides was in CAS04-SD03, the same sample with the maximum PCB concentration, suggesting that the two have a common source (likely Outfall 2). The EqP ESVs were generally only exceeded in the sample with the maximum concentration. Thus, as for PCBs, pesticides (particularly dieldrin, endosulfan II, endrin, and methoxychlor, which exceeded 95% UCLs based on a comparison with EqP ESVs) were identified as COCs in the sediment of Upstream Pond (exceedances for these pesticides extend into the subsurface sediment) but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas.

Fourteen PAHs (plus HMW, LMW, and total PAHs) were identified as COPCs for further risk evaluation in Upstream Pond surface sediment (**Table L-63**). As for PCBs and pesticides, the highest concentrations of total PAHs occurred at CAS04-SD03 and concentrations were lower in the streams (where EqP ESVs were rarely exceeded for individual compounds and total PAHs were not COPCs) than in the pond. The majority of pond samples exceeded ESVs for total PAHs, which is not surprising given that this pond is the repository of urban runoff. Total PAHs did not often exceed ESVs in subsurface sediment samples (and the 95% UCL HQ was less than 1). Thus, PAHs were identified as COCs in the surface sediment of Upstream Pond but potential impacts are likely to be localized and these constituents are not likely related to Site 4 source areas.

Although metal, PCB, pesticide, and PAH COCs were identified in surface sediments from Upstream Pond, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the Upstream Pond locations. At the conclusion of the test (Day 42), there were no significant differences relative to the control or reference locations for any of the endpoints tested. The chemical concentrations found in the site samples included in this testing are summarized in **Table L-94**. Although none of these samples contained the maximum sediment concentrations for the COCs, metal (except silver), PCB, and PAH concentrations (pesticides were not measured in these sediment samples) in excess of ESVs were represented in these samples (for example, the maximum Aroclor-1260 concentration was 2,300 µg/kg). There also do not appear to be any widespread impacts to the benthic invertebrate community in Upstream Pond based on the limited, semi-quantitative biological survey that was conducted as part of this BERA.

Most of the frogs that were collected from Upstream Pond for tissue analysis came from the southern end of the pond near where the Site 4 stream enters. This is the area that generally had the highest surface sediment

concentrations, particularly for the organic COPCs. Although most of the detected metal COPCs in frog tissue samples from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, only aluminum and cobalt exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. Few of the detected metals had available frog tissue ESVs, and those that were available were NOECs unbounded by a LOEC (that is, there were no reported effects at the highest concentration tested or observed). LOECs for the three metals with NOEC values were estimated by multiplying the NOEC by an uncertainty factor of 5. Only the LOEC value for aluminum was exceeded. NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs, although the uncertainties are too high to warrant formally selecting frog tissue COCs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (tadpoles were present and were sampled) population of bullfrogs (and likely leopard frogs) in the pond and none of the sampled frogs had any external abnormalities or deformities.

Although most of the detected metal COPCs in fish tissue samples collected from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations, only aluminum exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. Aluminum was also the only COPC to exceed ESVs based on the LOEC and the maximum concentration (but not the 95% UCL concentration). Several detected metals (barium, iron, and manganese) without ESVs were selected as COPCs (**Table L-80**). However, none of these were selected as COCs because none were identified as COCs in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond and none of the sampled fish had any external abnormalities or deformities.

PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) and endrin were identified as COPCs for further risk evaluation in aquatic food webs based on MATC exceedances of the 95% UCL exposure dose for the tree swallow and mink (PCBs), and osprey (endrin) (**Table L-86**). However, the LOAEL TRV was not exceeded for any of these receptor-chemical combinations and the endrin exceedance is not likely to be biologically significant because the use of Upstream Pond by osprey is likely to be occasional at best. Further, there were no exceedances based on the MATC and LOAEL for the mean exposure scenarios. Receptors actually observed in Upstream Pond (raccoon and great blue heron) had 95% UCL HQs that were less than 1 based on the MATC. Thus, potential risks based on exposure to PCBs in aquatic food webs are marginal for this water body but Aroclor-1254, total PCBs, and dioxin-like PCBs are identified as COCs to allow for risk management consideration.

Upstream Pond contains a fairly abundant and diverse aquatic community given its small size and relative isolation. Any intrusive actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Youth Pond, connected to Upstream Pond. Further, the source of most of the organic COCs is likely to be urban runoff from the storm water system so there would also be the potential for recontamination following any intrusive action in the pond itself.

Youth Pond. Youth Pond serves as a repository for storm water runoff from developed areas within its watershed. There are no specific source areas associated with this pond. In surface water, only barium exceeded both the ESV and the background UTL based on detected 95% UCL dissolved concentrations; however, the maximum ratio to the background UTL was only 1.03 (**Table L-60**). Thus, no surface water COCs were identified for Youth Pond.

In Youth Pond surface sediment, eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) were identified as COPCs for further risk evaluation (**Table L-65**). The maximum HQ or ratio to the background UTL exceeded 3 only for mercury (3.09 but only one exceedance) and zinc (3.88; seven exceedances). Barium was generally consistent with background, exceeding the background UTL in 6 of 12 samples but only

exceeding by a factor of more than 1.4 in one of these samples from the pond. The maximum ratio (1.44) occurred in sample CAYP-SD10, located on the far eastern bank of the pond well away from the two culverts. There were no strong spatial patterns to the exceedances for these metals except that the maximum concentration for five of the eight occurred at CAYP-SD05, located at the southern end of the pond about 100 feet from the culvert connecting Youth Pond with Upstream Pond (**Figure L-1**). There were no exceedances, however, at CAYP-SD06, located right at the Youth Pond end of this culvert. In addition, only zinc exceeded its ESV (HQ of 1.32) at CAYP-SD01, located about 100 feet from where the Northern Ditch enters Youth Pond. SEM/AVS ratios exceeded 1 at all Youth Pond surface sediment locations. However, mean concentrations in Youth Pond surface sediment were comparable, except for selenium, to mean concentrations in surface sediment samples used in the Upstream Pond toxicity testing (**Table L-94**), which were not impacted. There also do not appear to be any widespread impacts to the benthic invertebrate community in Youth Pond based on the limited, semi-quantitative biological survey that was conducted as part of this BERA. Thus, the observed concentrations of these metals are not likely to result in adverse impacts to the benthic community in Youth Pond. However, these seven metals are identified as COCs because there is no single compelling line of evidence with which to eliminate them, although the weight of the available evidence suggests that risks are likely to be acceptable. Arsenic was the only one of these seven metals that was also identified as a COPC in subsurface sediment (**Table L-72**).

PCBs (Aroclor 1260) and three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were identified as COPCs for further risk evaluation in surface sediment (**Table L-65**). However, the frequency of exceedance was low for each of these chemicals and, except for 4,4'-DDT, none exceeded it EqP ESV. 4,4'-DDT did not exceed its EqP ESV based on the 95% UCL. No PCB or pesticide exceeded its EqP ESV in subsurface sediment. Total PAHs did not exceed both ESVs and background UTLs in surface sediments and no individual PAH compound exceeded its EqP ESV. Total PAHs were also not exceeded in subsurface sediments.

Few of the detected metals in frog tissue samples had available frog tissue ESVs, and those that were available were NOECs unbounded by a LOEC (that is, there were no reported effects at the highest concentration tested or observed). LOECs for the three metals with NOEC values were estimated by multiplying the NOEC by an uncertainty factor of 5. Only the LOEC value for aluminum was exceeded. NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs, although the uncertainties are too high to warrant formally selecting frog tissue COCs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (based on the presence of tadpoles) population of bullfrogs (and likely leopard frogs) in the pond and none of the sampled frogs had any external abnormalities or deformities.

Although most of the detected metal COPCs in fish tissue samples collected from Youth Pond exceeded concentrations in reference samples based on maximum concentrations, none exceeded background concentrations in the majority (more than half) of pond samples for metal COPCs with background concentrations. No COPC exceeded ESVs based on the LOEC and the maximum concentration. Two detected metals (barium and manganese) without ESVs were selected as COPCs for risk evaluation (**Table L-81**). However, neither of these metals was selected as a COC because neither was identified as a COC in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond and none of the sampled fish had any external abnormalities or deformities.

No food web COPCs were identified for Youth Pond (**Table L-89**); risks are acceptable for this pathway.

Youth Pond contains a fairly abundant and diverse aquatic community given its size and relative isolation. Any intrusive actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Upstream Pond, connected

to Youth Pond. Further, the source of the COCs is likely to be urban runoff from the storm water system so there would also be the potential for recontamination following any intrusive action in the pond itself.

York River Ditch. Lead was the only metal that exceeded ESVs and background UTLs in surface sediment (**Table L-66**). The HQ was 5.06 (and 4.35 compared with the background UTL). Lead was not exceeded in the subsurface sample. Fourteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also exceeded background UTLs (where available) in surface sediment. Eight of the 14 individual PAHs also had EqP ESVs and five of the eight were exceeded. These exceedances extended into the subsurface sample. Thus, lead and PAHs were identified as COCs in surface sediment. However, PAHs did not exceed ESVs and background UTLs in CAYP-SD03, located at the Youth Pond end of the York River Ditch nor were there exceedances at CAYP-SD04, the next closest sample within Youth Pond to the York River culvert. The source of these PAHs (and lead, which also did not exceed ESVs in either CAYP-SD03 or CAYP-SD04) does not appear to be Youth Pond.

Northern Ditch. Two metals (selenium and zinc) were identified as surface soil COPCs for risk evaluation in the Northern Ditch (**Table L-46**). Selenium only exceeded ESVs in 1 of the 4 samples from the upper portion of this ditch at a maximum HQ of 1.28. It did not exceed sediment ESVs. Lead and zinc were the only metals with a HQ that exceeded 1 based on detected 95% UCL concentrations and also exceeded background UTLs (where available) in surface sediment (**Table L-67**). Lead only exceeded sediment ESVs in 1 of 6 samples at a maximum HQ of 2.01. It did not exceed soil ESVs. Zinc exceeded both soil and sediment ESVs but only in the three samples from the upper portion of the ditch. The three samples from the lower portion of the ditch, including the portion of the ditch with viable aquatic habitat, did not exceed ESVs. Potential exposures in the upper portion of the ditch are minimal since the ditch is narrow and only holds water intermittently. One pesticide (4,4'-DDT), bis(2-ethylhexyl)phthalate, and nine PAHs (plus LMW and total PAHs) exceeded SLC ESVs. However, these exceedances occurred in the upper portion of the ditch; soil ESVs were not exceeded.

L.6 Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. In addition, the use of various models (such as uptake and food web exposures) carries with it some associated uncertainty as to how well the model reflects actual conditions. Since conservative assumptions were generally used in the exposure and effects assessments, these uncertainties are more likely to result in an overestimation rather than an underestimation of the likelihood and magnitude of risks to ecological receptors.

The ERA uses "standard" methods and typical ranges of values for EPCs (maximum, mean, and 95% UCL), TRVs (NOAEL, MATC, LOAEL), and other parameters. This results in risk estimates that adequately span the risk range from extremely conservative (screening estimates) to central tendency (mean baseline estimates). The uncertainties associated with many of the particular inputs to the risk estimates are discussed below. What constitutes an unacceptable risk within this risk range is ultimately a risk management decision.

The uncertainties in this BERA are mainly attributable to the following factors:

- Reporting Limits – Reporting limits for some undetected analytes exceeded applicable ESVs in some media. **Table L-95** summarizes these chemicals, by medium, and reports both the ratio of the minimum and maximum reporting limits to the ESV as well as the ratio of the mean value (calculated using one-half of the reporting limit for each sample) to the ESV. Because these chemicals were not detected, they are not known to be present on the site but the potential for unacceptable risks cannot be totally discounted because the reporting limits are higher than the ESVs. The magnitude of the ratios can be used to qualitatively evaluate the magnitude of the associated uncertainty (that is, higher ratios are indicative of a greater likelihood that chemicals are present at concentrations that exceed the ESV relative to lower ratios). In surface soil, six undetected chemicals exceeded reporting limits based on the mean ratio, which exceeded 3 for only one of the six. In subsurface soil, 14 undetected chemicals exceeded reporting limits based on the mean ratio, which exceeded 3 for only three of the 14. In surface water and sediment, mean reporting limits were generally less than five times ESVs. In tissue, no chemicals had a mean ratio that exceeded 1.

In summary, there were no chemicals with very high mean ratios, suggesting that the associated uncertainties are relatively low. Because standard analytical methods were used and the sample reporting limits were not elevated relative to the method reporting limits for the vast majority of samples and analytes, these uncertainties are considered acceptable and are unlikely to impact the conclusions of the BERA.

- Duplicate Analyses – When evaluating samples with field duplicates, the value used in the BERA was always the detect when one result was a detect and the duplicate was a non-detect, regardless of whether or not the non-detected value was higher. In these cases, the use of the detect has less uncertainty since it represents an actual measured value (versus an upper limit bound) and the two samples will have identical or similar reporting limits.
- Selection of COPCs – Chemicals without available ESVs for a medium were not retained as COPCs for risk evaluation unless they were detected. These uncertainties are unlikely to impact the conclusions of the BERA since these chemicals are not known to be present on the site.
- Ingestion TRVs – Data on the toxicity of many chemicals to the receptor species were sparse or lacking, requiring the extrapolation of data from other wildlife species or from laboratory studies with non-wildlife species. This is a typical limitation and extrapolation for ERAs because so few wildlife species have been tested directly for most chemicals. The uncertainties associated with toxicity extrapolation were minimized through the selection of the most appropriate test species for which suitable toxicity data were available. The factors considered in selecting a test species to represent a receptor species included taxonomic relatedness, trophic level, foraging method, and similarity of diet. It is difficult to predict if these extrapolations would result in overestimating or underestimating potential risks.

  A second uncertainty related to the derivation of ingestion TRVs applies to metals. Most of the toxicological studies on which the ingestion TRVs for metals were based used forms of the metal (such as salts) that have high water solubility and high bioavailability to receptors. Because the analytical samples on which site-specific exposure estimates were based measured total metal concentration, regardless of form, and these highly bioavailable forms are expected to compose only a fraction of the total metal concentration, this is likely to result in an overestimation of potential risks for these chemicals but not to the extent that it would unduly impact the conclusions of the BERA.

  A third source of uncertainty related to the derivation of ingestion-based TRVs applies to mercury and selenium. The ingestion-based TRVs used for these two metals were based on organometallic (methylated) forms. TRVs for inorganic forms tend to be substantially higher. Given that inorganic forms likely contribute significantly to the total mercury and selenium, the use of TRVs based on organometallic forms tends to make the TRVs for these metals extremely conservative and likely overestimates potential risk.
- Chemical Mixtures – Information on the toxicological effects of chemical interactions is generally lacking for ecological receptors, which required (as is standard for ERAs) that the chemicals be evaluated on a compound-by-compound basis during the comparison to ESVs and TRVs. This could result in an underestimation of risk (if there are additive or synergistic effects among chemicals) or an overestimation of risks (if there are antagonistic effects among chemicals). However, some of the lines of evidence evaluated in the BERA (such as biological surveys and sediment toxicity tests) reflect concurrent exposures to all chemicals present on the site.
- Receptor Species Selection – Amphibians and reptiles were selected as receptors in the BERA, but were not evaluated quantitatively (except for the comparison of frog tissue concentrations with tissue-based ESVs) even when exposure pathways were likely to be complete. For food web exposures, these taxa were evaluated using other fauna (birds and mammals) as surrogates due to the general lack of taxon-specific toxicological data. This represents an uncertainty in the BERA. It was also assumed that any reptiles and amphibians present on the site were not exposed to significantly higher concentrations of chemicals and were not more sensitive to chemicals than other receptor species evaluated in the BERA that were used as surrogates for these groups. This assumption was a source of uncertainty in the BERA. In addition, there is

some uncertainty associated with the use of specific receptor species to represent larger groups of organisms (such as guilds).

- Calculation of the Total Exposure Dose – For most chemicals, the contribution to the total dose from the inhalation route is insignificant for upper trophic level ecological receptors, especially relative to ingestion pathways. Thus, and given the general lack of data for evaluating this pathway (USEPA, 1999), the air pathway is not generally included in the total dose calculations for these ecological receptors. This could lead to an underestimation of the total dose to which these receptors are exposed. However, this underestimation is likely to be very small, especially given the relatively low frequency of detection and the low magnitude of the concentrations of volatile organic compounds (the constituents most likely to contribute to exposures via the inhalation route) in site soils and sediments. Exposure to chemicals present in surface soil and surface sediment via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. As for the inhalation pathway, there is a general lack of data for evaluating this pathway (USEPA, 1999) and not including this pathway in the calculation of the total dose is not likely to significantly underestimate total exposure, especially since incidental ingestion of surface soil or surface sediment during feeding, preening, or grooming activities is included in the total dose calculations.

- Food Web Exposure Modeling – Chemical concentrations in some terrestrial and aquatic food items (plants, benthic invertebrates, and small mammals) were modeled from measured surface soil or surface sediment concentrations and were not directly measured. The use of generic, literature-derived exposure models and BAFs introduces some uncertainty into the resulting estimates. The values selected and methodology employed were intended to provide a conservative (Step 2) or reasonable (Step 7) estimate of potential food web exposure concentrations. Tissue concentrations were directly measured for key food items (earthworms, fish, and frogs) and chemicals (metals and PCBs).

  Another source of uncertainty is the use of default assumptions for exposure parameters such as BCFs and BAFs. Although BCFs or BAFs for many bioaccumulative chemicals were readily available from the literature and were used in the BERA, the use of a default factor of 1.0 to estimate the concentration of some chemicals in receptor prey items is a source of uncertainty.

  AUFs were assumed to equal 1. This is a conservative assumption since a significant percentage of each upper trophic level receptor species' time could be spent foraging off-site in unimpacted areas or in areas where chemical concentrations are expected to be significantly lower.

- Mean Versus Maximum Media Concentrations – As is typical in a BERA, a finite number of samples of environmental media were used to develop the exposure estimates. The maximum measured concentration provides a conservative estimate for immobile biota or those with a limited home range. The most realistic exposure estimates for mobile species with relatively large home ranges and for species populations (even those that are immobile or have limited home ranges) are those based on the mean chemical concentrations in each medium to which these receptors are exposed. This is reflected in the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (USEPA, 1993a), which specify the use of average media concentrations. Given the mobility of the upper trophic level receptor species used in the BERA, the use of maximum chemical concentrations (rather than mean concentrations) in the SERA to estimate the exposure via food webs is very conservative. This conservatism was reduced to more realistic levels in the values selected for use in the BERA evaluation. The 95% UCL of the arithmetic mean was typically used quantitatively in the BERA portion of this ERA to represent the average exposure scenarios during COC selection.

- Comparisons to Background Concentrations – Background concentrations were used to judge the site-relatedness of individual chemicals. If site concentrations were consistent with background levels, it was assumed that the concentrations were not related to known site-related source areas. There exists the possibility that concentrations below background were indeed site-related, rendering the assumption false. However, the potential impact of this possibility is minimal since chemicals at concentrations consistent with

background should exhibit no different ecological effects than commonly occurring in areas not affected by releases, regardless of their source.

- Total Versus Dissolved Metals – USEPA guidance (USEPA, 1996b) indicates that the dissolved metal fraction should be preferentially used to the total metal fraction in surface water screening. Both total and dissolved concentrations were used in the BERA for the surface water screen. High levels of suspended solids and sediment-adsorbed metals would result in overstating bioavailable surface water concentrations and thus potential exposures and risks. Because of this, dissolved concentrations were used in the risk evaluation to select COCs.
- Toxicity Testing – During the conduct of the toxicity testing, a few replicates within some samples exhibited anomalous results relative to other replicates within the same sample. In some cases, these were flagged as outliers during the statistical evaluation. When this occurred, the statistical evaluation was conducted both with and without the outlying replicate (see **Appendix N**). In only one instance was there a difference in the results when the replicate was removed from the evaluation (for one of the two reference samples). This had a minimal impact on the results of the test because there was a second reference sample (as well as the control) that were not impacted by this issue.

L.7 Risk Summary and Conclusions

This section provides a summary of the results of the BERA and outlines the conclusions.

L.7.1 Terrestrial Habitats

In summary, arsenic, mercury, zinc, and PAHs were identified as COCs in surface and/or subsurface soils from Site 4 (**Table L-96**) and are likely site-related, although PAHs also had non-site-related sources. Lead and pesticide exceedances are thought not to be site-related. The exceedances for all of these chemicals were spatially limited and likely have a low ecological risk potential on a site-wide and population-level basis. Similarly, PCBs were identified as terrestrial food web COCs but were also not site-related and their distribution in soils was spatially limited. The terrestrial areas of Site 4 consist of relatively mature forested habitats and any decision to conduct intrusive actions in this area should consider the potential impacts to these habitats that such actions would entail relative to the potential risks that have been identified. There were no unacceptable risks for the Youth Pond terrestrial habitats (Developed Area and the upper portion of the Northern Ditch).

L.7.2 Aquatic Habitats

Aquatic habitats evaluated in this BERA included Upstream Pond/Site 4 streams, Youth Pond, the York River Ditch, and the Northern Ditch.

L.7.2.1 Upstream Pond and Site 4 Streams

Upstream Pond serves as a repository for storm water runoff from developed areas within its watershed as well as from the source areas evaluated as part of this RI. The principal source of PCBs, in particular, appears to be Outfall 2. Few chemicals exceeded both ESVs and background UTLs in the surface water of Upstream Pond and the Site 4 streams and none were identified as COCs. Although metal, PCB, pesticide, and PAH COCs were identified in surface sediments from Upstream Pond, the results of the sediment toxicity testing did not indicate any consistent impacts to organism survival, growth, or reproduction at any of the Upstream Pond locations. At the conclusion of the test (Day 42), there were no significant differences relative to the control or reference locations for any of the endpoints tested. Although none of the surface sediment samples used in the toxicity tests contained the maximum sediment concentrations for the COPCs, metal (except silver), PCB, and PAH concentrations (pesticides were not measured in these sediment samples) in excess of ESVs were represented in these samples. There also do not appear to be any widespread impacts to the benthic invertebrate community in Upstream Pond based on the semi-quantitative biological survey that was conducted as part of this BERA.

Most of the frogs that were collected from Upstream Pond for tissue analysis came from the southern end of the pond near where the Site 4 stream enters. This is the area that generally had the highest surface sediment concentrations, particularly for the organic COPCs. Most of the detected metal COPCs in frog tissue samples from

Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations but only aluminum and cobalt exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. Only the LOEC value for aluminum was exceeded. NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (tadpoles were present and were sampled) population of bullfrogs (and likely leopard frogs) in the pond and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples collected from Upstream Pond exceeded concentrations in reference area (background) samples based on maximum concentrations but only aluminum exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. Aluminum was also the only COPC to exceed ESVs based on the LOEC and the maximum concentration (but not the 95% UCL concentration). Several detected metals (barium, iron, and manganese) without ESVs were selected as COPCs. However, none of these were selected as COCs because none were identified as COCs in surface sediment from the pond. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple age classes present) population of several fish species in the pond and none of the sampled fish had any external abnormalities or deformities.

PCBs (Aroclor-1254, total PCBs, and dioxin-like PCBs) were selected as COCs in aquatic food webs based on MATC exceedances of the 95% UCL exposure dose for the tree swallow and mink. However, the LOAEL TRV was not exceeded for any of these receptor-chemical combinations. Further, there were no exceedances based on the MATC and LOAEL for the mean exposure scenarios. Receptors actually observed in Upstream Pond (raccoon and great blue heron) had 95% UCL HQs that were less than 1 based on the MATC. Thus, potential risks based on exposure to PCBs in aquatic food webs are marginal for this water body but are identified for risk management consideration.

Upstream Pond contains a fairly abundant and diverse aquatic community given its small size and relative isolation. Any intrusive actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Youth Pond, connected to Upstream Pond. Further, the source of most of the organic COCs is likely to be urban runoff from the storm water system so there would also be the potential for recontamination following any intrusive action in the pond itself.

L.7.2.2 Youth Pond

Youth Pond serves as a repository for storm water runoff from developed areas within its watershed. There are no specific source areas associated with this pond. No COCs were identified in surface water. In surface sediment, eight metals (arsenic, barium, cadmium, copper, lead, mercury, selenium, and zinc) were identified as COPCs for further risk evaluation. The maximum HQ or ratio to the background UTL exceeded 3 only for mercury (3.09 but only one exceedance) and zinc (3.88; seven exceedances). Barium was generally consistent with background, exceeding the background UTL in 6 of 12 samples but only exceeding by a factor of more than 1.4 in one of these samples from the pond. The maximum ratio (1.44) occurred in sample CAYP-SD10, located on the far eastern bank of the pond well away from the two culverts. There were no strong spatial patterns to the exceedances for these metals except that the maximum concentration for five of the eight occurred at SD05, located at the southern end of the pond about 100 feet from the culvert connecting Youth Pond with Upstream Pond. There were no exceedances, however, at SD06, located right at the Youth Pond end of this culvert. In addition, only zinc exceeded its ESV (HQ of 1.32) at SD01, located about 100 feet from where the Northern Ditch enters Youth Pond. SEM/AVS ratios exceeded 1 at all Youth Pond surface sediment locations. However, mean concentrations in Youth Pond surface sediment were comparable, except for selenium, to mean concentrations in surface sediment

samples from the Upstream Pond toxicity testing, which were not impacted. There also do not appear to be any widespread impacts to the benthic invertebrate community in Youth Pond based on the semi-quantitative biological survey that was conducted as part of this BERA. Thus, the observed concentrations of these metals are not likely to result in adverse impacts to the benthic community in Youth Pond. However, these seven metals are identified as COCs because there is no single compelling line of evidence with which to eliminate them, although the weight of the available evidence suggests that risks are likely to be acceptable. No organic COCs were identified for Youth Pond surface sediments.

Few of the detected metals in frog tissue samples had available frog tissue ESVs. Only the LOEC value for aluminum was exceeded. NOEC values based on total PCBs were not exceeded. If fish tissue ESVs were extrapolated to frog tissue results for chemicals without frog ESVs, only chromium (NOEC but not LOEC) exceeded the fish ESV based on maximum concentrations. This evaluation suggests that metals and PCBs are not accumulating in frog tissue at concentrations that would be harmful to the frogs. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing population of bullfrogs (and likely leopard frogs) in Youth Pond and none of the sampled frogs had any external abnormalities or deformities.

Most of the detected metal COPCs in fish tissue samples from Youth Pond exceeded concentrations in reference area (background) samples based on maximum concentrations but none exceeded background concentrations in the majority of pond samples for metal COPCs with background concentrations. No COPC exceeded ESVs based on the LOEC and the maximum concentration. This evaluation suggests that metals and PCBs are not accumulating in fish tissue at concentrations that would be harmful to the fish. This conclusion is also supported by the results of the biological surveys, which found an abundant and reproducing (multiple ages classes present) population of several fish species in the pond and none of the sampled fish had any external abnormalities or deformities.

No food web COCs were identified for Youth Pond; risks are acceptable for this pathway.

Youth Pond contains a fairly abundant and diverse aquatic community given its size and relative isolation. Any intrusive actions would have detrimental physical effects on the habitats and biota that are currently present. These impacts would likely persist for a considerable period of time if natural processes are relied upon for recolonization since there are no natural sources of colonizing organisms, other than Upstream Pond, connected to Youth Pond. Further, the source of the COCs is likely to be urban runoff from the storm water system so there would also be the potential for recontamination following any intrusive action in the pond itself.

L.7.2.3 York River Ditch

Lead was the only metal that exceeded ESVs and background UTLs in surface sediment from the York River Ditch. Lead was not exceeded in the subsurface sample. Fourteen PAHs (plus HMW, LMW, and total PAHs) had SLC HQs that equaled or exceeded 1 and also exceeded background UTLs (where available) in surface sediment. These exceedances extended into the subsurface sample. However, PAHs did not exceed ESVs and background UTLs in CAYP-SD03, located at the Youth Pond end of the York River Ditch nor were there exceedances at CAYP-SD04, the next closest sample within Youth Pond to the York River culvert. The source of these PAHs (and lead, which did not exceed ESVs in either CAYP-SD03 or CAYP-SD04) does not appear to be Youth Pond.

L.7.2.4 Northern Ditch

There were no unacceptable risks associated with the lower [aquatic] portion of the Northern Ditch.

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TABLE L-1

Physical Parameter Measurements - Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Area	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
Surface Soil												
Site 4 (AOC 3)	CAA03-SS01	CAA03-SS01-1109	11/3/2009	0-6	6,200	0.62	8.50	1.0	1.0	6.0	56.0	36.0
Site 4 (AOC 3)	CAA03-SS02	CAA03-SS02-1109	11/4/2009	0-6	36,000	3.60	7.70	25.0	6.0	7.0	34.0	28.0
Site 4 (AOC 3)	CAA03-SS03	CAA03-SS03-1109	11/4/2009	0-6	26,000	2.60	7.60	7.0	1.0	7.0	47.0	38.0
Site 4 (AOC 3)	CAA03-SS04	CAA03-SS04-1109	11/4/2009	0-6	24,000	2.40	7.00	0.0	1.0	6.0	52.0	41.0
Site 4 (AOC 3)	CAA03-SS05	CAA03-SS05-1109	11/4/2009	0-6	12,000	1.20	6.40	0.0	1.0	5.0	54.0	40.0
Site 4 (AOC 3)	CAA03-SS06	CAA03-SS06-1109	11/4/2009	0-6	33,000	3.30	8.30	27.0	7.0	12.0	36.0	18.0
Site 4 (AOC 3)	CAA03-SS07	CAA03-SS07-1109	11/5/2009	0-6	8,400	0.84	8.80	23.0	15.0	21.0	24.0	17.0
Site 4 (AOC 3)	CAA03-SS08	CAA03-SS08-1109	11/5/2009	0-6	37,000	3.70	6.50	0.0	1.0	3.0	61.0	35.0
Site 4 (AOC 3)	CAA03-SS08	CAA03-SS08P-1109	11/5/2009	0-6	51,000	5.10	5.90	0.0	0.0	5.0	59.0	36.0
Site 4 (AOC 3)	CAA03-SS09	CAA03-SS09-1109	11/5/2009	0-6	18,000	1.80	4.60	0.0	0.0	3.0	81.0	16.0
Site 4 (AOC 3)	CAA03-SS10	CAA03-SS10-1109	11/5/2009	0-6	18,000	1.80	5.00	0.0	0.0	6.0	70.0	24.0
Site 4	CAS004-4HA01	CAS004-4HA01-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA02	CAS004-4HA02-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA02	CAS004-4HA02D-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA03	CAS004-4HA03-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA04	CAS004-4HA04-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA05	CAS004-4HA05-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 (AOC 3)	CAS004-4HA06	CAS004-4HA06-00-1199	11/12/1999	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SS01	CAS04-SS01-1109	11/3/2009	0-6	5,600	0.56	5.00	0.0	0.0	5.0	65.0	30.0
Site 4	CAS04-SS02	CAS04-SS02-1109	11/3/2009	0-6	16,000	1.60	6.00	0.0	1.0	4.0	65.0	30.0
Site 4	CAS04-SS03	CAS04-SS03-1109	11/3/2009	0-6	17,000	1.70	5.20	0.0	0.0	5.0	64.0	31.0
Site 4	CAS04-SS04	CAS04-SS04-1109	11/3/2009	0-6	17,000	1.70	5.50	0.0	0.0	6.0	65.0	29.0
Site 4	CAS04-SS05	CAS04-SS05-1109	11/3/2009	0-6	18,000	1.80	4.60	0.0	0.0	4.0	59.0	37.0
Site 4	CAS04-SO06	CAS04-SS06-1012	10/23/2012	0-6	59,000	5.90	4.00	0.0	0.6	17.7	47.7	34.0
Site 4	CAS04-SO07	CAS04-SS07-1012	10/23/2012	0-6	32,000	3.20	3.90	0.1	0.3	8.7	55.1	35.8
Site 4	CAS04-SO08	CAS04-SS08-1012	10/23/2012	0-6	10,000	1.00	7.50	24.9	2.4	6.6	41.8	24.3
Site 4	CAS04-SO09	CAS04-SS09-1012	10/23/2012	0-6	36,000	3.60	6.50	9.8	5.5	13.9	49.1	21.7
Site 4	CAS04-SO10	CAS04-SS10-1012	10/23/2012	0-6	84,000	8.40	5.60	3.2	3.8	17.0	49.2	26.8
Site 4	CAS04-SO11	CAS04-SS11-1012	10/23/2012	0-6	11,000	1.10	4.90	2.3	2.0	8.9	53.6	33.2
Site 4	CAS04-SO12	CAS04-SS12-1012	10/23/2012	0-6	14,000	1.40	6.80	0.1	0.6	7.0	53.1	39.2
Site 4	CAS04-SO12	CAS04-SS12P-1012	10/23/2012	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SO13	CAS04-SS13-1012	10/23/2012	0-6	55,000	5.50	7.10	30.8	10.1	12.1	29.3	17.7
Site 4	CAS04-SO14	CAS04-SS14-1012	10/23/2012	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SO14	CAS04-SS14P-1012	10/23/2012	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SO15	CAS04-SS15-1012	10/23/2012	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SO01	CAYP-SS01-1012	10/19/2012	0-6	11,000	1.10	6.70	23.0	7.8	9.9	43.6	15.7
Youth Pond	CAYP-SO02	CAYP-SS02-1012	10/19/2012	0-6	3,800	0.38	6.70	0.6	0.3	3.9	37.2	58.0
Youth Pond	CAYP-SO03	CAYP-SS03-1012	10/19/2012	0-6	17,000	1.70	6.40	0.1	0.5	5.3	54.3	39.8
Youth Pond	CAYP-SO03	CAYP-SS03P-1012	10/19/2012	0-6	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SO04	CAYP-SS04-1012	10/19/2012	0-6	7,100	0.71	6.90	6.4	9.9	20.1	40.4	23.2

TABLE L-1

Physical Parameter Measurements - Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Area	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)				
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines
Youth Pond	CAYP-SO05	CAYP-SS05-1012	10/19/2012	0-6	11,000	1.10	6.30	0.5	1.0	7.9	61.8	28.8
Youth Pond	CAYP-SO06	CAYP-SS06-1012	10/19/2012	0-6	4,100	0.41	6.70	6.9	1.9	12.8	67.0	11.4
Subsurface Soil												
Site 4 (AOC 3)	CAA03-SB01	CAA03-SB01-1109	11/3/2009	6-24	3,900	0.39	8.10	1.0	1.0	6.0	57.0	35.0
Site 4 (AOC 3)	CAA03-SB02	CAA03-SB02-1109A	11/4/2009	6-24	8,400	0.84	7.60	5.0	2.0	6.0	48.0	39.0
Site 4 (AOC 3)	CAA03-SB03	CAA03-SB03-1109A	11/4/2009	6-24	5,400	0.54	8.20	0.0	1.0	5.0	51.0	43.0
Site 4 (AOC 3)	CAA03-SB04	CAA03-SB04-1109A	11/4/2009	6-24	18,000	1.80	8.30	2.0	1.0	7.0	49.0	41.0
Site 4 (AOC 3)	CAA03-SB05	CAA03-SB05-1109A	11/4/2009	6-24	5,300	0.53	7.30	1.0	0.0	5.0	52.0	42.0
Site 4 (AOC 3)	CAA03-SB06	CAA03-SB06-1109	11/4/2009	6-24	3,600	0.36	8.40	1.0	2.0	6.0	57.0	34.0
Site 4 (AOC 3)	CAA03-SB07	CAA03-SB07-1109	11/5/2009	6-24	14,000	1.40	7.20	2.0	5.0	9.0	46.0	38.0
Site 4 (AOC 3)	CAA03-SB08	CAA03-SB08-1109	11/5/2009	6-24	11,000	1.10	5.20	0.0	0.0	2.0	59.0	39.0
Site 4 (AOC 3)	CAA03-SB08	CAA03-SB08P-1109	11/5/2009	6-24	9,200	0.92	5.20	0.0	0.0	3.0	59.0	38.0
Site 4 (AOC 3)	CAA03-SB09	CAA03-SB09-1109	11/5/2009	6-24	5,700	0.57	4.60	0.0	0.0	1.0	54.0	45.0
Site 4 (AOC 3)	CAA03-SB10	CAA03-SB10-1109	11/5/2009	6-24	6,700	0.67	5.00	0.0	0.0	5.0	73.0	22.0
Site 4	CAS004-4HA02	CAS004-4-HA02-02-1199	11/12/1999	12-24	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA03	CAS004-4-HA03-02-1199	11/12/1999	12-24	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA04	CAS004-4-HA04-01-1199	11/12/1999	6-12	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA05	CAS004-4-HA05-01-1199	11/12/1999	6-12	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS004-4HA06	CAS004-4-HA06-02-1199	11/12/1999	12-24	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SB01	CAS04-SB01-1109	11/3/2009	6-24	4,800	0.48	5.00	0.0	0.0	5.0	50.0	45.0
Site 4	CAS04-SB02	CAS04-SB02-1109	11/3/2009	6-24	3,400	0.34	5.80	0.0	0.0	5.0	68.0	27.0
Site 4	CAS04-SB03	CAS04-SB03-1109	11/3/2009	6-24	6,100	0.61	4.70	0.0	0.0	3.0	44.0	53.0
Site 4	CAS04-SB04	CAS04-SB04-1109	11/3/2009	6-24	5,400	0.54	5.00	0.0	0.0	5.0	68.0	27.0
Site 4	CAS04-SB05	CAS04-SB05-1109	11/3/2009	6-24	3,400	0.34	4.40	0.0	0.0	2.0	65.0	33.0
Site 4	CAS04-SO06	CAS04-SB06-1012	10/23/2012	6-24	NS	NS	3.90	NS	NS	NS	NS	NS
Site 4	CAS04-SO06	CAS04-SB06P-1012	10/23/2012	6-24	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SO07	CAS04-SB07-1012	10/23/2012	6-24	NS	NS	4.00	NS	NS	NS	NS	NS
Site 4	CAS04-SO15	CAS04-SB15-1012	10/23/2012	6-24	NS	NS	NS	NS	NS	NS	NS	NS
Site 4	CAS04-SO16	CAS04-SB16-1012	10/23/2012	6-24	NS	NS	NS	NS	NS	NS	NS	NS

NS - Not Sampled
Shaded cells indicate field duplicates

TABLE L-2

Water Column Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^oC)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Site Samples													
Upstream Pond	CAA03-SW01	12/7/2009	NS	Top	196	3.4	7.52	7.32	0.360	NS	4.36	NS	32.0
Upstream Pond	CAA03-SW01	12/7/2009	NS	Middle	NS	8.1	7.68	7.29	0.370	NS	5.90	NS	13.0
Upstream Pond	CAA03-SW01	12/7/2009	NS	Bottom	NS	11.5	7.57	7.25	0.360	NS	4.90	NS	34.0
Upstream Pond	CAA03-SW02	12/7/2009	NS	Top	179	3.8	7.60	7.31	0.330	NS	12.30	NS	58.0
Upstream Pond	CAA03-SW02	12/7/2009	NS	Middle	NS	15.4	7.60	7.20	0.330	NS	4.56	NS	14.0
Upstream Pond	CAA03-SW02	12/7/2009	NS	Bottom	NS	32.1	7.61	7.19	0.330	NS	5.56	NS	28.0
Upstream Pond	CAA03-SW03	12/7/2009	NS	Top	170	3.3	8.30	6.72	0.320	NS	2.44	NS	182.0
Upstream Pond	CAA03-SW03	12/7/2009	NS	Middle	NS	4.1	7.96	7.03	0.310	NS	2.26	NS	156.0
Upstream Pond	CAA03-SW03	12/7/2009	NS	Bottom	NS	4.0	8.00	6.90	0.320	NS	2.26	NS	168.0
Upstream Pond	CAA03-SW04	12/7/2009	NS	Top	169	2.5	7.29	7.25	0.330	NS	2.26	NS	59.0
Upstream Pond	CAA03-SW04	12/7/2009	NS	Middle	NS	7.2	7.33	7.22	0.340	NS	2.26	NS	27.0
Upstream Pond	CAA03-SW04	12/7/2009	NS	Bottom	NS	23.1	7.42	7.18	0.340	NS	2.26	NS	51.0
Upstream Pond	CAS04-SW01	12/7/2009	NS	Top	166	3.2	7.06	7.25	0.310	NS	2.65	NS	-30.0
Upstream Pond	CAS04-SW01	12/7/2009	NS	Middle	NS	3.0	7.10	7.29	0.310	NS	3.33	NS	-4.0
Upstream Pond	CAS04-SW01	12/7/2009	NS	Bottom	NS	5.3	7.34	7.30	0.300	NS	4.13	NS	36.0
Upstream Pond	CAS04-SW02	12/7/2009	NS	Top	209	8.0	7.67	7.23	0.390	NS	5.48	NS	-6.0
Upstream Pond	CAS04-SW02	12/7/2009	NS	Middle	NS	7.0	7.68	7.24	0.400	NS	5.92	NS	-12.0
Upstream Pond	CAS04-SW02	12/7/2009	NS	Bottom	NS	14.0	7.65	7.25	0.400	NS	6.60	NS	-15.0
Upstream Pond	CAS04-SW03	12/7/2009	NS	Top	276	24.5	7.71	7.41	0.480	NS	8.46	NS	-59.0
Upstream Pond	CAS04-SW03	12/7/2009	NS	Middle	NS	204	7.66	7.40	0.480	NS	9.20	NS	-59.0
Upstream Pond	CAS04-SW03	12/7/2009	NS	Bottom	NS	9.17	9.63	7.42	0.480	NS	8.32	NS	-33.0
Upstream Pond	CAS04-SW04	12/7/2009	NS	Top	181	2.9	7.61	7.17	0.340	NS	2.26	NS	147.0
Upstream Pond	CAS04-SW04	12/7/2009	NS	Middle	NS	2.7	7.42	7.18	0.350	NS	2.26	NS	50.0
Upstream Pond	CAS04-SW04	12/7/2009	NS	Bottom	NS	8.7	7.45	7.14	0.340	NS	2.26	NS	97.0
Site 4 Streams	CAS04-SW05	12/8/2009	NS	Top	338	45.3	10.13	6.57	0.610	1.00	3.13	NS	-11.0
Site 4 Streams	CAS04-SW06	12/8/2009	NS	Top	330	1.4	10.71	7.42	0.600	1.00	2.35	NS	-1.0
Site 4 Streams	CAS04-SW07	12/8/2009	NS	Top	335	8.9	12.59	7.37	0.600	1.00	3.06	NS	37.0
Site 4 Streams	CAS04-SW08	12/8/2009	NS	Top	321	0.7	14.82	7.61	0.570	1.00	4.29	NS	69.0
Site 4 Streams	CAS04-SW09	12/8/2009	NS	Top	297	800	12.48	7.07	0.680	2.00	NS	NS	-114.0
Upstream Pond	CAS04-SD10	10/3/2012	0.0	--	--	--	--	--	--	--	--	--	--
Upstream Pond	CAS04-SD11	10/2/2012	0.2	--	--	--	--	--	--	--	--	--	--
Upstream Pond	CAS04-SD12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD13	10/3/2012	0.75	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD14	10/3/2012	0.75	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD15	10/3/2012	0.0	--	--	--	--	--	--	--	--	--	--
Site 4 Streams	CAS04-SD16	10/3/2012	0.0	--	--	--	--	--	--	--	--	--	--
Site 4 Streams	CAS04-SD17	10/3/2012	0.0	--	--	--	--	--	--	--	--	--	--
Upstream Pond	CAS04-SD18	10/2/2012	2.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD19	10/2/2012	2.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD20	10/1/2012	1.5 - 2.0	Top	NS	18.6	18.93	7.58	0.459	0.22	2.70	29.50	-43.9
Upstream Pond	CAS04-SD21	10/1/2012	1.5	Top	NS	72.2	18.95	7.56	0.429	0.21	5.60	60.20	-5.0

TABLE L-2

Water Column Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^oC)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Upstream Pond	CAS04-SD22	10/1/2012	0.5	Top	NS	61.0	19.18	7.58	0.441	0.21	6.51	70.00	-46.2
Upstream Pond	CAS04-SD23	10/2/2012	0.2	--	--	--	--	--	--	--	--	--	--
Upstream Pond	South-center (open water)	10/1/2012	1.5	Top	NS	27.3	19.05	7.54	0.435	0.21	5.04	54.20	-30.1
Upstream Pond	North-center (open water)	10/1/2012	1.75	Top	NS	67.1	18.91	7.58	0.434	0.21	5.17	55.00	-30.7
Upstream Pond	Northeast (open water)	10/1/2012	2.0	Top	NS	94.6	18.76	7.54	0.433	0.21	4.08	39.30	-80.1
Upstream Pond	Northeast (open water)	10/1/2012	2.25	Top	NS	24.5	18.71	7.52	0.435	0.21	3.86	38.60	-19.7
Upstream Pond	Northeast (open water)	10/1/2012	2.25	Top	NS	9.3	18.68	7.52	0.434	0.21	3.84	38.60	-31.4
Youth Pond	CAYP-SWSD01	10/2/2012	3.0	Top	NS	0.2	20.75	6.96	0.167	0.08	3.89	40.10	-90.8
Youth Pond	CAYP-SWSD01	10/11/2012	NS	0.5	80	9.4	18.45	6.52	0.213	0.10	3.98	NS	20.9
Youth Pond	CAYP-SWSD02	10/2/2012	4.0	Top	NS	4.6	20.52	7.16	0.187	0.09	2.98	36.40	-67.6
Youth Pond	CAYP-SWSD02	10/2/2012	4.0	Bottom	NS	4.1	20.51	7.15	0.187	0.09	2.87	35.80	-66.8
Youth Pond	CAYP-SWSD02	10/11/2012	3.5 - 4.0	Top	84	6.4	18.93	6.78	0.213	0.10	3.65	NS	7.7
Youth Pond	CAYP-SWSD03	10/11/2012	NS	0.5	88	4.9	18.31	6.98	0.232	0.11	4.25	NS	11.5
Youth Pond	CAYP-SWSD04	10/2/2012	5.0	Top	NS	16.8	20.56	7.20	0.200	0.09	3.77	41.90	-34.2
Youth Pond	CAYP-SWSD04	10/2/2012	5.0	Bottom	NS	12.3	20.48	7.18	0.208	0.09	3.20	38.10	-38.9
Youth Pond	CAYP-SWSD04	10/11/2012	3.5	0.5	90	7.9	18.20	6.87	0.237	0.11	4.77	NS	21.0
Youth Pond	CAYP-SWSD04	10/11/2012	3.5	2.5	NS	16.4	17.35	6.72	0.238	0.11	2.36	NS	-45.8
Youth Pond	CAYP-SWSD05	10/2/2012	NS	2.0	NS	20.5	21.04	7.27	0.240	0.11	3.54	38.90	-88.0
Youth Pond	CAYP-SWSD05	11/9/2012	NS	1.0	62	2.6	7.61	6.41	0.183	NS	5.42	NS	122.6
Youth Pond	CAYP-SWSD06	11/9/2012	2.5	1.5	240	1.3	9.17	7.45	0.466	0.23	5.61	NS	16.4
Youth Pond	CAYP-SD07	10/2/2012	4.5	Top	NS	22.2	20.42	7.04	0.189	0.09	3.86	43.40	-80.6
Youth Pond	CAYP-SD07	10/2/2012	4.5	Bottom	NS	20.1	20.49	7.06	0.187	0.09	3.79	42.80	-82.4
Youth Pond	CAYP-SD08	10/2/2012	6.0	Top	NS	18.6	20.66	7.19	0.192	0.09	2.64	28.60	-75.5
Youth Pond	CAYP-SD08	10/2/2012	6.0	Bottom	NS	12.1	20.58	7.18	0.188	0.09	2.50	27.70	-73.3
Youth Pond	CAYP-SD09	10/2/2012	1.5	Top	NS	33.9	21.43	7.08	0.183	0.09	1.87	21.00	-57.6
Youth Pond	CAYP-SD10	10/2/2012	2.0	Top	NS	28.0	21.26	7.09	0.186	0.09	1.76	19.50	-59.5
Youth Pond	CAYP-SD11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SD12	10/2/2012	2.0	Top	NS	0.30	20.14	7.14	0.260	0.13	1.48	12.80	-116.4
Youth Pond	CAYP-SD13	10/2/2012	4.0	Top	NS	25.9	20.48	7.06	0.208	0.10	1.78	19.80	-93.1
Youth Pond	CAYP-SD13	10/2/2012	4.0	Bottom	NS	12.3	20.46	7.08	0.209	0.10	1.50	17.80	-95.5
Youth Pond	CAYP-SD14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SD15	10/2/2012	0.7	0.7	NS	37.5	21.35	7.62	0.190	0.09	4.04	44.40	-66.2
Reference Samples													
Cheatham Pond	CAREFS04-SWSD01	10/3/2012	1.5	Top	NS	45.5	23.05	6.98	0.316	0.15	3.68	39.00	-104.8
Cheatham Pond	CAREFS04-SWSD01	10/3/2012	NS	NS	94	30.3	26.82	8.56	0.235	0.11	12.66	NS	-92.2
Cheatham Pond	CAREFS04-SWSD02	10/3/2012	0.8	Top	NS	114.3	22.08	6.89	0.372	0.18	3.55	40.10	-142.1
Cheatham Pond	CAREFS04-SWSD02	10/3/2012	0.25	0.25	98	77.4	26.42	7.68	0.259	0.12	8.80	NS	-101.4
Cheatham Pond	CAREFS04-SWSD03	10/3/2012	2.3	Top	NS	5.2	22.78	6.85	0.292	0.14	4.35	50.50	-125.9
Cheatham Pond	CAREFS04-SWSD03	10/3/2012	2.0	Top	76	46.4	26.40	9.16	0.284	0.13	11.42	NS	97.4
Cheatham Pond	CAREFS04-SWSD04	10/3/2012	1.0	Top	NS	103.4	23.30	7.45	0.431	0.21	2.83	33.20	-179.8
Cheatham Pond	CAREFS04-SWSD04	10/3/2012	0.5	0.5	160	102.7	25.40	7.92	0.434	0.21	7.87	NS	74.7
Cheatham Pond	CAREFS04-SWSD05	10/3/2012	1.5	Top	NS	68.8	23.00	7.35	0.424	0.20	4.35	51.20	-190.1

TABLE L-2

Water Column Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Date	Total Depth (feet)	Sample Depth (feet)	Hardness (MG/L)	Turbidity (NTU)	Temperature (^{o}C)	pH	Conductivity (ms/cm)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Oxidation Reduction Potential (mV)
Cheatham Pond	CAREFS04-SWSD05	10/3/2012	1.0	Top	120	73.8	24.60	7.62	0.364	0.17	6.10	NS	25.0
Cheatham Pond	CAREFPL-SWSD01	10/3/2012	3.0	Top	NS	8.3	21.71	7.32	0.283	0.13	5.12	67.50	-99.0
Cheatham Pond	CAREFPL-SWSD01	10/4/2012	2.5	Top	107	34.0	22.92	6.62	0.501	0.24	4.57	NS	40.7
Cheatham Pond	CAREFPL-SWSD02	10/3/2012	3.0	Top	NS	7.3	21.66	7.35	0.261	0.12	5.44	68.30	-67.6
Cheatham Pond	CAREFPL-SWSD02	10/4/2012	2.0	Top	98	27.6	22.99	7.47	0.264	0.13	5.64	NS	145.5
Cheatham Pond	CAREFPL-SWSD03	10/3/2012	3.0	Top	NS	17.8	22.10	7.06	0.252	0.12	5.75	69.80	-75.3
Cheatham Pond	CAREFPL-SWSD03	10/4/2012	2.5 - 3	Top	85.5	34.7	23.40	7.48	0.463	0.22	9.49	NS	16.4
Cheatham Pond	CAREFPL-SWSD04	10/3/2012	3.0	Top	NS	38.5	21.83	7.04	0.318	0.15	5.64	68.90	-78.5
Cheatham Pond	CAREFPL-SWSD04	10/4/2012	2.5 - 3	Top	96.3	30.0	24.20	8.88	0.243	0.11	9.30	NS	130.4
Cheatham Pond	CAREFPL-SWSD05	10/3/2012	2.5	Top	NS	18.7	22.40	7.07	0.273	0.13	5.35	67.30	-66.8
Cheatham Pond	CAREFPL-SWSD05	10/4/2012	2.5 - 3	Top	97.3	38.1	23.96	8.23	0.454	0.22	12.15	NS	5.1

NS - Not Sampled

TABLE L-3

Physical Sediment Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					Ammonia (MG/KG)	Sulfide (MG/KG)	SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines			
Surface Sediment - Site Samples															
Upstream Pond	CAA03-SD01	CAA03-SD01-1209A	12/9/2009	0-4	43,000	4.30	7.60	NS	NS	NS	NS	NS	NS	NS	0.93
Upstream Pond	CAA03-SD02	CAA03-SD02-1209A	12/9/2009	0-4	250,000	25.00	6.20	NS	NS	NS	NS	NS	NS	NS	**2.75**
Upstream Pond	CAA03-SD03	CAA03-SD03-1209A	12/9/2009	0-4	60,000	6.00	6.90	NS	NS	NS	NS	NS	NS	NS	**10.8**
Upstream Pond	CAA03-SD04	CAA03-SD04-1209A	12/9/2009	0-4	38,000	3.80	6.80	NS	NS	NS	NS	NS	NS	NS	0.23
Upstream Pond	CAS004-4SD01	CAS004-4-SED01-00-1199	11/12/1999	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD02	CAS004-4-SD02-00-1199	11/14/1999	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD03	CAS004-4-SD03-00-1199	11/13/1999	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD04	CAS004-4-SD04-00-1199	11/13/1999	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD04	CAS004-4-SD04-00D-1199	11/13/1999	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD01	CAS04-SD01-1209A	12/9/2009	0-4	25,000	2.50	6.30	NS	NS	NS	NS	NS	NS	NS	0.33
Upstream Pond	CAS04-SD01	CAS04-SD01P-1209A	12/9/2009	0-4	17,000	1.70	6.90	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD02	CAS04-SD02-1209A	12/9/2009	0-4	62,000	6.20	7.70	NS	NS	NS	NS	NS	NS	NS	**4.66**
Upstream Pond	CAS04-SD03	CAS04-SD03-1209A	12/9/2009	0-4	40,000	4.00	7.60	NS	NS	NS	NS	NS	NS	NS	**23.2**
Upstream Pond	CAS04-SD04	CAS04-SD04-1209A	12/9/2009	0-4	16,000	1.60	7.10	NS	NS	NS	NS	NS	NS	NS	**2.92**
Site 4 Streams	CAS04-SD05	CAS04-SD05-1209A	12/8/2009	0-4	36,000	3.60	7.40	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD06	CAS04-SD06-1209A	12/8/2009	0-4	19,000	1.90	8.00	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD07	CAS04-SD07-1209A	12/8/2009	0-4	2,300	0.23	8.20	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD07	CAS04-SD07P-1209A	12/8/2009	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD08	CAS04-SD08-1209A	12/8/2009	0-4	9,900	0.99	8.00	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD09	CAS04-SD09-1209A	12/8/2009	0-4	40,000	4.00	7.20	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD10	CAS04-SD10-1012	10/23/2012	0-4	88,000	8.80	6.50	3.60	3.00	2.00	13.50	77.90	NS	NS	0.15
Upstream Pond	CAS04-SD10	CAS04-SD10P-1012	10/23/2012	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD11	CAS04-SD11-1012	10/2/2012	0-4	58,000	5.80	6.70	1.50	1.50	1.60	30.20	65.20	NS	NS	0.18
Upstream Pond	CAS04-SD12	CAS04-SD12-1012	10/2/2012	0-4	100,000	10.00	6.20	8.10	2.80	3.90	53.70	31.50	NS	NS	0.25
Upstream Pond	CAS04-SD13	CAS04-SD13-1012	10/3/2012	0-4	12,000	1.20	6.80	0.00	1.80	6.20	90.40	1.60	NS	NS	0.52
Upstream Pond	CAS04-SD14	CAS04-SD14-1012	10/3/2012	0-4	33,000	3.30	6.80	0.00	1.90	5.70	83.80	8.60	NS	NS	0.28
Site 4 Streams	CAS04-SD15	CAS04-SD15-1012	10/11/2012	0-4	21,000	2.10	7.10	0.20	0.40	2.30	72.40	24.70	NS	NS	**10.8**
Site 4 Streams	CAS04-SD16	CAS04-SD16-1012	10/11/2012	0-4	8,200	0.82	7.40	0.30	0.10	1.50	74.90	23.20	NS	NS	**5.33**
Site 4 Streams	CAS04-SD17	CAS04-SD17-1012	10/11/2012	0-4	53,000	5.30	7.50	0.10	0.50	2.50	60.20	36.70	NS	NS	**7.36**
Upstream Pond	CAS04-SD18	CAS04-SD18-1012	10/2/2012	0-4	36,000	3.60	7.00	16.70	4.10	20.10	38.10	21.00	74.0	120 U	0.33
Upstream Pond	CAS04-SD19	CAS04-SD19-1012	10/2/2012	0-4	66,000	6.60	6.70	0.30	1.30	1.10	13.70	83.60	210	140 U	0.08
Upstream Pond	CAS04-SD20	CAS04-SD20-1012	10/2/2012	0-4	92,000	9.20	6.60	0.90	1.90	0.50	9.20	87.50	110	160 U	0.24
Upstream Pond	CAS04-SD21	CAS04-SD21-1012	10/2/2012	0-4	34,000	3.40	6.70	0.10	0.40	1.10	73.00	25.40	120	170 U	0.11
Upstream Pond	CAS04-SD22	CAS04-SD22-1012	10/2/2012	0-4	62,000	6.20	6.80	0.40	0.50	0.70	32.90	65.50	230	170 U	0.08
Upstream Pond	CAS04-SD23	CAS04-SD23-1012	10/2/2012	0-4	46,000	4.60	6.10	0.00	0.90	2.60	43.90	52.60	110	140 U	0.11
Youth Pond	CAYP-SWSD01	CAYP-SD01-1012	10/12/2012	0-4	15,000	1.50	6.70	0.60	0.60	5.00	80.90	12.90	NS	NS	**11.9**
Youth Pond	CAYP-SWSD02	CAYP-SD02-1012	10/22/2012	0-4	89,000	8.90	6.40	0.90	0.90	2.00	2.00	94.20	NS	NS	**8.09**
Youth Pond	CAYP-SWSD02	CAYP-SD02P-1012	10/22/2012	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SWSD03	CAYP-SD03-1012	10/11/2012	0-4	74,000	7.40	6.60	5.20	4.70	17.90	59.60	12.60	NS	NS	**10.3**
Youth Pond	CAYP-SWSD04	CAYP-SD04-1112	11/9/2012	0-4	46,000	4.60	6.70	0.30	2.20	7.30	41.20	49.00	NS	NS	**1.31**
Youth Pond	CAYP-SWSD05	CAYP-SD05-1112	11/9/2012	0-4	100,000	10.00	6.60	0.20	3.30	8.30	11.20	77.00	NS	NS	**8.35**
Youth Pond	CAYP-SWSD06	CAYP-SD06-1112	11/9/2012	0-4	13,000	1.30	7.00	1.90	3.00	10.20	72.50	12.40	NS	NS	**10.2**
Youth Pond	CAYP-SD07	CAYP-SD07-1012	10/22/2012	0-4	78,000	7.80	6.60	0.60	0.70	1.40	1.20	96.10	NS	NS	**8.92**
Youth Pond	CAYP-SD08	CAYP-SD08-1012	10/12/2012	0-4	46,000	4.60	6.50	2.30	2.60	9.60	67.60	17.90	NS	NS	**2.00**
Youth Pond	CAYP-SD09	CAYP-SD09-1012	10/22/2012	0-4	80,000	8.00	6.50	0.20	0.30	1.10	1.00	97.40	NS	NS	**1.81**
Youth Pond	CAYP-SD10	CAYP-SD10-1012	10/22/2012	0-4	120,000	12.00	6.50	0.10	0.20	0.90	1.50	97.30	NS	NS	**9.72**
Youth Pond	CAYP-SD11	CAYP-SD11-1012	10/11/2012	0-4	9,600	0.96	7.40	34.20	6.40	11.00	45.20	3.20	NS	NS	**2.81**
Youth Pond	CAYP-SD12	CAYP-SD12-1012	10/22/2012	0-4	180,000	18.00	6.80	0.40	0.80	1.50	1.50	95.80	NS	NS	**12.9**
Youth Pond	CAYP-SD12	CAYP-SD12P-1012	10/22/2012	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SD13	CAYP-SD13-1012	10/12/2012	0-4	41,000	4.10	7.00	15.80	16.50	14.70	21.40	31.60	NS	NS	**1.36**
Youth Pond	CAYP-SD14	CAYP-SD14-1012	10/12/2012	0-4	2,700	0.27	6.60	0.10	0.90	18.10	75.40	5.50	NS	NS	**6.32**
Youth Pond	CAYP-SD15	CAYP-SD15-1012	10/12/2012	0-4	2,700	0.27	6.90	0.50	0.40	9.50	81.20	8.40	NS	NS	**8.92**

TABLE L-3

Physical Sediment Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					Ammonia (MG/KG)	Sulfide (MG/KG)	SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines			
Surface Sediment - Reference Samples															
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SD01-1012	10/9/2012	0-4	170,000	17.00	6.90	0.00	4.10	18.50	26.50	50.90	NS	NS	0.06
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SD01P-1012	10/9/2012	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFS04-SWSD02	CAREFS04-SD02-1012	10/9/2012	0-4	150,000	15.00	6.60	0.00	5.20	26.70	33.60	34.50	380	720	0.01
Cheatham Pond	CAREFS04-SWSD03	CAREFS04-SD03-1012	10/10/2012	0-4	57,000	5.70	6.90	0.00	3.20	6.30	74.70	15.80	NS	NS	0.01
Cheatham Pond	CAREFS04-SWSD04	CAREFS04-SD04-1012	10/9/2012	0-4	100,000	10.00	6.90	0.00	0.80	3.60	19.50	76.10	270	880	0.01
Cheatham Pond	CAREFS04-SWSD05	CAREFS04-SD05-1012	10/9/2012	0-4	110,000	11.00	6.90	0.00	1.40	9.30	14.80	74.50	NS	NS	0.004
Cheatham Pond	CAREFPL-SWSD01	CAREFPL-SD01-1012	10/10/2012	0-4	56,100	5.61	6.86	0.00	1.80	6.40	81.10	10.70	NS	NS	0.06
Cheatham Pond	CAREFPL-SWSD02	CAREFPL-SD02-1012	10/10/2012	0-4	97,200	9.72	6.54	0.00	7.80	10.00	47.00	35.20	NS	NS	0.05
Cheatham Pond	CAREFPL-SWSD02	CAREFPL-SD02P-1012	10/10/2012	0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD03	CAREFPL-SD03-1012	10/10/2012	0-4	37,600	3.76	6.91	0.00	3.90	8.10	61.80	26.20	NS	NS	0.02
Cheatham Pond	CAREFPL-SWSD04	CAREFPL-SD04-1012	10/10/2012	0-4	51,700	5.17	6.75	1.60	3.90	9.30	69.00	16.20	NS	NS	0.04
Cheatham Pond	CAREFPL-SWSD05	CAREFPL-SD05-1012	10/10/2012	0-4	57,100	5.71	6.72	0.00	5.60	8.50	65.30	20.60	NS	NS	0.03
Cheatham Pond	Cheatham Pond-SD02	CP-00-POND-SD02-0300	3/30/2000	0-4	43,200	4.32	7.60	NS	NS	NS	NS	NS	NS	NS	0.05
Cheatham Pond	Cheatham Pond-SD02	CP-00-POND-SD02D-0300	3/30/2000	0-4	60,800	6.08	7.70	NS	NS	NS	NS	NS	NS	NS	0.03
Cheatham Pond	Cheatham Pond-SD03	CP-00-POND-SD03-0300	3/30/2000	0-4	108,000	10.80	8.00	NS	NS	NS	NS	NS	NS	NS	0.07
Cheatham Pond	Cheatham Pond-SD04	CP-00-POND-SD04-0300	3/30/2000	0-4	29,500	2.95	7.80	NS	NS	NS	NS	NS	NS	NS	0.11
Cheatham Pond	Cheatham Pond-SD05	CP-00-POND-SD05-0300	3/31/2000	0-4	46,700	4.67	7.70	NS	NS	NS	NS	NS	NS	NS	0.06
Cheatham Pond	Cheatham Pond-SD06	CP-00-POND-SD06-0300	3/31/2000	0-4	78,300	7.83	7.90	NS	NS	NS	NS	NS	NS	NS	0.06
Cheatham Pond	Cheatham Pond-SD07	CP-00-POND-SD07-0300	3/31/2000	0-4	12,700	1.27	7.30	NS	NS	NS	NS	NS	NS	NS	0.03
Cheatham Pond	Cheatham Pond-SD18	CP-00-POND-SD18-0300	3/30/2000	0-4	96,500	9.65	7.70	NS	NS	NS	NS	NS	NS	NS	0.09
Cheatham Pond	Cheatham Pond-SD19	CP-00-POND-SD19-0300	3/30/2000	0-4	68,500	6.85	7.80	NS	NS	NS	NS	NS	NS	NS	0.06
Subsurface Sediment - Site Samples															
Upstream Pond	CAA03-SD01	CAA03-SD01-1209B	12/9/2009	4-8	40,000	4.00	7.10	NS	NS	NS	NS	NS	NS	NS	0.50
Upstream Pond	CAA03-SD02	CAA03-SD02-1209B	12/9/2009	4-8	71,000	7.10	6.50	NS	NS	NS	NS	NS	NS	NS	**9.86**
Upstream Pond	CAA03-SD03	CAA03-SD03-1209B	12/9/2009	4-8	6,500	0.65	6.10	NS	NS	NS	NS	NS	NS	NS	**8.08**
Upstream Pond	CAA03-SD04	CAA03-SD04-1209B	12/9/2009	4-8	7,300	0.73	6.90	NS	NS	NS	NS	NS	NS	NS	**1.25**
Upstream Pond	CAS004-4SD01	CAS004-4-SED01-01-1199	11/12/1999	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD02	CAS004-4-SD02-01-1199	11/14/1999	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD03	CAS004-4-SD03-01-1199	11/13/1999	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS004-4SD04	CAS004-4-SD04-01-1199	11/13/1999	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD01	CAS04-SD01-1209B	12/9/2009	4-8	9,500	0.95	7.50	NS	NS	NS	NS	NS	NS	NS	0.44
Upstream Pond	CAS04-SD01	CAS04-SD01P-1209B	12/9/2009	4-8	17,000	1.70	7.60	NS	NS	NS	NS	NS	NS	NS	NS
Upstream Pond	CAS04-SD02	CAS04-SD02-1209B	12/9/2009	4-8	28,000	2.80	7.80	NS	NS	NS	NS	NS	NS	NS	0.77
Upstream Pond	CAS04-SD03	CAS04-SD03-1209B	12/9/2009	4-8	19,000	1.90	8.20	NS	NS	NS	NS	NS	NS	NS	**17.6**
Upstream Pond	CAS04-SD04	CAS04-SD04-1209B	12/9/2009	4-8	22,000	2.20	7.00	NS	NS	NS	NS	NS	NS	NS	**3.38**
Site 4 Streams	CAS04-SD05	CAS04-SD05-1209B	12/8/2009	4-8	14,000	1.40	7.80	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD06	CAS04-SD06-1209B	12/8/2009	4-8	34,000	3.40	7.90	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD07	CAS04-SD07-1209B	12/8/2009	4-8	2,400	0.24	8.00	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD07	CAS04-SD07P-1209B	12/8/2009	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD08	CAS04-SD08-1209B	12/8/2009	4-8	2,500	0.25	8.30	NS	NS	NS	NS	NS	NS	NS	NS
Site 4 Streams	CAS04-SD09	CAS04-SD09-1209B	12/8/2009	4-8	16,000	1.60	7.50	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SWSD01	CAYP-SSD01-1012	10/12/2012	4-8	3,200	0.32	6.50	0.20	0.20	4.90	90.70	4.00	NS	NS	**5.43**
Youth Pond	CAYP-SWSD02	CAYP-SSD02-1012	10/22/2012	4-8	73,000	7.30	6.30	0.60	0.80	2.20	1.60	94.80	NS	NS	**3.45**
Youth Pond	CAYP-SWSD02	CAYP-SSD02P-1012	10/22/2012	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Youth Pond	CAYP-SWSD03	CAYP-SSD03-1012	10/11/2012	4-8	28,000	2.80	6.60	1.40	1.80	9.30	65.50	22.00	NS	NS	**7.88**
Youth Pond	CAYP-SWSD04	CAYP-SSD04-1112	11/9/2012	4-8	33,000	3.30	6.70	0.20	0.80	7.20	74.40	17.40	NS	NS	**4.91**
Youth Pond	CAYP-SWSD05	CAYP-SSD05-1112	11/9/2012	4-8	69,000	6.90	6.60	0.20	0.90	3.20	24.70	71.00	NS	NS	**4.58**
Youth Pond	CAYP-SWSD06	CAYP-SSD06-1112	11/9/2012	4-8	12,000	1.20	7.20	14.80	3.20	9.70	56.60	15.70	NS	NS	0.88
Youth Pond	CAYP-SD07	CAYP-SSD07-1012	10/22/2012	4-8	69,000	6.90	6.40	0.40	1.20	1.80	1.30	95.30	NS	NS	**2.12**
Youth Pond	CAYP-SD08	CAYP-SSD08-1012	10/12/2012	4-8	16,000	1.60	6.20	0.10	0.20	2.80	70.30	26.60	NS	NS	**2.83**
Youth Pond	CAYP-SD09	CAYP-SSD09-1012	10/22/2012	4-8	64,000	6.40	6.20	0.20	0.90	1.20	0.90	96.80	NS	NS	**1.48**
Youth Pond	CAYP-SD10	CAYP-SSD10-1012	10/22/2012	4-8	99,000	9.90	6.40	2.00	0.50	1.20	1.60	94.70	NS	NS	**4.66**

TABLE L-3

Physical Sediment Parameter Measurements

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Station ID	Sample ID	Date	Depth (inches)	Total Organic Carbon		pH	Grain Size (percent)					Ammonia (MG/KG)	Sulfide (MG/KG)	SEM/AVS Ratio[1]
					mg/kg	percent		Gravel	Coarse Sand	Medium Sand	Fine Sand	Fines			
Youth Pond	CAYP-SD11	CAYP-SSD11-1012	10/11/2012	4-8	8,800	0.88	7.50	17.70	7.40	13.80	50.90	10.20	NS	NS	**2.83**
Youth Pond	CAYP-SD12	CAYP-SSD12-1012	10/22/2012	4-8	140,000	14.00	6.80	1.00	0.40	1.40	2.60	94.60	NS	NS	**5.86**
Youth Pond	CAYP-SD13	CAYP-SSD13-1012	10/12/2012	4-8	52,000	5.20	7.00	27.40	7.50	8.20	14.00	42.90	NS	NS	**1.22**
Subsurface Sediment - Reference Samples															
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SSD01-1012	10/9/2012	4-8	130,000	13.00	7.20	0.00	1.80	13.00	56.00	29.20	NS	NS	0.05
Cheatham Pond	CAREFS04-SWSD01	CAREFS04-SSD01P-1012	10/9/2012	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFS04-SWSD02	CAREFS04-SSD02-1012	10/9/2012	4-8	83,000	8.30	6.80	0.00	1.60	8.50	46.90	43.00	NS	NS	0.02
Cheatham Pond	CAREFS04-SWSD03	CAREFS04-SSD03-1012	10/10/2012	4-8	72,000	7.20	6.90	0.00	1.40	4.40	64.20	30.00	NS	NS	0.01
Cheatham Pond	CAREFS04-SWSD04	CAREFS04-SSD04-1012	10/9/2012	4-8	100,000	10.00	6.90	0.00	1.60	3.80	12.30	82.30	NS	NS	0.01
Cheatham Pond	CAREFS04-SWSD05	CAREFS04-SSD05-1012	10/9/2012	4-8	92,000	9.20	6.80	0.00	2.60	3.90	8.30	85.20	NS	NS	0.08
Cheatham Pond	CAREFPL-SWSD01	CAREFPL-SSD01-1012	10/10/2012	4-8	26,500	2.65	6.87	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD02	CAREFPL-SSD02-1012	10/10/2012	4-8	42,500	4.25	6.89	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD03	CAREFPL-SSD03-1012	10/10/2012	4-8	19,600	1.96	6.77	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD04	CAREFPL-SSD04-1012	10/10/2012	4-8	67,800	6.78	6.79	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD05	CAREFPL-SSD05-1012	10/10/2012	4-8	43,400	4.34	6.94	NS	NS	NS	NS	NS	NS	NS	NS
Cheatham Pond	CAREFPL-SWSD05	CAREFPL-SSD05P-1012	10/10/2012	4-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS - Not Sampled

Gray shaded cells indicate field duplicates

1 - Yellow shaded cells indicate AVS not detected (one-half of the detection limit was used in calculations); bolded values indicate ratios > 1

TABLE L-4

Sampling Results - 2012 Aquatic Biological Surveys

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																										
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
Youth Pond																																						
SD-1	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	0	0	3	1	0	0	0	0	4	3	1	1	0	0	1	0	0	0	1	0	3	0	0	0	18	9
SD-2	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	2	0	5	0	0	0	0	0	4	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	16	6
SD-3	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	0	0	3	0	0	0	0	0	7	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0	16	5
SD-4	10/8/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	1	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	5	0	0	0	16	6
SD-5	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	1	3	0	4	0	1	0	0	0	3	1	1	1	0	0	2	0	0	0	0	0	3	0	0	0	20	10
SD-6	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-7	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	1	0	3	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	2	5	0	0	0	17	7
SD-8	10/8/2012	Rare	Common	Abundant	Absent	Common	Common	1	2	0	0	1	0	1	3	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	11	6
SD-9	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	1	0	0	0	0	0	0	0	4	5	3	1	0	0	0	0	0	0	0	0	1	0	2	0	17	7
SD-10	10/8/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2	0	8	0	0	0	19	5
SD-11	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-12	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	1	0	0	2	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	7	5
SD-13	10/8/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-14	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-15	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL		--	--	--	--	--	--	--	--	0	0	3	10	1	29	1	7	0	0	0	30	17	7	9	0	0	4	2	0	1	5	4	31	0	2	0	163	17
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3
								Average:		0	0	0.3	0.9	0.1	2.6	0.1	0.6	0	0	0	2.7	1.5	0.6	0.8	0	0	0.4	0.2	0	0.1	0.5	0.4	2.8	0	0.2	0	14.8	6.3
								Maximum:		0	0	1	3	1	6	1	4	0	0	0	7	5	3	2	0	0	2	2	0	1	2	2	8	0	2	0	20	10
Upstream Pond																																						
SD-10	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-11	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	0	0	0	0	4	2	0	5	0	0	0	0	0	0	0	0	2	0	1	0	15	6
SD-12	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	1	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	1	2	7	0	0	0	17	7
SD-13	10/11/2012	Rare	Rare	Rare	Absent	Rare	Common	0	3	0	0	0	0	0	3	0	1	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8	5
SD-14	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	1	0	0	4	2	1	3	0	0	0	0	0	0	0	0	5	0	1	0	17	7
SD-15	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-16	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-17	No sample	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SD-18	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	0	0	2	0	0	0	13	5
SD-19	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	1	2	0	0	0	0	0	1	0	3	0	0	0	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5
SD-20	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	1	2	0	0	0	0	0	4	0	0	0	0	0	6	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	14	4
SD-21	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	1	2	0	0	8	4	0	6	0	0	0	0	0	0	0	0	4	0	0	0	26	7
SD-22	10/11/2012	Rare	Rare	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-23	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	3	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1	4	14	0	0	0	25	6
TOTAL		--	--	--	--	--	--	--	--	0	0	1	3	0	12	0	6	4	0	0	36	14	2	22	0	0	0	0	0	3	2	6	36	0	2	0	149	14
								Minimum:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3
								Average:		0	0	0.1	0.3	0	1.2	0	0.6	0.4	0	0	3.6	1.4	0.2	2.2	0	0	0	0	0	0.3	0.2	0.6	3.6	0	0.2	0	14.9	5.5
								Maximum:		0	0	1	2	0	4	0	3	2	0	0	8	4	1	6	0	0	0	0	0	3	1	4	14	0	1	0	26	7

TABLE L-5

Fish and Amphibian Species Collected During 2012 Biological Surveys

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Water Body	Common Name	Scientific Name	Cohort	Total Length (mm)	Weight (grams)	Count
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	Adult	75 - 220	3 - 64	27
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	Tadpole	30 - 72	1 - 5	37
Upstream Pond	leopard frog	*Lithobates sphenocephalus*	Adult	150 - 150	19 - 19	1
Upstream Pond	American eel	*Anguilla rostrata*	--	260 - 320	30 - 53	6
Upstream Pond	bluegill	*Lepomis macrochirus*	--	50 - 153	1 - 63	27
Upstream Pond	brown bullhead	*Ameirus nebulosus*	--	135 - 135	25 - 25	1
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	--	62 - 145	2 - 35	14
Upstream Pond	largemouth bass	*Micropterus salmoides*	--	322 - 368	465 - 799	5
Upstream Pond	mosquitofish	*Gambusia holbrooki*	--	20 - 40	<1 - <1	2,450
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	Adult	90 - 210	4 - 95	16
Youth Pond	leopard frog	*Lithobates sphenocephalus*	Adult	140 - 150	11 - 14	2
				-	-	
Youth Pond	American eel	*Anguilla rostrata*	--	249 - 273	40 - 47	4
Youth Pond	black crappie	*Pomoxis nigromaculatus*	--	158 - 158	67 - 67	1
Youth Pond	bluegill	*Lepomis macrochirus*	--	142 - 178	52 - 108	5
Youth Pond	largemouth bass	*Micropterus salmoides*	--	135 - 310	31 - 340	18
Youth Pond	mosquitofish	*Gambusia holbrooki*	--	20 - 40	<1 - <1	525

TABLE L-6

Samples Used in the Baseline Ecological Risk Assessment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
Surface Soil						
CAA03-SS01	CAA03-SS01-1109	11/3/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS02	CAA03-SS02-1109	11/4/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS03	CAA03-SS03-1109	11/4/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS04	CAA03-SS04-1109	11/4/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS05	CAA03-SS05-1109	11/4/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS06	CAA03-SS06-1109	11/4/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS07	CAA03-SS07-1109	11/5/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS08	CAA03-SS08-1109	11/5/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS08	CAA03-SS08P-1109	11/5/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS09	CAA03-SS09-1109	11/5/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAA03-SS10	CAA03-SS10-1109	11/5/2009	0-6	Site 4 (AOC 3)	Site 4; NW	
CAS004-4HA01	CAS004-4HA01-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA02	CAS004-4HA02-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA02	CAS004-4HA02D-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA03	CAS004-4HA03-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA04	CAS004-4HA04-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA05	CAS004-4HA05-00-1199	11/12/1999	0-6	Site 4	Site 4; South	
CAS004-4HA06	CAS004-4HA06-00-1199	11/12/1999	0-6	Site 4 (AOC 3)	Site 4; NW	
CAS04-SS01	CAS04-SS01-1109	11/3/2009	0-6	Site 4	Site 4; South	
CAS04-SS02	CAS04-SS02-1109	11/3/2009	0-6	Site 4	Site 4; South	
CAS04-SS03	CAS04-SS03-1109	11/3/2009	0-6	Site 4	Site 4; South	
CAS04-SS04	CAS04-SS04-1109	11/3/2009	0-6	Site 4	Site 4; South	
CAS04-SS05	CAS04-SS05-1109	11/3/2009	0-6	Site 4	Site 4; NW	
CAS04-SO06	CAS04-SS06-1012	10/23/2012	0-6	Site 4	Site 4; East	
CAS04-SO07	CAS04-SS07-1012	10/23/2012	0-6	Site 4	Site 4; East	
CAS04-SO08	CAS04-SS08-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO09	CAS04-SS09-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO10	CAS04-SS10-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO11	CAS04-SS11-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO12	CAS04-SS12-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO12	CAS04-SS12P-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO13	CAS04-SS13-1012	10/23/2012	0-6	Site 4	Site 4; NW	
CAS04-SO14	CAS04-SS14-1012	10/23/2012	0-6	Site 4	Site 4; South	Hexavalent chromium only
CAS04-SO14	CAS04-SS14P-1012	10/23/2012	0-6	Site 4	Site 4; South	Hexavalent chromium only
CAS04-SO15	CAS04-SS15-1012	10/23/2012	0-6	Site 4	Site 4; NW	Hexavalent chromium only
CAYP-SO01	CAYP-SS01-1012	10/19/2012	0-6	Youth Pond	Developed Area	
CAYP-SO02	CAYP-SS02-1012	10/19/2012	0-6	Youth Pond	Developed Area	
CAYP-SO03	CAYP-SS03-1012	10/19/2012	0-6	Youth Pond	Northern Ditch	Also evaluated as sediment

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Samples Used in the Baseline Ecological Risk Assessment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAYP-SO03	CAYP-SS03P-1012	10/19/2012	0-6	Youth Pond	Northern Ditch	Also evaluated as sediment
CAYP-SO04	CAYP-SS04-1012	10/19/2012	0-6	Youth Pond	Northern Ditch	Also evaluated as sediment
CAYP-SO05	CAYP-SS05-1012	10/19/2012	0-6	Youth Pond	Northern Ditch	Also evaluated as sediment
CAYP-SO06	CAYP-SS06-1012	10/19/2012	0-6	Youth Pond	Northern Ditch	Also evaluated as sediment
Subsurface Soil						
CAA03-SB01	CAA03-SB01-1109	11/3/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB02	CAA03-SB02-1109A	11/4/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB03	CAA03-SB03-1109A	11/4/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB04	CAA03-SB04-1109A	11/4/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB05	CAA03-SB05-1109A	11/4/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB06	CAA03-SB06-1109	11/4/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB07	CAA03-SB07-1109	11/5/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB08	CAA03-SB08-1109	11/5/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB08	CAA03-SB08P-1109	11/5/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB09	CAA03-SB09-1109	11/5/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAA03-SB10	CAA03-SB10-1109	11/5/2009	6-24	Site 4 (AOC 3)	Site 4; NW	
CAS004-4HA02	CAS004-4-HA02-02-1199	11/12/1999	12-24	Site 4	Site 4; South	
CAS004-4HA03	CAS004-4-HA03-02-1199	11/12/1999	12-24	Site 4	Site 4; South	
CAS004-4HA04	CAS004-4-HA04-01-1199	11/12/1999	6-12	Site 4	Site 4; South	
CAS004-4HA05	CAS004-4-HA05-01-1199	11/12/1999	6-12	Site 4	Site 4; South	
CAS004-4HA06	CAS004-4-HA06-02-1199	11/12/1999	12-24	Site 4	Site 4; NW	
CAS04-SB01	CAS04-SB01-1109	11/3/2009	6-24	Site 4	Site 4; South	
CAS04-SB02	CAS04-SB02-1109	11/3/2009	6-24	Site 4	Site 4; South	
CAS04-SB03	CAS04-SB03-1109	11/3/2009	6-24	Site 4	Site 4; South	
CAS04-SB04	CAS04-SB04-1109	11/3/2009	6-24	Site 4	Site 4; South	
CAS04-SB05	CAS04-SB05-1109	11/3/2009	6-24	Site 4	Site 4; NW	
CAS04-SO06	CAS04-SB06-1012	10/23/2012	6-24	Site 4	Site 4; East	
CAS04-SO06	CAS04-SB06P-1012	10/23/2012	6-24	Site 4	Site 4; East	
CAS04-SO07	CAS04-SB07-1012	10/23/2012	6-24	Site 4	Site 4; East	
CAS04-SO15	CAS04-SB15-1012	10/23/2012	6-24	Site 4	Site 4; NW	Hexavalent chromium only
CAS04-SO16	CAS04-SB16-1012	10/23/2012	6-24	Site 4	Site 4; South	Hexavalent chromium only
Surface Water - Site Samples						
CAA03-SW01	CAA03-SW01-1209	12/7/2009	Surface	Site 4 (AOC 3)	Upstream Pond	
CAA03-SW01	CAA03-SW01P-1209	12/7/2009	Surface	Site 4 (AOC 3)	Upstream Pond	
CAA03-SW02	CAA03-SW02-1209	12/7/2009	Surface	Site 4 (AOC 3)	Upstream Pond	
CAA03-SW03	CAA03-SW03-1209	12/7/2009	Surface	Site 4 (AOC 3)	Upstream Pond	
CAA03-SW04	CAA03-SW04-1209	12/7/2009	Surface	Site 4 (AOC 3)	Upstream Pond	
CAS04-SW01	CAS04-SW01-1209	12/7/2009	Surface	Site 4	Upstream Pond	
CAS04-SW02	CAS04-SW02-1209	12/7/2009	Surface	Site 4	Upstream Pond	

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Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAS04-SW03	CAS04-SW03-1209	12/7/2009	Surface	Site 4	Upstream Pond	
CAS04-SW04	CAS04-SW04-1209	12/7/2009	Surface	Site 4	Upstream Pond	
CAS04-SW05	CAS04-SW05-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAS04-SW06	CAS04-SW06-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAS04-SW07	CAS04-SW07-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAS04-SW07	CAS04-SW07P-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAS04-SW08	CAS04-SW08-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAS04-SW09	CAS04-SW09-1209	12/8/2009	Surface	Site 4	Site 4 Streams	
CAYP-SWSD01	CAYP-SW01-1012	10/11/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD01	CAYP-SW01P-1012	10/11/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD02	CAYP-SW02-1012	10/11/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD03	CAYP-SW03-1012	10/11/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD04	CAYP-SW04-1012	10/11/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD05	CAYP-SW05-1112	11/9/2012	Surface	Youth Pond	Youth Pond	
CAYP-SWSD06	CAYP-SW06-1112	11/9/2012	Surface	Youth Pond	Youth Pond	
Surface Water - Reference Samples						
CAREFS04-SWSD01	CAREFS04-SW01-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SW02-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SW02P-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD03	CAREFS04-SW03-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SW04-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD05	CAREFS04-SW05-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SW01-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SW02-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SW03-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SW03P-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SW04-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SW05-1012	10/4/2012	Surface	Cheatham Pond	Reference	
Surface Sediment - Site Samples						
CAA03-SD01	CAA03-SD01-1209A	12/9/2009	0-4	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD02	CAA03-SD02-1209A	12/9/2009	0-4	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD03	CAA03-SD03-1209A	12/9/2009	0-4	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD04	CAA03-SD04-1209A	12/9/2009	0-4	Site 4 (AOC 3)	Upstream Pond	
CAS004-4SD01	CAS004-4-SED01-00-1199	11/12/1999	0-4	Site 4	Upstream Pond	
CAS004-4SD02	CAS004-4-SD02-00-1199	11/14/1999	0-4	Site 4	Upstream Pond	
CAS004-4SD03	CAS004-4-SD03-00-1199	11/13/1999	0-4	Site 4	Upstream Pond	
CAS004-4SD04	CAS004-4-SD04-00-1199	11/13/1999	0-4	Site 4	Upstream Pond	
CAS004-4SD04	CAS004-4-SD04-00D-1199	11/13/1999	0-4	Site 4	Upstream Pond	
CAS04-SD01	CAS04-SD01-1209A	12/9/2009	0-4	Site 4	Upstream Pond	

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Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAS04-SD01	CAS04-SD01P-1209A	12/9/2009	0-4	Site 4	Upstream Pond	
CAS04-SD02	CAS04-SD02-1209A	12/9/2009	0-4	Site 4	Upstream Pond	
CAS04-SD03	CAS04-SD03-1209A	12/9/2009	0-4	Site 4	Upstream Pond	
CAS04-SD04	CAS04-SD04-1209A	12/9/2009	0-4	Site 4	Upstream Pond	
CAS04-SD05	CAS04-SD05-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD06	CAS04-SD06-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD07	CAS04-SD07-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD07	CAS04-SD07P-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD08	CAS04-SD08-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD09	CAS04-SD09-1209A	12/8/2009	0-4	Site 4	Site 4 Streams	
CAS04-SD10	CAS04-SD10-1012	10/23/2012	0-4	Site 4	Upstream Pond	
CAS04-SD10	CAS04-SD10P-1012	10/23/2012	0-4	Site 4	Upstream Pond	
CAS04-SD11	CAS04-SD11-1012	10/2/2012	0-4	Site 4	Upstream Pond	
CAS04-SD12	CAS04-SD12-1012	10/2/2012	0-4	Site 4	Upstream Pond	
CAS04-SD13	CAS04-SD13-1012	10/3/2012	0-4	Site 4	Upstream Pond	
CAS04-SD14	CAS04-SD14-1012	10/3/2012	0-4	Site 4	Upstream Pond	
CAS04-SD15	CAS04-SD15-1012	10/11/2012	0-4	Site 4	Site 4 Streams	
CAS04-SD16	CAS04-SD16-1012	10/11/2012	0-4	Site 4	Site 4 Streams	
CAS04-SD17	CAS04-SD17-1012	10/11/2012	0-4	Site 4	Site 4 Streams	
CAS04-SD18	CAS04-SD18-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAS04-SD19	CAS04-SD19-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAS04-SD20	CAS04-SD20-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAS04-SD21	CAS04-SD21-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAS04-SD22	CAS04-SD22-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAS04-SD23	CAS04-SD23-1012	10/2/2012	0-4	Site 4	Upstream Pond	Toxicity test sample
CAYP-SWSD01	CAYP-SD01-1012	10/12/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD02	CAYP-SD02-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD02	CAYP-SD02P-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD03	CAYP-SD03-1012	10/11/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD04	CAYP-SD04-1112	11/9/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD05	CAYP-SD05-1112	11/9/2012	0-4	Youth Pond	Youth Pond	
CAYP-SWSD06	CAYP-SD06-1112	11/9/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD07	CAYP-SD07-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD08	CAYP-SD08-1012	10/12/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD09	CAYP-SD09-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD10	CAYP-SD10-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD11	CAYP-SD11-1012	10/11/2012	0-4	Youth Pond	York River Ditch	
CAYP-SD12	CAYP-SD12-1012	10/22/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD12	CAYP-SD12P-1012	10/22/2012	0-4	Youth Pond	Youth Pond	

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Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAYP-SD13	CAYP-SD13-1012	10/12/2012	0-4	Youth Pond	Youth Pond	
CAYP-SD14	CAYP-SD14-1012	10/12/2012	0-4	Youth Pond	Northern Ditch	
CAYP-SD15	CAYP-SD15-1012	10/12/2012	0-4	Youth Pond	Northern Ditch	
Surface Sediment - Reference Samples						
CAREFS04-SWSD01	CAREFS04-SD01-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD01	CAREFS04-SD01P-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SD02-1012	10/9/2012	0-4	Cheatham Pond	Reference	Toxicity test sample
CAREFS04-SWSD03	CAREFS04-SD03-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SD04-1012	10/9/2012	0-4	Cheatham Pond	Reference	Toxicity test sample
CAREFS04-SWSD05	CAREFS04-SD05-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SD01-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SD02-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SD02P-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SD03-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SD04-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SD05-1012	10/10/2012	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD02	CP-00-POND-SD02-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD02	CP-00-POND-SD02D-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD03	CP-00-POND-SD03-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD04	CP-00-POND-SD04-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD05	CP-00-POND-SD05-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD06	CP-00-POND-SD06-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD07	CP-00-POND-SD07-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD18	CP-00-POND-SD18-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD19	CP-00-POND-SD19-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Subsurface Sediment - Site Samples						
CAA03-SD01	CAA03-SD01-1209B	12/9/2009	4-8	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD02	CAA03-SD02-1209B	12/9/2009	4-8	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD03	CAA03-SD03-1209B	12/9/2009	4-8	Site 4 (AOC 3)	Upstream Pond	
CAA03-SD04	CAA03-SD04-1209B	12/9/2009	4-8	Site 4 (AOC 3)	Upstream Pond	
CAS004-4SD01	CAS004-4-SED01-01-1199	11/12/1999	4-8	Site 4	Upstream Pond	
CAS004-4SD02	CAS004-4-SD02-01-1199	11/14/1999	4-8	Site 4	Upstream Pond	
CAS004-4SD03	CAS004-4-SD03-01-1199	11/13/1999	4-8	Site 4	Upstream Pond	
CAS004-4SD04	CAS004-4-SD04-01-1199	11/13/1999	4-8	Site 4	Upstream Pond	
CAS04-SD01	CAS04-SD01-1209B	12/9/2009	4-8	Site 4	Upstream Pond	
CAS04-SD01	CAS04-SD01P-1209B	12/9/2009	4-8	Site 4	Upstream Pond	
CAS04-SD02	CAS04-SD02-1209B	12/9/2009	4-8	Site 4	Upstream Pond	
CAS04-SD03	CAS04-SD03-1209B	12/9/2009	4-8	Site 4	Upstream Pond	
CAS04-SD04	CAS04-SD04-1209B	12/9/2009	4-8	Site 4	Upstream Pond	

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Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAS04-SD05	CAS04-SD05-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAS04-SD06	CAS04-SD06-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAS04-SD07	CAS04-SD07-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAS04-SD07	CAS04-SD07P-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAS04-SD08	CAS04-SD08-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAS04-SD09	CAS04-SD09-1209B	12/8/2009	4-8	Site 4	Site 4 Streams	
CAYP-SWSD01	CAYP-SSD01-1012	10/12/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD02	CAYP-SSD02-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD02	CAYP-SSD02P-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD03	CAYP-SSD03-1012	10/11/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD04	CAYP-SSD04-1112	11/9/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD05	CAYP-SSD05-1112	11/9/2012	4-8	Youth Pond	Youth Pond	
CAYP-SWSD06	CAYP-SSD06-1112	11/9/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD07	CAYP-SSD07-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD08	CAYP-SSD08-1012	10/12/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD09	CAYP-SSD09-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD10	CAYP-SSD10-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD11	CAYP-SSD11-1012	10/11/2012	4-8	Youth Pond	York River Ditch	
CAYP-SD12	CAYP-SSD12-1012	10/22/2012	4-8	Youth Pond	Youth Pond	
CAYP-SD13	CAYP-SSD13-1012	10/12/2012	4-8	Youth Pond	Youth Pond	
Subsurface Sediment - Reference Samples						
CAREFS04-SWSD01	CAREFS04-SSD01-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD01	CAREFS04-SSD01P-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SSD02-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD03	CAREFS04-SSD03-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SSD04-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD05	CAREFS04-SSD05-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SSD01-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SSD02-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SSD03-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SSD04-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SSD05-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SSD05P-1012	10/10/2012	4-8	Cheatham Pond	Reference	
Tissue - Site Samples						
CAS04-TS01	CAS04-TS01-1012	10/11/2012	--	Site 4	Site 4 Streams	Earthworm
CAS04-TS02	CAS04-TS02-1012	10/4/2012	--	Site 4	Upstream Pond	Bullfrog (adult)
CAS04-TS03	CAS04-TS03-1012	10/24/2012	--	Site 4	Upstream Pond	Bullfrog (adult)
CAS04-TS04	CAS04-TS04-1012	10/26/2012	--	Site 4	Upstream Pond	Bullfrog (adult)
CAS04-TS05	CAS04-TS05-1012	10/26/2012	--	Site 4	Upstream Pond	Bullfrog (adult)

TABLE L-6

Samples Used in the Baseline Ecological Risk Assessment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
CAS04-TS06	CAS04-TS06-1012	10/11/2012	--	Site 4	Upstream Pond	Bullfrog (tadpole)
CAS04-TS07	CAS04-TS07-WB-1012	10/4/2012	--	Site 4	Upstream Pond	Golden shiner
CAS04-TS08	CAS04-TS08-WB-1012	10/5/2012	--	Site 4	Upstream Pond	Mosquitofish
CAS04-TS09	CAS04-TS09-WB-1012	10/5/2012	--	Site 4	Upstream Pond	Mosquitofish
CAS04-TS10	CAS04-TS10-WB-1012	10/4/2012	--	Site 4	Upstream Pond	American eel
CAS04-TS11	CAS04-TS11-WB-1012	10/4/2012	--	Site 4	Upstream Pond	Bluegill
CAS04-TS12	CAS04-TS12-WB-1012	10/4/2012	--	Site 4	Upstream Pond	Brown bullhead
CAS04-TS13	CAS04-TS13-WB-1012[a]	10/4/2012	--	Site 4	Upstream Pond	Largemouth bass
CAYP-TS01	CAYP-TS01-1012	10/5/2012	--	Youth Pond	Youth Pond	Bullfrog (adult)
CAYP-TS02	CAYP-TS02-1012	10/26/2012	--	Youth Pond	Youth Pond	Bullfrog (adult)
CAYP-TS03	CAYP-TS03-1012	10/26/2012	--	Youth Pond	Youth Pond	Bullfrog (adult)
CAYP-TS04	CAYP-TS04-WB-1012	10/5/2012	--	Youth Pond	Youth Pond	Bluegill
CAYP-TS05	CAYP-TS05-WB-1012	10/5/2012	--	Youth Pond	Youth Pond	Largemouth bass
CAYP-TS06	CAYP-TS06-WB-1012	10/9/2012	--	Youth Pond	Youth Pond	Mosquitofish
CAYP-TS07	CAYP-TS07-WB-1012	10/5/2012	--	Youth Pond	Youth Pond	American eel
CAYP-TS08	CAYP-TS08-WB-1012[a]	10/5/2012	--	Youth Pond	Youth Pond	Largemouth bass
Tissue - Reference Samples						
CAREFS04-TS01	CAREFS04-TS01-1012	10/24/2012	--	Cheatham Pond	Reference	Bullfrog (adult)
CAREFS04-TS02	CAREFS04-TS02-1012	10/24/2012	--	Cheatham Pond	Reference	Bullfrog (adult)
CAREFS04-TS03	CAREFS04-TS03-WB-1012	10/23/2012	--	Cheatham Pond	Reference	American eel
CAREFS04-TS04	CAREFS04-TS04-WB-1012	10/23/2012	--	Cheatham Pond	Reference	Bluegill
CAREFS04-TS05	CAREFS04-TS05-WB-1012	10/23/2012	--	Cheatham Pond	Reference	Bluegill
CAREFS04-TS06	CAREFS04-TS06-WB-1012	10/23/2012	--	Cheatham Pond	Reference	Largemouth bass
CAREFS04-TS07	CAREFS04-TS07-WB-1012[a]	10/23/2012	--	Cheatham Pond	Reference	Largemouth bass
CAREFS04-TS08	CAREFS04-TS08-WB-1012[a]	10/23/2012	--	Cheatham Pond	Reference	Largemouth bass

Shaded cells indicate field duplicates

a - Whole body concentration mathematically calculated from fillet and offal subsample concentrations and weights

TABLE L-7

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Terrestrial Habitats			
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Are site-related chemical concentrations in surface soil sufficient to adversely affect soil invertebrate communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely affect terrestrial plant communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface soil with soil ESVs Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants (seeds) from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mourning dove
Survival, growth, and reproduction of avian terrestrial invertivore/omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	American robin
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume plants from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Meadow vole
Survival, growth, and reproduction of mammalian terrestrial invertivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Short-tailed shrew
Survival, growth, and reproduction of mammalian terrestrial omnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil and field-collected invertebrate (earthworm tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	White-footed mouse
Survival, growth, and reproduction of mammalian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface soil concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Red fox
Aquatic Habitats			

TABLE L-7

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of aquatic and wetland plant communities	Are site-related chemical concentrations in surface water and surface sediment sufficient to adversely affect aquatic or wetland plant communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and wetland plants
Survival, growth, and reproduction of aquatic and benthic invertebrate communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect aquatic and benthic invertebrate communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Aquatic and benthic invertebrates
		Comparison of invertebrate field survey results in site water bodies with a reference water body	
		Comparison of 42-day sediment toxicity test results (growth, survival, and reproduction) with the amphipod, *Hyalella azteca* , using site and reference sediment	
Survival, growth, and reproduction of fish communities	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to adversely affect fish communities?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs	Fish
		Comparison of fish tissue residue analysis results with literature-based tissue ESVs	

TABLE L-7

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of amphibian populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to amphibian populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs Comparison of tissue residue analysis results with literature-based tissue ESVs Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	Amphibians
Survival, growth, and reproduction of wetland/aquatic reptile populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to aquatic/wetland reptile populations?	Comparison of maximum (SERA) and mean (BERA) chemical concentrations in surface water and sediment with medium-specific ESVs Evidence of potential risk to other upper trophic level aquatic receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mallard
Survival, growth, and reproduction of avian aquatic/wetland piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Belted kingfisher Great blue heron Osprey
Survival, growth, and reproduction of avian aerial insectivore populations	Are site-related constituent concentrations in surface water and/or sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to avian insectivore populations that may consume emergent aquatic invertebrates from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Tree swallow
Survival, growth, and reproduction of mammalian aquatic/wetland herbivore populations	Are site-related chemical concentrations in surface water and/or surface sediment sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland plants from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water and surface sediment concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Muskrat
Survival, growth, and reproduction of mammalian aquatic/wetland omnivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume aquatic/wetland prey from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Raccoon

TABLE L-7

Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Survival, growth, and reproduction of mammalian semi-aquatic piscivore populations	Are site-related chemical concentrations in surface water, surface sediment, and/or fish/frog tissue sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume fish from the site?	Comparison of modeled dietary intakes using maximum (SERA) and mean (BERA) surface water, surface sediment, and field-collected fish/frog (tissue residue) concentrations with literature-based ingestion TRVs; ratios >1 based on the NOAEL-LOAEL range indicate an effect	Mink

TABLE L-8

Background Data and Upper Tolerance Limits (UTLs) for Physical Media

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil		Subsurface Soil		Surface Water		Surface Sediment		Subsurface Sediment	
	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL
Inorganics (mg/kg; ug/L)										
Aluminum	12,900	12,200	12,600	13,000	149	228	24,200	23,200	19,400	19,400
Antimony	11.0	11.0	--	--	--	--	1.70	1.70	26.7	26.7
Arsenic	6.00	6.36	6.80	5.54	7.90	8.81	106	108	51.1	51.1
Barium	62.0	52.9	58.0	84.5	24.6	26.6	75.0	75.0	98.1	98.1
Beryllium	0.790	0.587	0.52	0.52	--	--	1.39	1.39	0.96	0.96
Cadmium	1.50	1.50	--	--	0.080	0.080	0.450	0.571	0.18	0.18
Chromium	18.3	18.2	26.4	33.7	0.570	0.713	46.2	52.0	25.8	25.8
Cobalt	6.70	9.93	6.00	5.18	--	--	9.40	9.45	5.30	5.30
Copper	5.30	4.25	3.20	3.17	--	--	20.8	25.6	8.90	8.90
Cyanide	--	--	2.70	2.70	--	--	--	--	--	--
Iron	20,300	19,900	30,000	32,000	2,050	2,620	38,900	45,600	43,800	43,800
Lead	22.7	17.4	8.30	8.79	--	--	31.3	41.6	17.2	17.2
Manganese	340	324	154	176	142	161	300	368	310	310
Mercury	0.240	0.111	0.14	0.14	--	--	0.240	0.255	0.090	0.090
Nickel	11.9	9.52	11.0	17.6	--	--	13.4	17.1	9.10	9.10
Selenium	0.69	0.51	0.64	0.64	2.50	2.50	2.20	2.69	2.50	2.50
Silver	2.10	2.10	1.10	1.10	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	6.50	6.50	--	--
Vanadium	29.8	27.9	37.8	48.3	1.10	1.46	58.3	62.5	40.8	40.8
Zinc	30.0	26.5	20.9	28.0	1.64	1.81	91.1	110	52.8	52.8
Dissolved Metals (ug/L)										
Aluminum	--	--	--	--	158	193	--	--	--	--
Arsenic	--	--	--	--	6.10	6.47	--	--	--	--
Barium	--	--	--	--	24.5	27.7	--	--	--	--
Cadmium	--	--	--	--	0.050	0.050	--	--	--	--
Chromium	--	--	--	--	0.65	0.65	--	--	--	--
Iron	--	--	--	--	1,800	2,410	--	--	--	--
Lead	--	--	--	--	0.523	0.523	--	--	--	--
Manganese	--	--	--	--	116	165	--	--	--	--
Mercury	--	--	--	--	0.040	0.067	--	--	--	--
Selenium	--	--	--	--	2.80	2.80	--	--	--	--
Thallium	--	--	--	--	1.40	1.43	--	--	--	--
Vanadium	--	--	--	--	0.96	1.27	--	--	--	--
Pesticides (ug/kg; ug/L)										
4,4'-DDD	--	--	--	--	--	--	7.97	10.1	4.20	4.20
4,4'-DDE	--	--	--	--	--	--	28.0	44.1	14.0	14.0
4,4'-DDT	--	--	--	--	--	--	1.45	1.45	--	--

TABLE L-8

Background Data and Upper Tolerance Limits (UTLs) for Physical Media

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Soil		Subsurface Soil		Surface Water		Surface Sediment		Subsurface Sediment	
	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL	Maximum	UTL
alpha-BHC	--	--	--	--	0.00432	0.00432	0.813	0.813	--	--
alpha-Chlordane	--	--	--	--	0.01720	0.02050	--	--	--	--
Dieldrin	--	--	--	--	--	--	0.948	0.948	--	--
Endrin	--	--	--	--	--	--	7.36	8.64	--	--
gamma-BHC (Lindane)	--	--	--	--	0.01240	0.01550	2.22	2.92	--	--
gamma-Chlordane	--	--	--	--	0.02130	0.02130	1.10	1.10	--	--
Heptachlor epoxide	--	--	--	--	0.00746	0.00746	--	--	--	--
Other Chemicals (ug/kg; ug/L)										
Anthracene	--	--	--	--	--	--	--	--	4.60	4.60
Benzo(a)anthracene	--	--	--	--	0.0515	0.0515	16.0	18.2	14.0	14.0
Benzo(a)pyrene	--	--	--	--	--	--	--	--	15.0	15.0
Benzo(b)fluoranthene	--	--	--	--	--	--	28.0	30.3	25.0	25.0
Benzo(g,h,i)perylene	--	--	--	--	--	--	25.0	25.0	12.0	12.0
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	16.0	16.0
Chrysene	--	--	--	--	--	--	17.3	21.7	--	--
Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	8.60	8.60
Fluoranthene	--	--	--	--	0.0901	0.0948	19.0	26.0	16.0	16.0
Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	8.40	8.40
PAH (HMW)	--	--	--	--	--	--	294	381	142	142
PAH (LMW)	--	--	--	--	--	--	1,080	1,670	601	601
PAH (total)	--	--	--	--	--	--	1,374	2,110	735	735
Phenanthrene	--	--	--	--	0.124	0.144	27.5	30.2	10.0	10.0
Pyrene	--	--	--	--	0.0591	0.0591	27.4	35.3	16.0	16.0
2-Butanone	--	--	--	--	--	--	430	591	340	340
Acetone	--	--	--	--	--	--	1,700	2,500	1,400	1,400
Carbon disulfide	--	--	--	--	--	--	18.0	25.8	11.0	11.0

TABLE L-9

Reference Tissue Concentrations (wet weight) - Whole-Body Frogs

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	96.0 - 97.0	0 / 2	--	--	--	48.3	0.35	49.8
3,4,4',5-Tetrachlorobiphenyl (81)	96.0 - 97.0	0 / 2	--	--	--	48.3	0.35	49.8
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	2 / 2	49.0	57.0	CAREFS04-TS02-1012	53.0	5.66	78.3
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	2 / 2	16.0	17.0	CAREFS04-TS01-1012	16.5	0.71	19.7
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	2 / 2	640	2,200	CAREFS04-TS01-1012	1,420	1,103	6,345
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	2 / 2	11.0	26.0	CAREFS04-TS01-1012	18.5	10.6	65.9
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	2 / 2	40.0	77.0	CAREFS04-TS01-1012	58.5	26.2	175
Congeners (156/157)	-- - --	2 / 2	960	3,600	CAREFS04-TS01-1012	2,280	1,867	10,614
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	2 / 2	790	2,100	CAREFS04-TS01-1012	1,445	926	5,581
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	2 / 2	24.0	120	CAREFS04-TS01-1012	72.0	67.9	375
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	2 / 2	310	980	CAREFS04-TS01-1012	645	474	2,760
TEQ (Bird)	-- - --	2 / 2	4.14	8.24	CAREFS04-TS01-1012	6.19	2.90	19.1
TEQ (Mammal)	-- - --	2 / 2	4.80	11.6	CAREFS04-TS01-1012	8.19	4.78	29.5
TEQ (Fish)	-- - --	2 / 2	0.22	0.44	CAREFS04-TS01-1012	0.33	0.16	1.02
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	96.0 - 97.0	0 / 2	--	--	--	48.3	0.35	49.8
Total Dichlorobiphenyls	-- - --	2 / 2	170	210	CAREFS04-TS01-1012	190	28.3	316
Total Trichlorobiphenyls	-- - --	2 / 2	880	1,100	CAREFS04-TS01-1012	990	156	1,685
Total Tetrachlorobiphenyls	-- - --	2 / 2	650	970	CAREFS04-TS01-1012	810	226	1,820
Total Pentachlorobiphenyls	-- - --	2 / 2	1,400	3,000	CAREFS04-TS01-1012	2,200	1,131	7,251
Total Hexachlorobiphenyls	-- - --	2 / 2	28,000	110,000	CAREFS04-TS01-1012	69,000	57,983	327,864
Total Heptachlorobiphenyls	-- - --	2 / 2	44,000	160,000	CAREFS04-TS01-1012	102,000	82,024	468,198
Total Octachlorobiphenyls	-- - --	2 / 2	9,000	34,000	CAREFS04-TS01-1012	21,500	17,678	100,422
Total Nonachlorobiphenyls	-- - --	2 / 2	420	1,500	CAREFS04-TS01-1012	960	764	4,369
Decachlorobiphenyl (209)	-- - --	2 / 2	9.20	18.0	CAREFS04-TS01-1012	13.6	6.22	41.4
PCBs (total)	-- - --	2 / 2	84,529	310,798	CAREFS04-TS01-1012	197,664	159,996	911,966
Metals (MG/KG)								
Aluminum	-- - --	2 / 2	15.7	34.4	CAREFS04-TS02-1012	25.1	13.2	84.1
Antimony	0.034 - 0.043	0 / 2	--	--	--	0.019	0.0032	0.033
Arsenic	0.27 - 0.34	0 / 2	--	--	--	0.15	0.025	0.26
Barium	-- - --	2 / 2	2.20	2.90	CAREFS04-TS02-1012	2.55	0.49	4.76
Beryllium	0.014 - 0.017	0 / 2	--	--	--	0.0078	0.0011	0.012
Cadmium	-- - --	2 / 2	0.060	0.070	CAREFS04-TS02-1012	0.065	0.0071	0.097
Chromium	-- - --	2 / 2	0.11	0.14	CAREFS04-TS02-1012	0.13	0.021	0.22
Cobalt	-- - --	2 / 2	0.020	0.030	CAREFS04-TS02-1012	0.025	0.0071	0.057
Copper	-- - --	2 / 2	1.80	2.00	CAREFS04-TS02-1012	1.90	0.14	2.53

TABLE L-9

Reference Tissue Concentrations (wet weight) - Whole-Body Frogs

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Iron	-- - --	2 / 2	76.1	135	CAREFS04-TS02-1012	106	41.6	291
Lead	0.060 - 0.10	0 / 2	--	--	--	0.040	0.014	0.10
Manganese	1.70 - 2.00	0 / 2	--	--	--	0.93	0.11	1.40
Mercury	0.020 - 0.020	0 / 2	--	--	--	0.010	0.0	0.010
Nickel	0.020 - 0.030	0 / 2	--	--	--	0.013	0.0035	0.028
Selenium	-- - --	2 / 2	0.21	0.24	CAREFS04-TS02-1012	0.23	0.021	0.32
Silver	-- - --	2 / 2	0.0060	0.0070	CAREFS04-TS02-1012	0.0065	7.07E-04	0.0097
Thallium	0.027 - 0.034	0 / 2	--	--	--	0.015	0.0025	0.026
Vanadium	0.27 - 0.34	0 / 2	--	--	--	0.15	0.025	0.26
Zinc	-- - --	2 / 2	15.2	17.5	CAREFS04-TS02-1012	16.4	1.63	23.6
Other Parameters								
Percent Solids	-- - --	2 / 2	21.0	22.0	CAREFS04-TS01-1012	21.5	0.71	24.7
Percent Lipids	-- - --	2 / 2	0.13	0.48	CAREFS04-TS02-1012	0.31	0.25	1.41

TABLE L-10

Reference Tissue Concentrations (wet weight) - Whole-Body Fish

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1016	24.2 - 25.0	0 / 2	--	--	--	12.3	0.28	13.5
Aroclor-1221	24.2 - 25.0	0 / 2	--	--	--	12.3	0.28	13.5
Aroclor-1232	28.2 - 29.0	0 / 2	--	--	--	14.3	0.28	15.5
Aroclor-1242	24.2 - 25.0	0 / 2	--	--	--	12.3	0.28	13.5
Aroclor-1248	24.2 - 25.0	0 / 2	--	--	--	12.3	0.28	13.5
Aroclor-1254	24.2 - 25.0	0 / 2	--	--	--	12.3	0.28	13.5
Aroclor-1260	-- - --	2 / 2	42.1	68.5	CAREFS04-TS07-WB-1012	55.3	18.7	139
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	98.0 - 98.0	5 / 6	5.90	15.7	CAREFS04-TS07-WB-1012	17.2	15.9	30.3
3,4,4',5-Tetrachlorobiphenyl (81)	9.70 - 98.0	0 / 6	--	--	--	20.5	18.5	35.8
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	6 / 6	79.0	240	CAREFS04-TS03-WB-1012	146	73.7	207
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	6 / 6	5.00	15.0	CAREFS04-TS03-WB-1012	7.81	3.68	10.8
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	6 / 6	320	901	CAREFS04-TS07-WB-1012	549	264	767
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	6 / 6	3.80	12.0	CAREFS04-TS03-WB-1012	8.67	3.20	11.3
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	6 / 6	3.10	51.1	CAREFS04-TS08-WB-1012	12.9	18.8	28.4
Congeners (156/157)	-- - --	6 / 6	120	513	CAREFS04-TS07-WB-1012	244	155	372
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	6 / 6	91.0	348	CAREFS04-TS07-WB-1012	174	108	263
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	55.4 - 98.0	4 / 6	7.70	15.1	CAREFS04-TS07-WB-1012	19.6	16.2	32.9
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	6 / 6	44.0	163	CAREFS04-TS07-WB-1012	73.4	46.8	112
TEQ (Bird)	-- - --	6 / 6	0.64	5.67	CAREFS04-TS08-WB-1012	1.80	1.93	3.39
TEQ (Mammal)	-- - --	6 / 6	0.56	5.14	CAREFS04-TS08-WB-1012	1.53	1.79	3.00
TEQ (Fish)	-- - --	6 / 6	0.022	0.27	CAREFS04-TS08-WB-1012	0.075	0.094	0.15
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	98.0 - 98.0	5 / 6	1.40	60.2	CAREFS04-TS07-WB-1012	28.0	28.1	51.2
Total Dichlorobiphenyls	-- - --	6 / 6	95.0	460	CAREFS04-TS03-WB-1012	221	127	325
Total Trichlorobiphenyls	-- - --	6 / 6	470	2,400	CAREFS04-TS03-WB-1012	1,017	713	1,603
Total Tetrachlorobiphenyls	-- - --	6 / 6	700	2,600	CAREFS04-TS03-WB-1012	1,176	713	1,763
Total Pentachlorobiphenyls	-- - --	6 / 6	2,100	6,021	CAREFS04-TS07-WB-1012	3,524	1,515	4,771
Total Hexachlorobiphenyls	-- - --	6 / 6	11,000	40,120	CAREFS04-TS07-WB-1012	20,287	11,257	29,548
Total Heptachlorobiphenyls	-- - --	6 / 6	9,100	34,871	CAREFS04-TS07-WB-1012	16,686	10,060	24,962
Total Octachlorobiphenyls	-- - --	6 / 6	2,000	6,970	CAREFS04-TS07-WB-1012	3,823	1,865	5,357
Total Nonachlorobiphenyls	-- - --	6 / 6	70.0	286	CAREFS04-TS07-WB-1012	160	92.0	236
Decachlorobiphenyl (209)	-- - --	6 / 6	6.70	18.0	CAREFS04-TS03-WB-1012	11.3	4.10	14.7
PCBs (total)	-- - --	6 / 6	27,360	90,258	CAREFS04-TS07-WB-1012	46,926	25,108	67,581

TABLE L-10

Reference Tissue Concentrations (wet weight) - Whole-Body Fish

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Metals (MG/KG)								
Aluminum	1.10 - 7.70	2 / 6	3.69	6.23	CAREFS04-TS07-WB-1012	3.16	2.07	4.86
Antimony	0.010 - 0.40	0 / 6	--	--	--	0.070	0.086	0.14
Arsenic	0.31 - 0.40	2 / 6	0.15	0.20	CAREFS04-TS04-WB-1012	0.17	0.023	0.19
Barium	-- - --	6 / 6	0.090	1.20	CAREFS04-TS04-WB-1012	0.49	0.41	0.83
Beryllium	0.011 - 0.040	0 / 6	--	--	--	0.011	0.0058	0.016
Cadmium	0.011 - 0.24	0 / 6	--	--	--	0.041	0.053	0.084
Chromium	0.16 - 0.17	4 / 6	0.10	0.15	CAREFS04-TS06-WB-1012	0.11	0.026	0.13
Cobalt	-- - --	6 / 6	0.0050	0.18	CAREFS04-TS08-WB-1012	0.069	0.079	0.13
Copper	-- - --	6 / 6	0.31	0.85	CAREFS04-TS07-WB-1012	0.48	0.23	0.68
Iron	-- - --	6 / 6	10.5	91.4	CAREFS04-TS04-WB-1012	37.7	32.2	64.2
Lead	0.010 - 0.32	0 / 6	--	--	--	0.052	0.070	0.11
Manganese	0.61 - 0.89	4 / 6	0.94	5.30	CAREFS04-TS04-WB-1012	1.94	1.97	3.56
Mercury	0.040 - 0.040	5 / 6	0.020	0.098	CAREFS04-TS07-WB-1012	0.045	0.030	0.070
Nickel	0.050 - 0.32	0 / 6	--	--	--	0.073	0.056	0.12
Selenium	0.24 - 0.42	4 / 6	0.090	0.18	CAREFS04-TS06-WB-1012	0.14	0.049	0.18
Silver	0.022 - 0.033	2 / 6	0.12	0.16	CAREFS04-TS08-WB-1012	0.058	0.068	0.11
Thallium	0.022 - 0.40	0 / 6	--	--	--	0.069	0.087	0.14
Vanadium	0.22 - 0.33	2 / 6	0.15	0.18	CAREFS04-TS08-WB-1012	0.15	0.024	0.17
Zinc	-- - --	6 / 6	11.3	28.8	CAREFS04-TS04-WB-1012	19.2	7.05	25.0
Other Parameters								
Percent Solids	-- - --	6 / 6	23.1	28.3	CAREFS04-TS07-WB-1012	25.6	2.12	27.3
Percent Lipids	-- - --	6 / 6	0.22	6.50	CAREFS04-TS03-WB-1012	1.89	2.31	3.79

TABLE L-11

Tissue Concentrations (dry weight) - Earthworms

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	1 / 1	1,034	1,034	CAS04-TS01-1012	1,034	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	-- - --	1 / 1	55.2	55.2	CAS04-TS01-1012	55.2	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	1 / 1	5,172	5,172	CAS04-TS01-1012	5,172	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	1 / 1	283	283	CAS04-TS01-1012	283	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	1 / 1	14,138	14,138	CAS04-TS01-1012	14,138	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	1 / 1	334	334	CAS04-TS01-1012	334	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	1 / 1	483	483	CAS04-TS01-1012	483	--	--
Congeners (156/157)	-- - --	1 / 1	6,207	6,207	CAS04-TS01-1012	6,207	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	1 / 1	5,517	5,517	CAS04-TS01-1012	5,517	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	1 / 1	193	193	CAS04-TS01-1012	193	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	1 / 1	2,759	2,759	CAS04-TS01-1012	2,759	--	--
TEQ (Bird)	-- - --	1 / 1	107	107	CAS04-TS01-1012	107	--	--
TEQ (Mammal)	-- - --	1 / 1	55.2	55.2	CAS04-TS01-1012	55.2	--	--
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	379 - 379	0 / 1	--	--	--	190	--	--
Total Dichlorobiphenyls	-- - --	1 / 1	2,345	2,345	CAS04-TS01-1012	2,345	--	--
Total Trichlorobiphenyls	-- - --	1 / 1	20,690	20,690	CAS04-TS01-1012	20,690	--	--
Total Tetrachlorobiphenyls	-- - --	1 / 1	58,621	58,621	CAS04-TS01-1012	58,621	--	--
Total Pentachlorobiphenyls	-- - --	1 / 1	110,345	110,345	CAS04-TS01-1012	110,345	--	--
Total Hexachlorobiphenyls	-- - --	1 / 1	551,724	551,724	CAS04-TS01-1012	551,724	--	--
Total Heptachlorobiphenyls	-- - --	1 / 1	517,241	517,241	CAS04-TS01-1012	517,241	--	--
Total Octachlorobiphenyls	-- - --	1 / 1	93,103	93,103	CAS04-TS01-1012	93,103	--	--
Total Nonachlorobiphenyls	-- - --	1 / 1	5,172	5,172	CAS04-TS01-1012	5,172	--	--
Decachlorobiphenyl (209)	-- - --	1 / 1	552	552	CAS04-TS01-1012	552	--	--
PCBs (total)	-- - --	1 / 1	1,359,793	1,359,793	CAS04-TS01-1012	1,359,793	--	--
Metals (MG/KG)								
Arsenic	-- - --	1 / 1	7.59	7.59	CAS04-TS01-1012	7.59	--	--
Cadmium	-- - --	1 / 1	26.2	26.2	CAS04-TS01-1012	26.2	--	--
Chromium	-- - --	1 / 1	12.8	12.8	CAS04-TS01-1012	12.8	--	--
Copper	-- - --	1 / 1	45.5	45.5	CAS04-TS01-1012	45.5	--	--
Lead	-- - --	1 / 1	12.1	12.1	CAS04-TS01-1012	12.1	--	--
Mercury	-- - --	1 / 1	0.14	0.14	CAS04-TS01-1012	0.14	--	--
Nickel	-- - --	1 / 1	5.86	5.86	CAS04-TS01-1012	5.86	--	--
Selenium	3.24 - 3.24	0 / 1	--	--	--	1.62	--	--
Silver	-- - --	1 / 1	0.28	0.28	CAS04-TS01-1012	0.28	--	--
Zinc	-- - --	1 / 1	199	199	CAS04-TS01-1012	199	--	--

TABLE L-12

Tissue Concentrations (dry weight) - Whole-Body Frogs - All Site Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	422 - 445	6 / 8	39.0	2,214	CAS04-TS06-1012	457	735	949
3,4,4',5-Tetrachlorobiphenyl (81)	422 - 476	4 / 8	25.7	150	CAS04-TS03-1012	158	83.2	214
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	8 / 8	386	19,091	CAS04-TS03-1012	5,858	7,350	10,782
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	8 / 8	57.1	2,273	CAS04-TS03-1012	501	738	996
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	8 / 8	2,190	140,909	CAS04-TS03-1012	32,933	46,049	63,779
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	8 / 8	61.9	3,455	CAS04-TS03-1012	722	1,134	1,482
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	8 / 8	90.5	443	CAS04-TS06-1012	254	123	337
Congeners (156/157)	-- - --	8 / 8	2,286	24,545	CAS04-TS03-1012	8,194	6,984	12,871
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	8 / 8	1,714	11,818	CAS04-TS03-1012	5,421	3,205	7,568
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	8 / 8	41.9	357	CAS04-TS06-1012	161	108	233
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	8 / 8	762	3,000	CAS04-TS06-1012	1,737	659	2,179
TEQ (Bird)	-- - --	8 / 8	11.4	164	CAS04-TS06-1012	52.0	52.6	87.3
TEQ (Mammal)	-- - --	8 / 8	10.5	57.6	CAS04-TS06-1012	32.0	16.3	42.9
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	16.4 - 485	1 / 8	436	436	CAS04-TS06-1012	228	115	305
Total Dichlorobiphenyls	-- - --	8 / 8	143	20,000	CAS04-TS06-1012	3,307	6,763	7,837
Total Trichlorobiphenyls	419 - 419	7 / 8	1,455	92,857	CAS04-TS06-1012	16,813	31,490	37,906
Total Tetrachlorobiphenyls	857 - 2,043	6 / 8	3,227	257,143	CAS04-TS06-1012	43,481	87,752	102,260
Total Pentachlorobiphenyls	-- - --	8 / 8	4,619	378,571	CAS04-TS06-1012	95,177	136,128	186,360
Total Hexachlorobiphenyls	-- - --	8 / 8	57,143	1,000,000	CAS04-TS06-1012	319,192	314,279	529,708
Total Heptachlorobiphenyls	-- - --	8 / 8	100,000	857,143	CAS04-TS06-1012	316,540	237,296	475,489
Total Octachlorobiphenyls	-- - --	8 / 8	20,952	214,286	CAS04-TS06-1012	71,677	60,845	112,433
Total Nonachlorobiphenyls	-- - --	8 / 8	1,381	10,714	CAS04-TS06-1012	3,758	2,928	5,719
Decachlorobiphenyl (209)	-- - --	8 / 8	69.6	714	CAS04-TS06-1012	252	208	391
PCBs (total)	-- - --	8 / 8	184,433	2,831,864	CAS04-TS06-1012	870,043	860,961	1,446,745
Metals (MG/KG)								
Arsenic	1.35 - 1.35	7 / 8	0.20	12.9	CAS04-TS06-1012	2.13	4.34	5.04
Cadmium	-- - --	8 / 8	0.10	1.05	CAS04-TS04-1012	0.67	0.37	0.91
Chromium	1.30 - 1.85	5 / 8	0.57	5.00	CAS04-TS06-1012	1.85	1.65	2.96
Copper	-- - --	8 / 8	5.50	32.1	CAS04-TS06-1012	13.2	8.60	19.0
Lead	0.43 - 0.43	7 / 8	0.45	5.50	CAS04-TS06-1012	1.57	1.69	2.71
Mercury	0.095 - 0.19	3 / 8	0.043	0.100	CAS04-TS02-1012	0.064	0.023	0.079
Nickel	0.087 - 1.50	4 / 8	0.25	2.07	CAS04-TS06-1012	0.66	0.65	1.10
Selenium	2.00 - 3.00	4 / 8	0.96	2.57	CAS04-TS04-1012	1.40	0.54	1.76
Silver	0.023 - 1.81	1 / 8	0.43	0.43	CAS04-TS06-1012	0.41	0.36	0.65
Zinc	-- - --	8 / 8	77.8	174	CAS04-TS06-1012	98.8	33.1	121

TABLE L-12a

Tissue Concentrations (dry weight) - Whole-Body Frogs - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	422 - 445	1 / 3	39.0	39.0	CAYP-TS03-1012	158	103	331
3,4,4',5-Tetrachlorobiphenyl (81)	422 - 476	0 / 3	--	--	--	224	13.7	247
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	3 / 3	386	1,304	CAYP-TS01-1012	791	469	1,581
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	3 / 3	57.1	282	CAYP-TS02-1012	143	121	348
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	3 / 3	2,190	15,000	CAYP-TS02-1012	8,194	6,442	19,055
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	3 / 3	61.9	209	CAYP-TS02-1012	129	74.3	255
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	3 / 3	90.5	248	CAYP-TS01-1012	160	80.3	295
Congeners (156/157)	-- - --	3 / 3	2,286	6,364	CAYP-TS02-1012	4,477	2,056	7,943
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	3 / 3	1,714	3,913	CAYP-TS01-1012	3,133	1,231	5,209
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	3 / 3	41.9	195	CAYP-TS02-1012	93.6	88.2	242
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	3 / 3	762	1,522	CAYP-TS01-1012	1,261	433	1,990
TEQ (Bird)	-- - --	3 / 3	11.4	25.6	CAYP-TS01-1012	17.4	7.35	29.8
TEQ (Mammal)	-- - --	3 / 3	10.5	26.7	CAYP-TS01-1012	19.3	8.16	33.1
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	422 - 476	0 / 3	--	--	--	224	13.7	247
Total Dichlorobiphenyls	-- - --	3 / 3	143	913	CAYP-TS01-1012	496	389	1,152
Total Trichlorobiphenyls	419 - 419	2 / 3	1,455	2,217	CAYP-TS01-1012	1,294	1,014	3,002
Total Tetrachlorobiphenyls	857 - 2,043	1 / 3	3,227	3,227	CAYP-TS02-1012	1,559	1,475	4,045
Total Pentachlorobiphenyls	-- - --	3 / 3	4,619	19,091	CAYP-TS02-1012	12,396	7,296	24,697
Total Hexachlorobiphenyls	-- - --	3 / 3	57,143	182,609	CAYP-TS01-1012	128,402	64,448	237,052
Total Heptachlorobiphenyls	-- - --	3 / 3	100,000	260,870	CAYP-TS01-1012	186,957	81,224	323,889
Total Octachlorobiphenyls	-- - --	3 / 3	20,952	60,870	CAYP-TS01-1012	42,425	20,130	76,362
Total Nonachlorobiphenyls	-- - --	3 / 3	1,381	2,818	CAYP-TS02-1012	2,269	776	3,578
Decachlorobiphenyl (209)	-- - --	3 / 3	69.6	195	CAYP-TS03-1012	132	62.8	238
PCBs (total)	-- - --	3 / 3	184,433	523,635	CAYP-TS01-1012	375,377	173,583	668,013
Metals (MG/KG)								
Arsenic	1.35 - 1.35	2 / 3	0.55	0.95	CAYP-TS03-1012	0.72	0.21	1.07
Cadmium	-- - --	3 / 3	0.17	0.95	CAYP-TS03-1012	0.63	0.41	1.32
Chromium	-- - --	3 / 3	0.57	1.55	CAYP-TS02-1012	1.21	0.56	2.16
Copper	-- - --	3 / 3	6.52	11.4	CAYP-TS03-1012	9.47	2.60	13.8
Lead	0.43 - 0.43	2 / 3	0.82	1.90	CAYP-TS03-1012	0.98	0.86	2.42
Mercury	0.14 - 0.19	1 / 3	0.043	0.043	CAYP-TS01-1012	0.069	0.026	0.113
Nickel	0.087 - 1.50	0 / 3	--	--	--	0.34	0.37	0.96
Selenium	-- - --	3 / 3	0.96	1.71	CAYP-TS03-1012	1.28	0.39	1.94
Silver	0.023 - 0.13	0 / 3	--	--	--	0.030	0.032	0.084
Zinc	-- - --	3 / 3	77.8	120	CAYP-TS03-1012	95.0	22.1	132

TABLE L-12b

Tissue Concentrations (dry weight) - Whole-Body Frogs - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	5 / 5	61.9	2,214	CAS04-TS06-1012	637	912	1,506
3,4,4',5-Tetrachlorobiphenyl (81)	475 - 475	4 / 5	25.7	150	CAS04-TS03-1012	119	82.6	197
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	5 / 5	952	19,091	CAS04-TS03-1012	8,899	7,976	16,503
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	5 / 5	57.1	2,273	CAS04-TS03-1012	716	891	1,565
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	5 / 5	6,190	140,909	CAS04-TS03-1012	47,777	54,367	99,610
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	5 / 5	148	3,455	CAS04-TS03-1012	1,077	1,352	2,366
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	5 / 5	205	443	CAS04-TS06-1012	311	112	418
Congeners (156/157)	-- - --	5 / 5	4,571	24,545	CAS04-TS03-1012	10,423	8,165	18,207
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	5 / 5	3,700	11,818	CAS04-TS03-1012	6,794	3,307	9,947
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	5 / 5	95.0	357	CAS04-TS06-1012	201	105	301
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	5 / 5	1,300	3,000	CAS04-TS06-1012	2,023	628	2,622
TEQ (Bird	-- - --	5 / 5	26.9	164	CAS04-TS06-1012	72.8	58.1	128
TEQ (Mammal)	-- - --	5 / 5	24.5	57.6	CAS04-TS06-1012	39.6	15.6	54.4
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	16.4 - 485	1 / 5	436	436	CAS04-TS06-1012	231	151	375
Total Dichlorobiphenyls	-- - --	5 / 5	900	20,000	CAS04-TS06-1012	4,993	8,396	12,998
Total Trichlorobiphenyls	-- - --	5 / 5	2,476	92,857	CAS04-TS06-1012	26,125	38,023	62,376
Total Tetrachlorobiphenyls	-- - --	5 / 5	3,524	257,143	CAS04-TS06-1012	68,633	106,611	170,275
Total Pentachlorobiphenyls	-- - --	5 / 5	11,429	378,571	CAS04-TS06-1012	144,845	155,496	293,094
Total Hexachlorobiphenyls	-- - --	5 / 5	130,000	1,000,000	CAS04-TS06-1012	433,667	356,500	773,550
Total Heptachlorobiphenyls	-- - --	5 / 5	190,000	857,143	CAS04-TS06-1012	394,290	274,031	655,548
Total Octachlorobiphenyls	-- - --	5 / 5	43,500	214,286	CAS04-TS06-1012	89,228	72,451	158,303
Total Nonachlorobiphenyls	-- - --	5 / 5	2,450	10,714	CAS04-TS06-1012	4,651	3,470	7,959
Decachlorobiphenyl (209)	-- - --	5 / 5	124	714	CAS04-TS06-1012	323	238	550
PCBs (total)	-- - --	5 / 5	400,715	2,831,864	CAS04-TS06-1012	1,166,843	994,231	2,114,734
Metals (MG/KG)								
Arsenic	-- - --	5 / 5	0.20	12.9	CAS04-TS06-1012	2.98	5.53	8.25
Cadmium	-- - --	5 / 5	0.10	1.05	CAS04-TS04-1012	0.69	0.39	1.06
Chromium	1.30 - 1.85	2 / 5	3.81	5.00	CAS04-TS06-1012	2.24	2.03	4.17
Copper	-- - --	5 / 5	5.50	32.1	CAS04-TS06-1012	15.4	10.5	25.4
Lead	-- - --	5 / 5	0.45	5.50	CAS04-TS06-1012	1.92	2.06	3.89
Mercury	0.095 - 0.13	2 / 5	0.043	0.10	CAS04-TS02-1012	0.061	0.023	0.083
Nickel	1.15 - 1.15	4 / 5	0.25	2.07	CAS04-TS06-1012	0.86	0.74	1.57
Selenium	2.00 - 3.00	1 / 5	2.57	2.57	CAS04-TS04-1012	1.46	0.65	2.08
Silver	0.95 - 1.81	1 / 5	0.43	0.43	CAS04-TS06-1012	0.64	0.21	0.84
Zinc	-- - --	5 / 5	79.1	174	CAS04-TS06-1012	101	40.6	140

TABLE L-13

Tissue Concentrations (dry weight) - Whole-Body Fish - All Site Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	341 - 341	9 / 10	177	6,400	CAS04-TS07-WB-1012	1,860	2,102	3,079
3,4,4',5-Tetrachlorobiphenyl (81)	341 - 400	7 / 10	23.3	236	CAS04-TS08-WB-1012	149	72.0	191
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	10 / 10	3,704	69,231	CAS04-TS09-WB-1012	34,764	27,946	50,964
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	10 / 10	92.0	2,625	CAS04-TS11-WB-1012	1,210	919	1,742
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	10 / 10	13,704	211,538	CAS04-TS09-WB-1012	108,320	83,721	156,852
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	10 / 10	156	3,846	CAS04-TS09-WB-1012	1,868	1,554	2,769
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	10 / 10	60.0	1,520	CAS04-TS07-WB-1012	629	410	867
Congeners (156/157)	-- - --	10 / 10	1,080	45,833	CAS04-TS11-WB-1012	15,502	13,098	23,095
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	10 / 10	3,444	33,750	CAS04-TS11-WB-1012	17,031	11,284	23,571
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	377 - 400	7 / 10	88.9	680	CAS04-TS07-WB-1012	344	221	472
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	10 / 10	252	11,250	CAS04-TS11-WB-1012	3,837	3,388	5,801
TEQ (Bird)	-- - --	10 / 10	19.2	502	CAS04-TS07-WB-1012	171	153	260
TEQ (Mammal)	-- - --	10 / 10	6.95	179	CAS04-TS07-WB-1012	77.2	47.7	105
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	341 - 400	6 / 10	330	2,880	CAS04-TS08-WB-1012	1,023	1,077	1,648
Total Dichlorobiphenyls	-- - --	10 / 10	2,241	132,000	CAS04-TS08-WB-1012	47,662	53,435	78,637
Total Trichlorobiphenyls	-- - --	10 / 10	15,185	480,000	CAS04-TS07-WB-1012	189,803	190,719	300,360
Total Tetrachlorobiphenyls	-- - --	10 / 10	32,963	1,269,231	CAS04-TS09-WB-1012	512,608	462,790	780,879
Total Pentachlorobiphenyls	-- - --	10 / 10	96,296	1,846,154	CAS04-TS09-WB-1012	839,250	669,191	1,227,168
Total Hexachlorobiphenyls	-- - --	10 / 10	444,444	4,166,667	CAS04-TS11-WB-1012	2,210,400	1,498,728	3,079,184
Total Heptachlorobiphenyls	-- - --	10 / 10	351,852	3,208,333	CAS04-TS11-WB-1012	1,608,053	1,041,760	2,211,941
Total Octachlorobiphenyls	-- - --	10 / 10	60,000	666,667	CAS04-TS11-WB-1012	297,417	211,696	420,133
Total Nonachlorobiphenyls	-- - --	10 / 10	960	27,083	CAS04-TS11-WB-1012	10,182	8,685	15,217
Decachlorobiphenyl (209)	400 - 400	9 / 10	24.8	1,625	CAS04-TS11-WB-1012	597	545	913
PCBs (total)	-- - --	10 / 10	1,010,691	10,297,615	CAS04-TS09-WB-1012	5,716,901	3,967,058	8,016,530
Metals (MG/KG)								
Arsenic	0.78 - 1.34	6 / 10	0.24	0.91	CAS04-TS12-WB-1012	0.52	0.19	0.63
Cadmium	0.037 - 1.08	5 / 10	0.025	0.13	CAYP-TS05-WB-1012	0.14	0.20	0.26
Chromium	0.50 - 1.68	4 / 10	0.44	0.62	CAYP-TS07-WB-1012	0.56	0.15	0.65
Copper	-- - --	10 / 10	1.70	5.60	CAS04-TS08-WB-1012	3.66	1.56	4.57
Lead	0.17 - 1.42	1 / 10	0.77	0.77	CAS04-TS12-WB-1012	0.40	0.28	0.56
Mercury	-- - --	10 / 10	0.033	0.13	CAS04-TS11-WB-1012	0.062	0.033	0.081
Nickel	0.23 - 1.42	0 / 10	--	--	--	0.41	0.22	0.54
Selenium	1.44 - 2.59	4 / 10	0.66	1.08	CAYP-TS05-WB-1012	0.95	0.23	1.08
Silver	0.078 - 1.42	0 / 10	--	--	--	0.36	0.28	0.53
Zinc	-- - --	10 / 10	70.4	271	CAYP-TS06-WB-1012	140	78.6	186

TABLE L-13a

Tissue Concentrations (dry weight) - Whole-Body Fish - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	341 - 341	3 / 4	248	396	CAYP-TS05-WB-1012	281	95.5	394
3,4,4',5-Tetrachlorobiphenyl (81)	341 - 400	1 / 4	23.3	23.3	CAYP-TS05-WB-1012	143	80.7	238
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	4 / 4	3,704	8,276	CAYP-TS07-WB-1012	6,174	2,269	8,844
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	4 / 4	92.0	379	CAYP-TS07-WB-1012	263	142	429
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	4 / 4	13,704	30,000	CAYP-TS05-WB-1012	22,795	7,693	31,847
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	4 / 4	156	358	CAYP-TS05-WB-1012	234	94.0	345
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	4 / 4	60.0	458	CAYP-TS05-WB-1012	267	163	459
Congeners (156/157)	-- - --	4 / 4	1,080	9,310	CAYP-TS07-WB-1012	6,463	3,848	10,991
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	4 / 4	3,444	10,417	CAYP-TS05-WB-1012	6,058	3,019	9,611
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	400 - 400	3 / 4	88.9	625	CAYP-TS05-WB-1012	286	234	562
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	4 / 4	252	2,417	CAYP-TS05-WB-1012	1,554	958	2,681
TEQ (Bird)	-- - --	4 / 4	19.2	70.8	CAYP-TS05-WB-1012	41.0	22.0	67.0
TEQ (Mammal)	-- - --	4 / 4	6.95	66.4	CAYP-TS05-WB-1012	35.1	24.6	64.0
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	341 - 400	0 / 4	--	--	--	187	15.2	205
Total Dichlorobiphenyls	-- - --	4 / 4	2,241	4,815	CAYP-TS04-WB-1012	3,361	1,139	4,702
Total Trichlorobiphenyls	-- - --	4 / 4	15,185	18,400	CAYP-TS06-WB-1012	16,320	1,421	17,993
Total Tetrachlorobiphenyls	-- - --	4 / 4	32,963	51,724	CAYP-TS07-WB-1012	44,630	8,150	54,220
Total Pentachlorobiphenyls	-- - --	4 / 4	96,296	170,833	CAYP-TS05-WB-1012	140,300	33,721	179,979
Total Hexachlorobiphenyls	-- - --	4 / 4	444,444	1,000,000	CAYP-TS05-WB-1012	664,904	239,438	946,646
Total Heptachlorobiphenyls	-- - --	4 / 4	351,852	916,667	CAYP-TS05-WB-1012	556,440	249,476	849,993
Total Octachlorobiphenyls	-- - --	4 / 4	60,000	154,167	CAYP-TS05-WB-1012	90,834	43,818	142,394
Total Nonachlorobiphenyls	-- - --	4 / 4	960	4,167	CAYP-TS05-WB-1012	2,655	1,401	4,304
Decachlorobiphenyl (209)	400 - 400	3 / 4	24.8	117	CAYP-TS07-WB-1012	112	71.7	196
PCBs (total)	-- - --	4 / 4	1,010,691	2,310,313	CAYP-TS05-WB-1012	1,519,506	562,937	2,181,903
Metals (MG/KG)								
Arsenic	0.78 - 1.34	1 / 4	0.64	0.64	CAYP-TS06-WB-1012	0.57	0.13	0.72
Cadmium	0.037 - 0.072	2 / 4	0.069	0.13	CAYP-TS05-WB-1012	0.062	0.047	0.12
Chromium	-- - --	4 / 4	0.44	0.62	CAYP-TS07-WB-1012	0.54	0.079	0.63
Copper	-- - --	4 / 4	1.70	4.80	CAYP-TS06-WB-1012	2.85	1.42	4.52
Lead	0.17 - 0.21	0 / 4	--	--	--	0.096	0.0080	0.11
Mercury	-- - --	4 / 4	0.033	0.083	CAYP-TS05-WB-1012	0.047	0.024	0.075
Nickel	0.23 - 0.44	0 / 4	--	--	--	0.17	0.043	0.22
Selenium	-- - --	4 / 4	0.66	1.08	CAYP-TS05-WB-1012	0.80	0.19	1.03
Silver	0.078 - 0.14	0 / 4	--	--	--	0.059	0.015	0.076
Zinc	-- - --	4 / 4	70.4	271	CAYP-TS06-WB-1012	129	95.1	241

TABLE L-13b

Tissue Concentrations (dry weight) - Whole-Body Fish - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	6 / 6	177	6,400	CAS04-TS07-WB-1012	2,912	2,151	4,682
3,4,4',5-Tetrachlorobiphenyl (81)	-- - --	6 / 6	60.0	236	CAS04-TS08-WB-1012	153	73.3	213
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	6 / 6	24,545	69,231	CAS04-TS09-WB-1012	53,824	17,686	68,373
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	6 / 6	1,091	2,625	CAS04-TS11-WB-1012	1,841	559	2,301
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	6 / 6	81,818	211,538	CAS04-TS09-WB-1012	165,337	53,180	209,086
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	6 / 6	1,500	3,846	CAS04-TS09-WB-1012	2,957	884	3,685
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	6 / 6	560	1,520	CAS04-TS07-WB-1012	871	334	1,146
Congeners (156/157)	-- - --	6 / 6	7,600	45,833	CAS04-TS11-WB-1012	21,527	13,821	32,897
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	6 / 6	12,727	33,750	CAS04-TS11-WB-1012	24,345	7,949	30,885
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	377 - 400	4 / 6	163	680	CAS04-TS07-WB-1012	382	225	567
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	6 / 6	1,640	11,250	CAS04-TS11-WB-1012	5,359	3,627	8,343
TEQ (Bird)	-- - --	6 / 6	103	502	CAS04-TS07-WB-1012	258	139	372
TEQ (Mammal)	-- - --	6 / 6	82.0	179	CAS04-TS07-WB-1012	105	37.0	136
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	-- - --	6 / 6	330	2,880	CAS04-TS08-WB-1012	1,581	1,076	2,466
Total Dichlorobiphenyls	-- - --	6 / 6	14,000	132,000	CAS04-TS08-WB-1012	77,196	50,219	118,508
Total Trichlorobiphenyls	-- - --	6 / 6	133,333	480,000	CAS04-TS07-WB-1012	305,458	159,196	436,419
Total Tetrachlorobiphenyls	-- - --	6 / 6	500,000	1,269,231	CAS04-TS09-WB-1012	824,594	305,729	1,076,099
Total Pentachlorobiphenyls	-- - --	6 / 6	681,818	1,846,154	CAS04-TS09-WB-1012	1,305,218	392,443	1,628,057
Total Hexachlorobiphenyls	-- - --	6 / 6	1,681,818	4,166,667	CAS04-TS11-WB-1012	3,240,730	907,741	3,987,474
Total Heptachlorobiphenyls	-- - --	6 / 6	1,181,818	3,208,333	CAS04-TS11-WB-1012	2,309,128	664,539	2,855,804
Total Octachlorobiphenyls	-- - --	6 / 6	209,091	666,667	CAS04-TS11-WB-1012	435,139	150,376	558,845
Total Nonachlorobiphenyls	-- - --	6 / 6	8,400	27,083	CAS04-TS11-WB-1012	15,200	7,684	21,522
Decachlorobiphenyl (209)	-- - --	6 / 6	455	1,625	CAS04-TS11-WB-1012	920	467	1,304
PCBs (total)	-- - --	6 / 6	4,560,773	10,297,615	CAS04-TS09-WB-1012	8,515,165	2,155,599	10,288,447
Metals (MG/KG)								
Arsenic	0.90 - 0.90	5 / 6	0.24	0.91	CAS04-TS12-WB-1012	0.48	0.23	0.67
Cadmium	0.080 - 1.08	3 / 6	0.025	0.067	CAS04-TS10-WB-1012	0.20	0.24	0.40
Chromium	0.50 - 1.68	0 / 6	--	--	--	0.57	0.20	0.73
Copper	-- - --	6 / 6	2.20	5.60	CAS04-TS08-WB-1012	4.20	1.52	5.46
Lead	0.73 - 1.42	1 / 6	0.77	0.77	CAS04-TS12-WB-1012	0.60	0.14	0.71
Mercury	-- - --	6 / 6	0.038	0.13	CAS04-TS11-WB-1012	0.071	0.036	0.10
Nickel	0.73 - 1.42	0 / 6	--	--	--	0.57	0.12	0.66
Selenium	1.44 - 2.59	0 / 6	--	--	--	1.05	0.20	1.22
Silver	0.73 - 1.42	0 / 6	--	--	--	0.57	0.12	0.66
Zinc	-- - --	6 / 6	76.7	250	CAS04-TS09-WB-1012	148	74.4	209

TABLE L-14

Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - All Site Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1016	104 - 105	0 / 2	--	--	--	52.3	0.34	53.9
Aroclor-1221	104 - 105	0 / 2	--	--	--	52.3	0.34	53.9
Aroclor-1232	120 - 123	0 / 2	--	--	--	60.9	0.92	65.0
Aroclor-1242	104 - 105	0 / 2	--	--	--	52.3	0.34	53.9
Aroclor-1248	104 - 105	0 / 2	--	--	--	52.3	0.34	53.9
Aroclor-1254	105 - 105	1 / 2	594	594	CAS04-TS13-WB-1012	323	383	2,033
Aroclor-1260	-- - --	2 / 2	672	3,198	CAS04-TS13-WB-1012	1,935	1,786	9,911
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	2 / 2	225	5,134	CAS04-TS13-WB-1012	2,679	3,471	18,174
3,4,4',5-Tetrachlorobiphenyl (81)	445 - 445	1 / 2	231	231	CAS04-TS13-WB-1012	226	5.68	252
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	2 / 2	4,357	63,116	CAS04-TS13-WB-1012	33,736	41,548	219,229
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	2 / 2	302	2,393	CAS04-TS13-WB-1012	1,347	1,479	7,949
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	2 / 2	17,911	195,237	CAS04-TS13-WB-1012	106,574	125,388	666,368
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	2 / 2	228	3,675	CAS04-TS13-WB-1012	1,951	2,438	12,834
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	2 / 2	467	1,501	CAS04-TS13-WB-1012	984	731	4,247
Congeners (156/157)	-- - --	2 / 2	11,334	28,207	CAS04-TS13-WB-1012	19,771	11,930	73,034
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	2 / 2	8,290	28,613	CAS04-TS13-WB-1012	18,452	14,370	82,607
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	2 / 2	224	324	CAYP-TS08-WB-1012	274	70.6	589
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	2 / 2	3,788	7,448	CAS04-TS13-WB-1012	5,618	2,588	17,171
TEQ (Bird)	-- - --	2 / 2	60.2	442	CAS04-TS13-WB-1012	251	270	1,456
TEQ (Mammal)	-- - --	2 / 2	57.8	167	CAS04-TS13-WB-1012	113	77.4	458
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	239 - 239	1 / 2	2,341	2,341	CAS04-TS13-WB-1012	1,230	1,571	8,242
Total Dichlorobiphenyls	-- - --	2 / 2	1,868	124,402	CAS04-TS13-WB-1012	63,135	86,645	449,960
Total Trichlorobiphenyls	-- - --	2 / 2	8,703	374,477	CAS04-TS13-WB-1012	191,590	258,641	1,346,292
Total Tetrachlorobiphenyls	-- - --	2 / 2	23,587	1,035,082	CAS04-TS13-WB-1012	529,335	715,235	3,722,498
Total Pentachlorobiphenyls	-- - --	2 / 2	106,260	1,583,467	CAS04-TS13-WB-1012	844,864	1,044,544	5,508,225
Total Hexachlorobiphenyls	-- - --	2 / 2	736,085	4,025,319	CAS04-TS13-WB-1012	2,380,702	2,325,839	12,764,404
Total Heptachlorobiphenyls	-- - --	2 / 2	733,764	2,861,281	CAS04-TS13-WB-1012	1,797,523	1,504,382	8,513,829
Total Octachlorobiphenyls	-- - --	2 / 2	153,202	625,577	CAS04-TS13-WB-1012	389,389	334,019	1,880,617
Total Nonachlorobiphenyls	-- - --	2 / 2	5,479	23,396	CAS04-TS13-WB-1012	14,437	12,669	70,999
Decachlorobiphenyl (209)	-- - --	2 / 2	376	1,386	CAS04-TS13-WB-1012	881	714	4,068
PCBs (total)	-- - --	2 / 2	1,769,325	10,656,727	CAS04-TS13-WB-1012	6,213,026	6,284,343	34,269,452

TABLE L-14

Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - All Site Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Metals (MG/KG)								
Arsenic	1.14 - 1.44	0 / 2	--	--	--	0.65	0.11	1.12
Cadmium	0.072 - 0.66	0 / 2	--	--	--	0.18	0.21	1.12
Chromium	1.03 - 1.03	1 / 2	0.78	0.78	CAYP-TS08-WB-1012	0.65	0.18	1.47
Copper	-- - --	2 / 2	1.28	2.89	CAS04-TS13-WB-1012	2.09	1.14	7.16
Lead	0.15 - 0.91	0 / 2	--	--	--	0.26	0.27	1.47
Mercury	-- - --	2 / 2	0.12	0.29	CAYP-TS08-WB-1012	0.21	0.12	0.75
Nickel	0.40 - 0.91	0 / 2	--	--	--	0.33	0.18	1.14
Selenium	1.85 - 1.85	1 / 2	0.89	0.89	CAYP-TS08-WB-1012	0.90	0.026	1.02
Silver	0.14 - 0.91	0 / 2	--	--	--	0.26	0.27	1.47
Zinc	-- - --	2 / 2	53.9	82.5	CAYP-TS08-WB-1012	68.2	20.2	159

TABLE L-14a

Tissue Concentrations (dry weight) - Largemouth bass (Fillet/Offal) Reconstituted Whole-Body - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1016	105 - 105	0 / 1	--	--	--	52.6	--	--
Aroclor-1221	105 - 105	0 / 1	--	--	--	52.6	--	--
Aroclor-1232	123 - 123	0 / 1	--	--	--	61.5	--	--
Aroclor-1242	105 - 105	0 / 1	--	--	--	52.6	--	--
Aroclor-1248	105 - 105	0 / 1	--	--	--	52.6	--	--
Aroclor-1254	105 - 105	0 / 1	--	--	--	52.6	--	--
Aroclor-1260	-- - --	1 / 1	672	672	CAYP-TS08-WB-1012	672	--	--
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	1 / 1	225	225	CAYP-TS08-WB-1012	225	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	445 - 445	0 / 1	--	--	--	222	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	1 / 1	4,357	4,357	CAYP-TS08-WB-1012	4,357	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	1 / 1	302	302	CAYP-TS08-WB-1012	302	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	1 / 1	17,911	17,911	CAYP-TS08-WB-1012	17,911	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	1 / 1	228	228	CAYP-TS08-WB-1012	228	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	1 / 1	467	467	CAYP-TS08-WB-1012	467	--	--
Congeners (156/157)	-- - --	1 / 1	11,334	11,334	CAYP-TS08-WB-1012	11,334	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	1 / 1	8,290	8,290	CAYP-TS08-WB-1012	8,290	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	1 / 1	324	324	CAYP-TS08-WB-1012	324	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	1 / 1	3,788	3,788	CAYP-TS08-WB-1012	3,788	--	--
TEQ (Bird)	-- - --	1 / 1	60.2	60.2	CAYP-TS08-WB-1012	60.2	--	--
TEQ (Mammal)	-- - --	1 / 1	57.8	57.8	CAYP-TS08-WB-1012	57.8	--	--
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	239 - 239	0 / 1	--	--	--	120	--	--
Total Dichlorobiphenyls	-- - --	1 / 1	1,868	1,868	CAYP-TS08-WB-1012	1,868	--	--
Total Trichlorobiphenyls	-- - --	1 / 1	8,703	8,703	CAYP-TS08-WB-1012	8,703	--	--
Total Tetrachlorobiphenyls	-- - --	1 / 1	23,587	23,587	CAYP-TS08-WB-1012	23,587	--	--
Total Pentachlorobiphenyls	-- - --	1 / 1	106,260	106,260	CAYP-TS08-WB-1012	106,260	--	--
Total Hexachlorobiphenyls	-- - --	1 / 1	736,085	736,085	CAYP-TS08-WB-1012	736,085	--	--
Total Heptachlorobiphenyls	-- - --	1 / 1	733,764	733,764	CAYP-TS08-WB-1012	733,764	--	--
Total Octachlorobiphenyls	-- - --	1 / 1	153,202	153,202	CAYP-TS08-WB-1012	153,202	--	--
Total Nonachlorobiphenyls	-- - --	1 / 1	5,479	5,479	CAYP-TS08-WB-1012	5,479	--	--
Decachlorobiphenyl (209)	-- - --	1 / 1	376	376	CAYP-TS08-WB-1012	376	--	--
PCBs (total)	-- - --	1 / 1	1,769,325	1,769,325	CAYP-TS08-WB-1012	1,769,325	--	--

TABLE L-14a

Tissue Concentrations (dry weight) - Largemouth bass (Fillet/Offal) Reconstituted Whole-Body - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Metals (MG/KG)								
Arsenic	1.44 - 1.44	0 / 1	--	--	--	0.72	--	--
Cadmium	0.072 - 0.072	0 / 1	--	--	--	0.036	--	--
Chromium	-- - --	1 / 1	0.78	0.78	CAYP-TS08-WB-1012	0.78	--	--
Copper	-- - --	1 / 1	1.28	1.28	CAYP-TS08-WB-1012	1.28	--	--
Lead	0.15 - 0.15	0 / 1	--	--	--	0.074	--	--
Mercury	-- - --	1 / 1	0.29	0.29	CAYP-TS08-WB-1012	0.29	--	--
Nickel	0.40 - 0.40	0 / 1	--	--	--	0.20	--	--
Selenium	-- - --	1 / 1	0.89	0.89	CAYP-TS08-WB-1012	0.89	--	--
Silver	0.14 - 0.14	0 / 1	--	--	--	0.072	--	--
Zinc	-- - --	1 / 1	82.5	82.5	CAYP-TS08-WB-1012	82.5	--	--

TABLE L-14b

Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1016	104 - 104	0 / 1	--	--	--	52.1	--	--
Aroclor-1221	104 - 104	0 / 1	--	--	--	52.1	--	--
Aroclor-1232	120 - 120	0 / 1	--	--	--	60.2	--	--
Aroclor-1242	104 - 104	0 / 1	--	--	--	52.1	--	--
Aroclor-1248	104 - 104	0 / 1	--	--	--	52.1	--	--
Aroclor-1254	-- - --	1 / 1	594	594	CAS04-TS13-WB-1012	594	--	--
Aroclor-1260	-- - --	1 / 1	3,198	3,198	CAS04-TS13-WB-1012	3,198	--	--
Dioxin-Like PCB Congeners (PG/G)								
3,3',4,4'-Tetrachlorobiphenyl (77)	-- - --	1 / 1	5,134	5,134	CAS04-TS13-WB-1012	5,134	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	-- - --	1 / 1	231	231	CAS04-TS13-WB-1012	231	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	1 / 1	63,116	63,116	CAS04-TS13-WB-1012	63,116	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	1 / 1	2,393	2,393	CAS04-TS13-WB-1012	2,393	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	1 / 1	195,237	195,237	CAS04-TS13-WB-1012	195,237	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	1 / 1	3,675	3,675	CAS04-TS13-WB-1012	3,675	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	1 / 1	1,501	1,501	CAS04-TS13-WB-1012	1,501	--	--
Congeners (156/157)	-- - --	1 / 1	28,207	28,207	CAS04-TS13-WB-1012	28,207	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	1 / 1	28,613	28,613	CAS04-TS13-WB-1012	28,613	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	1 / 1	224	224	CAS04-TS13-WB-1012	224	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	1 / 1	7,448	7,448	CAS04-TS13-WB-1012	7,448	--	--
TEQ (Bird)	-- - --	1 / 1	442	442	CAS04-TS13-WB-1012	442	--	--
TEQ (Mammal)	-- - --	1 / 1	167	167	CAS04-TS13-WB-1012	167	--	--
PCB Homologues (PG/G)								
Total Monochlorobiphenyls	-- - --	1 / 1	2,341	2,341	CAS04-TS13-WB-1012	2,341	--	--
Total Dichlorobiphenyls	-- - --	1 / 1	124,402	124,402	CAS04-TS13-WB-1012	124,402	--	--
Total Trichlorobiphenyls	-- - --	1 / 1	374,477	374,477	CAS04-TS13-WB-1012	374,477	--	--
Total Tetrachlorobiphenyls	-- - --	1 / 1	1,035,082	1,035,082	CAS04-TS13-WB-1012	1,035,082	--	--
Total Pentachlorobiphenyls	-- - --	1 / 1	1,583,467	1,583,467	CAS04-TS13-WB-1012	1,583,467	--	--
Total Hexachlorobiphenyls	-- - --	1 / 1	4,025,319	4,025,319	CAS04-TS13-WB-1012	4,025,319	--	--
Total Heptachlorobiphenyls	-- - --	1 / 1	2,861,281	2,861,281	CAS04-TS13-WB-1012	2,861,281	--	--
Total Octachlorobiphenyls	-- - --	1 / 1	625,577	625,577	CAS04-TS13-WB-1012	625,577	--	--
Total Nonachlorobiphenyls	-- - --	1 / 1	23,396	23,396	CAS04-TS13-WB-1012	23,396	--	--
Decachlorobiphenyl (209)	-- - --	1 / 1	1,386	1,386	CAS04-TS13-WB-1012	1,386	--	--
PCBs (total)	-- - --	1 / 1	10,656,727	10,656,727	CAS04-TS13-WB-1012	10,656,727	--	--

TABLE L-14b

Tissue Concentrations (dry weight) - Largemouth Bass (Fillet/Offal) Reconstituted Whole-Body - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)
Metals (MG/KG)								
Arsenic	1.14 - 1.14	0 / 1	--	--	--	0.57	--	--
Cadmium	0.66 - 0.66	0 / 1	--	--	--	0.33	--	--
Chromium	1.03 - 1.03	0 / 1	--	--	--	0.52	--	--
Copper	-- - --	1 / 1	2.89	2.89	CAS04-TS13-WB-1012	2.89	--	--
Lead	0.91 - 0.91	0 / 1	--	--	--	0.45	--	--
Mercury	-- - --	1 / 1	0.12	0.12	CAS04-TS13-WB-1012	0.12	--	--
Nickel	0.91 - 0.91	0 / 1	--	--	--	0.45	--	--
Selenium	1.85 - 1.85	0 / 1	--	--	--	0.92	--	--
Silver	0.91 - 0.91	0 / 1	--	--	--	0.45	--	--
Zinc	-- - --	1 / 1	53.9	53.9	CAS04-TS13-WB-1012	53.9	--	--

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Site 4	**earthworm**	***Lumbricus terrestris***	**--**	**--**	**--**	**48**	**CAS04-TS01-1012**	**whole body**	**10/11/2012**
Upstream Pond	leopard frog	*Lithobates sphenocephalus*	adult	1	150	19	Released	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	49	--	--	10/4/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	210	45	--	--	10/4/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	212	64	--	--	10/4/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**3**	**--**	**158**	**CAS04-TS02-1012**	**whole body**	10/4/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	40	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	25	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	17	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	16	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	120	12	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	95	6	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	85	4	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	75	3	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	80	3	--	--	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	85	3	--	--	10/24/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**10**	**--**	**129**	**CAS04-TS03-1012**	**whole body**	10/24/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	220	59	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	200	48	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	19	--	--	10/26/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**3**	**--**	**126**	**CAS04-TS04-1012**	**whole body**	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	175	32	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	19	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	135	13	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	130	12	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	155	16	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	95	4	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	100	7	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	110	8	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	95	7	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	95	4	--	--	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	85	3	--	--	10/26/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**11**	**--**	**125**	**CAS04-TS05-1012**	**whole body**	10/26/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	65	4	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	4	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	4	--	--	10/11/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	72	5	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	72	5	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	63	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	40	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	43	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	2	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	65	5	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	40	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	40	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	40	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	40	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	65	4	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	60	4	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	45	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	50	2	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	2	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	45	2	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	45	3	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	45	2	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	30	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	30	1	--	--	10/11/2012
Upstream Pond	American bullfrog	*Lithobates catesbeinanus*	tadpole	1	55	3	--	--	10/11/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**tadpole**	**37**	**--**	**101**	**CAS04-TS06-1012**	**whole body**	10/11/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	135	26	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	141	28	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	141	29	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	135	35	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	130	26	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	135	23	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	140	26	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	145	35	--	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	medium	1	100	10	--	--	10/4/2012
Total	**golden shiner**	***Notemigonus crysoleucas***	**medium**	**9**	**--**	**238**	**CAS04-TS07-WB-1012**	**whole body**	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	small	1	62	2	Released	--	10/4/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	small	1	85	5	Released	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	small	1	65	2	Released	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	small	1	75	2	Released	--	10/4/2012
Upstream Pond	golden shiner	*Notemigonus crysoleucas*	small	1	71	3	Released	--	10/4/2012
Upstream Pond	**mosquitofish**	***Gambusia holbrooki***	**medium**	**1,750**	**20-40**	**550**	**CAS04-TS08-WB-1012**	**whole body**	**10/5/2012**
Upstream Pond	**mosquitofish**	***Gambusia holbrooki***	**medium**	**700**	**20-40**	**200**	**CAS04-TS09-WB-1012**	**whole body**	**10/5/2012**
Upstream Pond	American eel	*Anguilla rostrata*	small	1	290	46	--	--	10/4/2012
Upstream Pond	American eel	*Anguilla rostrata*	small	1	270	36	--	--	10/4/2012
Upstream Pond	American eel	*Anguilla rostrata*	small	1	300	53	--	--	10/4/2012
Upstream Pond	American eel	*Anguilla rostrata*	small	1	300	45	--	--	10/4/2012
Upstream Pond	American eel	*Anguilla rostrata*	small	1	260	30	--	--	10/4/2012
Upstream Pond	American eel	*Anguilla rostrata*	small	1	320	43	--	--	10/4/2012
Total	**American eel**	***Anguilla rostrata***	**small**	**6**	**--**	**253**	**CAS04-TS10-WB-1012**	**whole body**	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	138	45	--	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	151	63	--	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	153	59	--	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	135	43	--	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	152	62	--	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	medium	1	133	40	--	--	10/4/2012
Total	**bluegill**	***Lepomis macrochirus***	**medium**	**6**	**--**	**312**	**CAS04-TS11-WB-1012**	**whole body**	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	101	8	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	65	4	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	60	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	58	3	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	58	3	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	50	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	50	1	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	50	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	75	7	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	60	4	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	50	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	50	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	58	3	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	57	2	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	59	3	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	85	10	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	85	11	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	52	1	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	51	3	Released	--	10/4/2012
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	58	3	Released	--	10/4/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Upstream Pond	bluegill	*Lepomis macrochirus*	small	1	58	3	Released	--	10/4/2012
Upstream Pond	**brown bullhead**	***Ameirus nebulosus***	**small**	**1**	**135**	**25**	**CAS04-TS12-WB-1012**	**whole body**	**10/4/2012**
Upstream Pond	largemouth bass	*Micropterus salmoides*	large	1	322	465	--	--	10/4/2012
Upstream Pond	largemouth bass	*Micropterus salmoides*	large	1	350	626	--	--	10/4/2012
Upstream Pond	largemouth bass	*Micropterus salmoides*	large	1	360	799	--	--	10/4/2012
Upstream Pond	largemouth bass	*Micropterus salmoides*	large	1	340	688	--	--	10/4/2012
Upstream Pond	largemouth bass	*Micropterus salmoides*	large	1	368	695	--	--	10/4/2012
Total	**largemouth bass**	***Micropterus salmoides***	**large**	**5**	**--**	**3,273**	**CAS04-TS13-F-1012 & CAS04-TS13-O-1012**	**fillet/offal**	**10/4/2012**
Youth Pond	leopard frog	*Lithobates sphenocephalus*	adult	1	150	14	Released	--	10/26/2012
Youth Pond	leopard frog	*Lithobates sphenocephalus*	adult	1	140	11	Released	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	133	13	--	--	10/5/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	210	95	--	--	10/5/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**2**	**--**	**108**	**CAYP-TS01-1012**	**whole body**	**10/5/2012**
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	190	48	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	175	33	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	170	35	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	150	21	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	90	5	--	--	10/26/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**5**	**--**	**142**	**CAYP-TS02-1012**	**whole body**	**10/26/2012**
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	28	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	16	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	14	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	24	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	18	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	19	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	120	13	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	90	4	--	--	10/26/2012
Youth Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	140	17	--	--	10/26/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**9**	**--**	**153**	**CAYP-TS03-1012**	**whole body**	**10/26/2012**
Youth Pond	bluegill	*Lepomis macrochirus*	medium	1	142	53	--	--	10/5/2012
Youth Pond	bluegill	*Lepomis macrochirus*	medium	1	142	52	--	--	10/5/2012
Youth Pond	bluegill	*Lepomis macrochirus*	medium	1	163	78	--	--	10/5/2012
Total	**bluegill**	***Lepomis macrochirus***	**medium**	**3**	**--**	**183**	**CAYP-TS04-WB-1012**	**whole body**	**10/5/2012**
Youth Pond	bluegill	*Lepomis macrochirus*	medium	1	165	79	Released	--	10/5/2012
Youth Pond	bluegill	*Lepomis macrochirus*	medium	1	178	108	Released	--	10/5/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	184	75	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	180	72	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	190	85	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	212	104	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	198	88	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	165	46	--	--	10/5/2012
Total	**largemouth bass**	***Micropterus salmoides***	**medium**	**6**	**--**	**470**	**CAYP-TS05-WB-1012**	**whole body**	**10/5/2012**
Youth Pond	**mosquitofish**	***Gambusia holbrooki***	**medium**	**525**	**20-40**	**155**	**CAYP-TS06-WB-1012**	**whole body**	**10/9/2012**
Youth Pond	black crappie	*Pomoxis nigromaculatus*	medium	1	158	67	Released	--	10/5/2012
Youth Pond	American eel	*Anguilla rostrata*	small	1	270	47	--	--	10/5/2012
Youth Pond	American eel	*Anguilla rostrata*	small	1	256	42	--	--	10/5/2012
Youth Pond	American eel	*Anguilla rostrata*	small	1	249	40	--	--	10/5/2012
Youth Pond	American eel	*Anguilla rostrata*	small	1	273	44	--	--	10/5/2012
Total	**American eel**	***Anguilla rostrata***	**small**	**4**	**--**	**173**	**CAYP-TS07-WB-1012**	**whole body**	**10/5/2012**
Youth Pond	largemouth bass	*Micropterus salmoides*	large	1	280	220	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	large	1	270	223	--	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	large	1	310	340	--	--	10/5/2012
Total	**largemouth bass**	***Micropterus salmoides***	**large**	**3**	**--**	**783**	**CAYP-TS08-F-1012 & CAYP-TS08-O-1012**	**fillet/offal**	**10/5/2012**
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	185	79	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	168	48	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	199	92	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	135	31	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	191	82	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	200	93	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	180	67	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	medium	1	180	64	Released	--	10/5/2012
Youth Pond	largemouth bass	*Micropterus salmoides*	large	1	260	206	Released	--	10/5/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	21	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	165	25	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	185	36	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	165	27	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	165	25	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	120	10	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	100	6	--	--	10/24/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**7**	**--**	**150**	**CAS04REF-TS01-1012**	**whole body**	**10/24/2012**
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	150	21	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	21	--	--	10/24/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	23	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	160	23	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	145	16	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	110	8	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	115	10	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	115	10	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	125	11	--	--	10/24/2012
Cheatham Pond	American bullfrog	*Lithobates catesbeinanus*	adult	1	120	10	--	--	10/24/2012
Total	**American bullfrog**	***Lithobates catesbeinanus***	**adult**	**10**	**--**	**153**	**CAS04REF-TS02-1012**	**whole body**	**10/24/2012**
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	220	22	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	230	28	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	260	45	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	240	39	--	--	10/23/2012
Cheatham Pond	American eel	*Anguilla rostrata*	small	1	200	11	--	--	10/23/2012
Total	**American eel**	***Anguilla rostrata***	**small**	**5**	**--**	**145**	**CAS04REF-TS03-WB-1012**	**whole body**	**10/23/2012**
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	10	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	19	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	15	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	20	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	16	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	12	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	15	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	15	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	12	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	10	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	20	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	11	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	11	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	17	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	14	--	--	10/23/2012

TABLE L-15

Composition of Tissue Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Site/Water Body	Common Name	Scientific Name	Cohort/ Size Class	Number	Length (mm)	Weight (g)	Sample ID	Sample Type	Date
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	7	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	8	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	80	7	--	--	10/23/2012
Total	**bluegill**	***Lepomis macrochirus***	**medium**	**33**	**--**	**397**	**CAS04REF-TS04-WB-1012**	**whole body**	**10/23/2012**
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	18	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	15	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	105	18	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	100	16	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	9	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	90	11	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	13	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	10	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	95	14	--	--	10/23/2012
Cheatham Pond	bluegill	*Lepomis macrochirus*	medium	1	85	8	--	--	10/23/2012
Total	**bluegill**	***Lepomis macrochirus***	**medium**	**15**	**--**	**195**	**CAS04REF-TS05-WB-1012**	**whole body**	**10/23/2012**
Cheatham Pond	largemouth bass	*Micropterus salmoides*	medium	1	150	40	--	--	10/23/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	medium	1	180	98	--	--	10/23/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	medium	1	160	38	--	--	10/23/2012
Total	**largemouth bass**	***Micropterus salmoides***	**medium**	**3**	**--**	**176**	**CAS04REF-TS06-WB-1012**	**whole body**	**10/23/2012**
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	410	956	--	--	10/23/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	370	761	--	--	10/23/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	385	914	--	--	10/23/2012
Total	**largemouth bass**	***Micropterus salmoides***	**large**	**3**	**--**	**2,631**	**CAS04REF-TS07-F-1012 & CAS04REF-TS07-O-1012**	**fillet/offal**	**10/23/2012**
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	270	213	--	--	10/23/2012
Cheatham Pond	largemouth bass	*Micropterus salmoides*	large	1	290	259	--	--	10/23/2012
Total	**largemouth bass**	***Micropterus salmoides***	**large**	**2**	**--**	**472**	**CAS04REF-TS08-F-1012 & CAS04REF-TS08-O-1012**	**fillet/offal**	**10/23/2012**

TABLE L-16

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
Metals					
Arsenic	7440-38-2	Yes	-- - --	--	--
Cadmium	7440-43-9	Yes	-- - --	--	--
Chromium[1]	7440-47-3	Yes	-- - --	--	--
Copper	7440-50-8	Yes	-- - --	--	--
Lead	7439-92-1	Yes	-- - --	--	--
Mercury[2]	7439-97-6	Yes	-- - --	--	--
Nickel	7440-02-0	Yes	-- - --	--	--
Selenium	7782-49-2	Yes	-- - --	--	--
Silver	7440-22-4	Yes	-- - --	--	--
Tributyltin	56-35-9	No	-- - --	--	--
Zinc	7440-66-6	Yes	-- - --	--	--
Polychlorinated Biphenyls[3]					
Aroclor-1016	12674-11-2	Yes	Not reported	5.60	Sample et al. 1996
Aroclor-1221	11104-28-2	Yes	Not reported	4.70	Jones et al. 1997
Aroclor-1232	11141-16-5	Yes	Not reported	5.10	Jones et al. 1997
Aroclor-1242	53469-21-9	Yes	Not reported	5.60	Jones et al. 1997
Aroclor-1248	12672-29-6	Yes	Not reported	6.20	Jones et al. 1997
Aroclor-1254	11097-69-1	Yes	Not reported	6.50	Jones et al. 1997
Aroclor-1260	11096-82-5	Yes	Not reported	6.80	Jones et al. 1997
Aroclor-1262	37384-23-5	No	-- - --	--	--
Aroclor-1268	11100-14-4	No	-- - --	--	--
Pesticides					
4,4'-DDD	72-54-8	Yes	5.90 - 6.65	6.10	USEPA 1995a
4,4'-DDE	72-55-9	Yes	5.63 - 6.96	6.76	USEPA 1995a
4,4'-DDT	50-29-3	Yes	5.56 - 7.01	6.53	USEPA 1995a
Aldrin	309-00-2	Yes	5.11 - 7.50	6.50	USEPA 1995a
alpha-BHC	319-84-6	Yes	3.75 - 3.81	3.80	USEPA 1995a
alpha-Chlordane[4]	5103-71-9	Yes	5.80 - 6.41	6.32	USEPA 1995a
beta-BHC	319-85-7	Yes	3.75 - 3.84	3.81	USEPA 1995a
Chlorpyrifos	2921-88-2	No	-- - --	--	--
delta-BHC	319-86-8	Yes	Not reported	4.10	USEPA 1996a
Diazinon	333-41-5	No	-- - --	--	--
Dicofol	115-32-2	No	-- - --	--	--
Dieldrin	60-57-1	Yes	3.63 - 6.20	5.37	USEPA 1995a
Disulfoton	298-04-4	No	-- - --	--	--
Endosulfan I	959-98-8	Yes	3.55 - 3.85	3.83	USEPA 1995a
Endosulfan II	33213-65-9	Yes	3.62 - 4.52	4.52	USEPA 1995a
Endrin	72-20-8	Yes	2.92 - 5.20	5.06	USEPA 1995a
Ethion	563-12-2	No	-- - --	--	--
Ethalfluralin	55283-68-6	No	-- - --	--	--
gamma-BHC (Lindane)	58-89-9	Yes	3.61 - 3.90	3.73	USEPA 1995a

TABLE L-16

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
gamma-Chlordane[4]	5103-74-2	Yes	5.80 - 6.41	6.32	USEPA 1995a
Heptachlor	76-44-8	Yes	4.93 - 6.26	6.26	USEPA 1995a
Heptachlor epoxide	1024-57-3	Yes	3.50 - 5.40	5.00	USEPA 1995a
Methoxychlor	72-43-5	Yes	4.20 - 5.60	5.08	USEPA 1995a
Mirex	2385-85-5	No	-- - --	--	--
Nitrofen	1836-75-5	No	-- - --	--	--
Oxyfluorfen	42874-03-3	No	-- - --	--	--
Pentachloronitrobenzene	82-68-8	No	-- - --	--	--
Permethrin	52645-53-1	No	-- - --	--	--
S-Fenvalerate	66230-04-4	No	-- - --	--	--
Terbufos	13071-79-9	No	-- - --	--	--
Toxaphene	8001-35-2	Yes	4.33 - 5.56	5.50	USEPA 1995a
Trifluralin	1582-09-8	No	-- - --	--	--
Volatile and Semivolatile Organic Compounds					
1,1,1,2-Tetrachloroethane[5]	630-20-6	No	-- - --	--	--
1,1,2,2-Tetrachloroethane[5]	79-34-5	Yes	2.31 - 2.64	2.39	USEPA 1995a
1,2,3,4-Tetrachlorobenzene	634-66-2	No	-- - --	--	--
1,2,4,5-Tetrachlorobenzene	95-94-3	Yes	4.51 - 4.83	4.64	USEPA 1995a
1,2,4-Trichlorobenzene	120-82-1	Yes	3.89 - 4.23	4.01	USEPA 1995a
1,2-Dichlorobenzene	95-50-1	Yes	3.20 - 3.61	3.43	USEPA 1995a
1,3-Dichlorobenzene	541-73-1	Yes	Not reported	3.50	USEPA 1996a
1,4-Dichlorobenzene	106-46-7	Yes	3.26 - 3.62	3.42	USEPA 1995a
4-Bromophenyl-phenylether	101-55-3	Yes	4.89 - 5.24	5.00	USEPA 1995a
4-Chlorophenyl-phenylether	7005-72-3	Yes	4.08 - 5.09	4.95	USEPA 1995a
Acenaphthene	83-32-9	Yes	3.77 - 4.49	3.92	USEPA 1995a
Acenaphthylene	208-96-8	Yes	Not reported	4.10	USEPA 1996a
Anthracene	120-12-7	Yes	4.44 - 4.80	4.55	USEPA 1995a
Benzo(a)anthracene	56-55-3	Yes	5.61 - 5.79	5.70	USEPA 1995a
Benzo(a)pyrene	50-32-8	Yes	5.98 - 6.34	6.11	USEPA 1995a
Benzo(b)fluoranthene	205-99-2	Yes	5.79 - 6.40	6.20	USEPA 1995a
Benzo(g,h,i)perylene	191-24-2	Yes	6.58 - 7.05	6.70	USEPA 1995a
Benzo(k)fluoranthene	207-08-9	Yes	6.12 - 6.27	6.20	USEPA 1995a
Chrysene	218-01-9	Yes	5.41 - 5.79	5.70	USEPA 1995a
Dibenz(a,h)anthracene	53-70-3	Yes	6.50 - 6.88	6.69	USEPA 1995a
Fluoranthene	206-44-0	Yes	4.84 - 5.39	5.12	USEPA 1995a
Fluorene	86-73-7	Yes	4.04 - 4.40	4.21	USEPA 1995a
Hexachlorobenzene	118-74-1	Yes	5.23 - 6.92	5.89	USEPA 1995a
Hexachlorobutadiene	87-68-3	Yes	4.74 - 5.16	4.81	USEPA 1995a
Hexachlorocyclopentadiene	77-47-4	Yes	5.05 - 5.51	5.39	USEPA 1995a
Hexachloroethane	67-72-1	Yes	3.82 - 4.14	4.00	USEPA 1995a
Indeno(1,2,3-cd)pyrene	193-39-5	Yes	6.58 - 6.72	6.65	USEPA 1995a
Octachlorostyrene	29082-74-4	No	-- - --	--	--

TABLE L-16

Bioaccumulative Chemicals List and Log K_{ow} Values

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS Number	"Standard" Facility Analyte?	Log K_{ow} Range	Selected log K_{ow}	Reference
Pentachloroanisole	1825-21-4	No	-- - --	--	--
Pentachlorobenzene	608-93-5	No	-- - --	--	--
Pentachlorophenol	87-86-5	Yes	5.01 - 5.24	5.09	USEPA 1995a
Phenanthrene	85-01-8	Yes	4.37 - 4.57	4.55	USEPA 1995a
Pyrene	129-00-0	Yes	4.76 - 5.52	5.11	USEPA 1995a
Dioxins/Furans					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	No	-- - --	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	No	-- - --	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	No	-- - --	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	No	-- - --	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	No	-- - --	--	--
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	No	-- - --	--	--
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	No	-- - --	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	No	6.42 - 7.02	6.53	USEPA 1995a
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	No	-- - --	--	--

[1] Listed as chromium VI but applied to total chromium

[2] Listed as methylmercury but applied to total mercury

[3] PCB congeners 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 118, 126, 128, 138, 153, 156, 169, 170, 180, 187, 195, 206, and 209 are also listed in USEPA (2000a)

[4] Listed as "chlordane"

[5] Listed as "tetrachloroethane"

TABLE L-17

Toxicity Equivalence Factors (TEFs) for Dioxin-Like PCB Congeners

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Congener	Fish TEF	Mammal TEF	Bird TEF
Non-ortho PCBs			
3,3',4,4'-TetraCB (PCB-77)	0.0005	0.0001	0.05
3,4,4',5-TetraCB (PCB-81)	0.0001	0.0003	0.1
3,3',4,4',5-PentaCB (PCB-126)	0.005	0.1	0.1
3,3',4,4',5,5'-HexaCB (PCB-169)	0.00005	0.03	0.001
Mono-ortho PCBs			
2,3,3',4,4'-PentaCB (PCB-105)	<0.000005	0.00003	0.0001
2,3,4,4',5-PentaCB (PCB-114)	<0.000005	0.00003	0.0001
2,3',4,4',5-PentaCB (PCB-118)	<0.000005	0.00003	0.00001
2',3,4,4',5-PentaCB (PCB-123)	<0.000005	0.00003	0.00001
2,3,3',4,4',5-HexaCB (PCB-156)	<0.000005	0.00003	0.0001
2,3,3',4,4',5'-HexaCB (PCB-157)	<0.000005	0.00003	0.0001
2,3',4,4',5,5'-HexaCB (PCB-167)	<0.000005	0.00003	0.00001
2,3,3',4,4',5,5'-HeptaCB (PCB-189)	<0.000005	0.00003	0.00001

From Van den Berg et al. (1998; 2006)

TABLE L-18

Soil Bioccumulation Factors For Terrestrial Plants (Also Extrapolated to Sediments and Aquatic Plants)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table L-19	--	--	See Table L-19	--
Cadmium	--	See Table L-19	--	--	See Table L-19	--
Chromium	0.084	90th percentile	Bechtel Jacobs 1998a	0.041	Median	Bechtel Jacobs 1998a; USEPA 2007j
Copper	--	See Table L-19	--	--	See Table L-19	--
Lead	--	See Table L-19	--	--	See Table L-19	--
Mercury	--	See Table L-19	--	--	See Table L-19	--
Nickel	--	See Table L-19	--	--	See Table L-19	--
Selenium	--	See Table L-19	--	--	See Table L-19	--
Silver	0.037	90th percentile	Bechtel Jacobs 1998a	0.014	Median	Bechtel Jacobs 1998a; USEPA 2007j
Zinc	--	See Table L-19	--	--	See Table L-19	--
Polychlorinated Biphenyls						
Aroclor-1016	0.323	Calculated[1]	USEPA 2007j	0.323	Calculated[1]	USEPA 2007j
Aroclor-1221	0.749	Calculated	USEPA 2007j	0.749	Calculated	USEPA 2007j
Aroclor-1232	0.515	Calculated	USEPA 2007j	0.515	Calculated	USEPA 2007j
Aroclor-1242	0.323	Calculated	USEPA 2007j	0.323	Calculated	USEPA 2007j
Aroclor-1248	0.184	Calculated	USEPA 2007j	0.184	Calculated	USEPA 2007j
Aroclor-1254	0.139	Calculated	USEPA 2007j	0.139	Calculated	USEPA 2007j
Aroclor-1260	0.105	Calculated	USEPA 2007j	0.105	Calculated	USEPA 2007j
Pesticides						
4,4'-DDD	--	See Table L-19	--	--	See Table L-19	--
4,4'-DDE	--	See Table L-19	--	--	See Table L-19	--
4,4'-DDT	--	See Table L-19	--	--	See Table L-19	--
Aldrin	0.139	Calculated	USEPA 2007j	0.139	Calculated	USEPA 2007j
alpha-BHC	1.735	Calculated	USEPA 2007j	1.735	Calculated	USEPA 2007j
alpha-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
beta-BHC	1.719	Calculated	USEPA 2007j	1.719	Calculated	USEPA 2007j
delta-BHC	1.311	Calculated	USEPA 2007j	1.311	Calculated	USEPA 2007j
Dieldrin	1.500	90th percentile	USEPA 2007j	0.410	Median	USEPA 2007j
Endosulfan I	1.687	Calculated	USEPA 2007j	1.687	Calculated	USEPA 2007j
Endosulfan II	0.886	Calculated	USEPA 2007j	0.886	Calculated	USEPA 2007j
Endrin	0.535	Calculated	USEPA 2007j	0.535	Calculated	USEPA 2007j
gamma-BHC (Lindane)	1.852	Calculated	USEPA 2007j	1.852	Calculated	USEPA 2007j
gamma-Chlordane	0.165	Calculated	USEPA 2007j	0.165	Calculated	USEPA 2007j
Heptachlor	0.174	Calculated	USEPA 2007j	0.174	Calculated	USEPA 2007j
Heptachlor epoxide	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
Methoxychlor	0.525	Calculated	USEPA 2007j	0.525	Calculated	USEPA 2007j
Toxaphene	0.355	Calculated	USEPA 2007j	0.355	Calculated	USEPA 2007j
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--

TABLE L-18

Soil Bioccumulation Factors For Terrestrial Plants (Also Extrapolated to Sediments and Aquatic Plants)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
1,2,4,5-Tetrachlorobenzene	0.792	Calculated	USEPA 2007j	0.792	Calculated	USEPA 2007j
1,2,4-Trichlorobenzene	1.426	Calculated	USEPA 2007j	1.426	Calculated	USEPA 2007j
1,2-Dichlorobenzene	2.452	Calculated	USEPA 2007j	2.452	Calculated	USEPA 2007j
1,3-Dichlorobenzene	2.296	Calculated	USEPA 2007j	2.296	Calculated	USEPA 2007j
1,4-Dichlorobenzene	2.475	Calculated	USEPA 2007j	2.475	Calculated	USEPA 2007j
4-Bromophenyl-phenylether	0.566	Calculated	USEPA 2007j	0.566	Calculated	USEPA 2007j
4-Chlorophenyl-phenylether	0.593	Calculated	USEPA 2007j	0.593	Calculated	USEPA 2007j
Acenaphthene	--	See Table L-19	--	--	See Table L-19	--
Acenaphthylene	--	See Table L-19	--	--	See Table L-19	--
Anthracene	--	See Table L-19	--	--	See Table L-19	--
Benzo(a)anthracene	--	See Table L-19	--	--	See Table L-19	--
Benzo(a)pyrene	--	See Table L-19	--	--	See Table L-19	--
Benzo(b)fluoranthene	0.480	Maximum	USEPA 2007j	0.310	Median	USEPA 2007j
Benzo(g,h,i)perylene	--	See Table L-19	--	--	See Table L-19	--
Benzo(k)fluoranthene	--	See Table L-19	--	--	See Table L-19	--
Chrysene	--	See Table L-19	--	--	See Table L-19	--
Dibenz(a,h)anthracene	0.230	Maximum	USEPA 2007j	0.130	Median	USEPA 2007j
Fluoranthene	4.700	90th percentile	USEPA 2007j	0.500	Median	USEPA 2007j
Fluorene	--	See Table L-19	--	--	See Table L-19	--
Hexachlorobenzene	0.246	Calculated	USEPA 2007j	0.246	Calculated	USEPA 2007j
Hexachlorobutadiene	0.675	Calculated	USEPA 2007j	0.675	Calculated	USEPA 2007j
Hexachlorocyclopentadiene	0.393	Calculated	USEPA 2007j	0.393	Calculated	USEPA 2007j
Hexachloroethane	1.439	Calculated	USEPA 2007j	1.439	Calculated	USEPA 2007j
Indeno(1,2,3-cd)pyrene	0.150	Maximum	USEPA 2007j	0.110	Median	USEPA 2007j
Pentachlorophenol	30.10	90th percentile	USEPA 2007j	5.930	Median	USEPA 2007j
Phenanthrene	--	See Table L-19	--	--	See Table L-19	--
Pyrene	2.400	90th percentile	USEPA 2007j	0.720	Median	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	0.135	Calculated	USEPA 2007j	0.135	Calculated	USEPA 2007j

[1] Calculated as described in the text using the "selected" log K_{ow} from Table L-16

TABLE L-19

Bioconcentration/Bioaccumulation Factor Models (Dry Weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Benthic Invertebrates[3]	Reference
Metals						
Arsenic	$C_p = e^{(-1.992 + 0.564(\ln Cs))}$	Bechtel Jacobs 1998a	$C_w = e^{(-1.421 + 0.706(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.292 + 0.754(\log Csd))}$	Bechtel Jacobs 1998b
Cadmium	$C_p = e^{(-0.476 + 0.546(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(2.114 + 0.795(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.314 + 0.513(\log Csd))}$	Bechtel Jacobs 1998b
Chromium	--	--	--	--	$C_i = 10^{(0.2092 + 0.365(\log Csd))}$	Bechtel Jacobs 1998b
Copper	$C_p = e^{(0.669 + 0.394(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(1.675 + 0.264(\ln Cs))}$	Sample et al. 1998a	--	--
Lead	$C_p = e^{(-1.328 + 0.561(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.218 + 0.807(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{(-0.515 + 0.653(\log Csd))}$	Bechtel Jacobs 1998b
Mercury	$C_p = e^{(-0.996 + 0.544(\ln Cs))}$	Bechtel Jacobs 1998a	--	--	--	--
Nickel	$C_p = e^{(-2.224 + 0.748(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	--	--	$C_i = 10^{(-0.440 + 0.695(\log Csd))}$	Bechtel Jacobs 1998b
Selenium	$C_p = e^{(-0.678 + 1.104(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(-0.075 + 0.733(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	--	--
Zinc	$C_p = e^{(1.575 + 0.555(\ln Cs))}$	Bechtel Jacobs 1998a; USEPA 2007j	$C_w = e^{(4.449 + 0.328(\ln Cs))}$	Sample et al. 1998a; USEPA 2007j	$C_i = 10^{1.89 + 0.126(\log Csd)}$	Bechtel Jacobs 1998b
Polychlorinated Biphenyls						
Aroclor-1016	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1221	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1232	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1242	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1248	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1254	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Aroclor-1260	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	$C_i = 10^{(0.590 + 1.110(\log Csd))}$	Bechtel Jacobs 1998b (Benthos)
					$C_i = 10^{(1.60 + 0.939(\log Csd))}$	Bechtel Jacobs 1998b (Adults)
Pesticides						
4,4'-DDD	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(1.1613 + 0.6975(\ln Cs))}$	USEPA 2007j	--	--
4,4'-DDE	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.4771 + 0.8804(\ln Cs))}$	USEPA 2007j	--	--
4,4'-DDT	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	USEPA 2007j	$C_w = e^{(2.1247 + 0.8689(\ln Cs))}$	USEPA 2007j	--	--
PAHs						
Acenaphthene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--
Acenaphthylene	$C_p = e^{(-1.144 + 0.791(\ln Cs))}$	USEPA 2007j	--	--	--	--
Anthracene	$C_p = e^{(-0.9887 + 0.7784(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(a)anthracene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(a)pyrene	$C_p = e^{(-2.0615 + 0.9750(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(g,h,i)perylene	$C_p = e^{(-0.9313 + 1.1829(\ln Cs))}$	USEPA 2007j	--	--	--	--
Benzo(k)fluoranthene	$C_p = e^{(-2.1579 + 0.8595(\ln Cs))}$	USEPA 2007j	--	--	--	--
Chrysene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	USEPA 2007j	--	--	--	--
Fluorene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	USEPA 2007j	--	--	--	--
Phenanthrene	$C_p = e^{(-0.1665 + 0.6203(\ln Cs))}$	USEPA 2007j	--	--	--	--
Dioxin/Furans						
2,3,7,8-TCDD	--	--	$C_w = e^{(3.533 + 1.182(\ln Cs))}$	Sample et al. 1998a	--	--

Chemical	Small Mammal Omnivores[4]	Reference	Small Mammal Herbivores[4]	Reference	Small Mammal Insectivores[4]	Reference
Metals						
Arsenic	$C_m = e^{(-4.5796 + 0.7354(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-5.6531 + 1.1382(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-4.8471 + 0.8188(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Cadmium	$C_m = e^{(-1.5383 + 0.5660(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-1.2571 + 0.4723(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(0.8150 + 0.9638(\ln Cs))}$	Sample et al. 1998b
Chromium	$C_m = e^{(-1.4945 + 0.7326(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-1.4599 + 0.7338(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Copper	$C_m = e^{(1.4592 + 0.2681(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(2.0420 + 0.1444(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(2.1042 + 0.1783(\ln Cs))}$	Sample et al. 1998b
Lead	$C_m = e^{(0.0761 + 0.4422(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.6114 + 0.5181(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.4819 + 0.4869(\ln Cs))}$	Sample et al. 1998b
Mercury	--	--	--	--	--	--
Nickel	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Selenium	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j
Zinc	$C_m = e^{(4.4713 + 0.0738(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(4.3632 + 0.0706(\ln Cs))}$	Sample et al. 1998b; USEPA 2007j	$C_m = e^{(4.2479 + 0.1324(\ln Cs))}$	Sample et al. 1998b
PCBs						
Aroclor-1016	--	--	--	--	--	--
Aroclor-1221	--	--	--	--	--	--
Aroclor-1232	--	--	--	--	--	--
Aroclor-1242	--	--	--	--	--	--
Aroclor-1248	--	--	--	--	--	--
Aroclor-1254	--	--	--	--	--	--
Aroclor-1260	--	--	--	--	--	--
Pesticides						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
PAHs						
Acenaphthene	--	--	--	--	--	--
Acenaphthylene	--	--	--	--	--	--
Anthracene	--	--	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	--
Benzo(a)pyrene	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--
Chrysene	--	--	--	--	--	--
Fluorene	--	--	--	--	--	--
Phenanthrene	--	--	--	--	--	--
Dioxin/Furans						
2,3,7,8-TCDD	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b	$C_m = e^{(0.8113 + 1.0993(\ln Cs))}$	Sample et al. 1998b

[1] Where C_p = Concentration in aboveground portion of plant (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

[2] Where C_w = Concentration in earthworm (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

[3] Where C_i = Concentration in benthic invertebrate (mg/kg dry wt) and C_{sd} = Concentration in sediment (mg/kg dry wt)

[4] Where C_m = Concentration in whole-body small mammal (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

TABLE L-20

Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table L-19	--	--	See Table L-19	--
Cadmium	--	See Table L-19	--	--	See Table L-19	--
Chromium	3.162	90th percentile	Sample et al. 1998a	0.320	Geometric mean	Sample et al. 1998a
Copper	--	See Table L-19	--	--	See Table L-19	--
Lead	--	See Table L-19	--	--	See Table L-19	--
Mercury	20.63	90th percentile	Sample et al. 1998a	1.186	Geometric mean	Sample et al. 1998a
Nickel	4.730	90th percentile	Sample et al. 1998a	1.656	Arithmetic mean	Sample et al. 1998a
Selenium	--	See Table L-19	--	--	See Table L-19	--
Silver	15.34	90th percentile	Sample et al. 1998a	2.045	Median	Sample et al. 1998a
Zinc	--	See Table L-19	--	--	See Table L-19	--
Polychlorinated Biphenyls						
Aroclor-1016	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1221	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1232	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1242	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1248	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1254	--	See Table L-19	--	--	See Table L-19	--
Aroclor-1260	--	See Table L-19	--	--	See Table L-19	--
Pesticides						
4,4'-DDD	--	See Table L-19	--	--	See Table L-19	--
4,4'-DDE	--	See Table L-19	--	--	See Table L-19	--
4,4'-DDT	--	See Table L-19	--	--	See Table L-19	--
Aldrin	3.300	Mean	Edwards and Bohlen 1992	3.300	Mean	Edwards and Bohlen 1992
alpha-BHC	1.000	Assumed	--	1.000	Assumed	--
alpha-Chlordane	4.000	Mean	Edwards and Bohlen 1992	4.000	Mean	Edwards and Bohlen 1992
beta-BHC	1.000	Assumed	--	1.000	Assumed	--
delta-BHC	1.000	Assumed	--	1.000	Assumed	--
Dieldrin	52.10	90th percentile	USEPA 2007j	14.70	Median	USEPA 2007j
Endosulfan I	1.000	Assumed	--	1.000	Assumed	--
Endosulfan II	1.000	Assumed	--	1.000	Assumed	--
Endrin	3.600	Mean	Edwards and Bohlen 1992	3.600	Mean	Edwards and Bohlen 1992
gamma-BHC (Lindane)	26.60	Maximum	Romijn et al. 1994	13.70	Mean	Romijn et al. 1994
gamma-Chlordane	4.000	Mean	Edwards and Bohlen 1992	4.000	Mean	Edwards and Bohlen 1992
Heptachlor	3.000	Mean	Edwards and Bohlen 1992	3.000	Mean	Edwards and Bohlen 1992
Heptachlor epoxide	10.00	Mean	Beyer and Gish 1980	10.00	Mean	Beyer and Gish 1980
Methoxychlor	1.000	Assumed	--	1.000	Assumed	--
Toxaphene	1.000	Assumed	--	1.000	Assumed	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.500	Mean	Beyer 1996	0.500	Mean	Beyer 1996
1,2,4-Trichlorobenzene	0.560	Mean	Beyer 1996	0.560	Mean	Beyer 1996

TABLE L-20

Soil Bioaccumulation Factors For Soil Invertebrates (Dry Weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
1,2-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
1,3-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
1,4-Dichlorobenzene	1.000	Assumed	--	1.000	Assumed	--
4-Bromophenyl-phenylether	1.000	Assumed	--	1.000	Assumed	--
4-Chlorophenyl-phenylether	1.000	Assumed	--	1.000	Assumed	--
Acenaphthene	0.300	Median	Beyer and Stafford 1993	0.300	Median	Beyer and Stafford 1993
Acenaphthylene	0.220	Median	Beyer and Stafford 1993	0.220	Median	Beyer and Stafford 1993
Anthracene	0.320	Median	Beyer and Stafford 1993	0.320	Median	Beyer and Stafford 1993
Benzo(a)anthracene	0.270	Median	Beyer and Stafford 1993	0.270	Median	Beyer and Stafford 1993
Benzo(a)pyrene	0.340	Median	Beyer and Stafford 1993	0.340	Median	Beyer and Stafford 1993
Benzo(b)fluoranthene	0.210	Median	Beyer and Stafford 1993	0.210	Median	Beyer and Stafford 1993
Benzo(g,h,i)perylene	0.150	Median	Beyer and Stafford 1993	0.150	Median	Beyer and Stafford 1993
Benzo(k)fluoranthene	0.210	Median	Beyer and Stafford 1993	0.210	Median	Beyer and Stafford 1993
Chrysene	0.440	Median	Beyer and Stafford 1993	0.440	Median	Beyer and Stafford 1993
Dibenz(a,h)anthracene	0.490	Median	Beyer and Stafford 1993	0.490	Median	Beyer and Stafford 1993
Fluoranthene	0.370	Median	Beyer and Stafford 1993	0.370	Median	Beyer and Stafford 1993
Fluorene	0.200	Median	Beyer and Stafford 1993	0.200	Median	Beyer and Stafford 1993
Hexachlorobenzene	1.690	Mean	Beyer 1996	1.690	Mean	Beyer 1996
Hexachlorobutadiene	1.000	Assumed	--	1.000	Assumed	--
Hexachlorocyclopentadiene	1.000	Assumed	--	1.000	Assumed	--
Hexachloroethane	1.000	Assumed	--	1.000	Assumed	--
Indeno(1,2,3-cd)pyrene	0.410	Median	Beyer and Stafford 1993	0.410	Median	Beyer and Stafford 1993
Pentachlorophenol	88.10	90th percentile	USEPA 2007j	14.63	Median	USEPA 2007j
Phenanthrene	0.280	Median	Beyer and Stafford 1993	0.280	Median	Beyer and Stafford 1993
Pyrene	0.390	Median	Beyer and Stafford 1993	0.390	Median	Beyer and Stafford 1993
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table L-19	--	--	See Table L-19	--

TABLE L-21

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Omnivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table L-19	--	--	See Table L-19	--
Cadmium	--	See Table L-19	--	--	See Table L-19	--
Chromium	--	See Table L-19	--	--	See Table L-19	--
Copper	--	See Table L-19	--	--	See Table L-19	--
Lead	--	See Table L-19	--	--	See Table L-19	--
Mercury	0.130	90th percentile	Sample et al. 1998b	0.054	Median	Sample et al. 1998b
Nickel	--	See Table L-19	--	--	See Table L-19	--
Selenium	--	See Table L-19	--	--	See Table L-19	--
Silver	0.810	90th percentile	Sample et al. 1998b	0.151	Median	Sample et al. 1998b
Zinc	--	See Table L-19	--	--	See Table L-19	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--

TABLE L-21

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Omnivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table L-19	--	--	See Table L-19	--

NA - Not Available (see text)

TABLE L-22

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table L-19	--	--	See Table L-19	--
Cadmium	--	See Table L-19	--	--	See Table L-19	--
Chromium	--	See Table L-19	--	--	See Table L-19	--
Copper	--	See Table L-19	--	--	See Table L-19	--
Lead	--	See Table L-19	--	--	See Table L-19	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	See Table L-19	--	--	See Table L-19	--
Selenium	--	See Table L-19	--	--	See Table L-19	--
Silver	0.007	90th percentile	Sample et al. 1998b	0.006	Geometric mean	Sample et al. 1998b
Zinc	--	See Table L-19	--	--	See Table L-19	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--

TABLE L-22

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Herbivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table L-19	--	--	See Table L-19	--

NA - Not Available (see text)

TABLE L-23

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Arsenic	--	See Table L-19	--	--	See Table L-19	--
Cadmium	--	See Table L-19	--	--	See Table L-19	--
Chromium	--	See Table L-19	--	--	See Table L-19	--
Copper	--	See Table L-19	--	--	See Table L-19	--
Lead	--	See Table L-19	--	--	See Table L-19	--
Mercury	0.192	90th percentile	Sample et al. 1998b	0.067	Geometric mean	Sample et al. 1998b
Nickel	--	See Table L-19	--	--	See Table L-19	--
Selenium	--	See Table L-19	--	--	See Table L-19	--
Silver	0.501	90th percentile	Sample et al. 1998b	0.036	Geometric mean	Sample et al. 1998b
Zinc	--	See Table L-19	--	--	See Table L-19	--
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	--	NA	--	--
Aroclor-1221	NA	--	--	NA	--	--
Aroclor-1232	NA	--	--	NA	--	--
Aroclor-1242	NA	--	--	NA	--	--
Aroclor-1248	NA	--	--	NA	--	--
Aroclor-1254	NA	--	--	NA	--	--
Aroclor-1260	NA	--	--	NA	--	--
Pesticides						
4,4'-DDD	NA	--	--	NA	--	--
4,4'-DDE	NA	--	--	NA	--	--
4,4'-DDT	NA	--	--	NA	--	--
Aldrin	NA	--	--	NA	--	--
alpha-BHC	NA	--	--	NA	--	--
alpha-Chlordane	NA	--	--	NA	--	--
beta-BHC	NA	--	--	NA	--	--
delta-BHC	NA	--	--	NA	--	--
Dieldrin	NA	--	--	NA	--	--
Endosulfan I	NA	--	--	NA	--	--
Endosulfan II	NA	--	--	NA	--	--
Endrin	NA	--	--	NA	--	--
gamma-BHC (Lindane)	NA	--	--	NA	--	--
gamma-Chlordane	NA	--	--	NA	--	--
Heptachlor	NA	--	--	NA	--	--
Heptachlor epoxide	NA	--	--	NA	--	--
Methoxychlor	NA	--	--	NA	--	--
Toxaphene	NA	--	--	NA	--	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	--	NA	--	--
1,2,4,5-Tetrachlorobenzene	NA	--	--	NA	--	--
1,2,4-Trichlorobenzene	NA	--	--	NA	--	--

TABLE L-23

Soil Bioaccumulation Factors For Small Mammals (Dry Weight) - Insectivores

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)			Baseline (Step 7)		
	Value	Basis	Reference	Value	Basis	Reference
1,2-Dichlorobenzene	NA	--	--	NA	--	--
1,3-Dichlorobenzene	NA	--	--	NA	--	--
1,4-Dichlorobenzene	NA	--	--	NA	--	--
4-Bromophenyl-phenylether	NA	--	--	NA	--	--
4-Chlorophenyl-phenylether	NA	--	--	NA	--	--
Acenaphthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Acenaphthylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(a)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(b)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(g,h,i)perylene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Benzo(k)fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Chrysene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dibenz(a,h)anthracene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluoranthene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Fluorene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Hexachlorobenzene	NA	--	--	NA	--	--
Hexachlorobutadiene	NA	--	--	NA	--	--
Hexachlorocyclopentadiene	NA	--	--	NA	--	--
Hexachloroethane	NA	--	--	NA	--	--
Indeno(1,2,3-cd)pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pentachlorophenol	NA	--	--	NA	--	--
Phenanthrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Pyrene	0.000	Assumed	USEPA 2007j	0.000	Assumed	USEPA 2007j
Dioxin/Furans						
2,3,7,8-TCDD	--	See Table L-19	--	--	See Table L-19	--

NA - Not Available (see text)

TABLE L-24

Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Benthic Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)						Baseline (Step 7)					
	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference
Metals												
Arsenic	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Cadmium	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Chromium	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Copper	--	7.957	Fresh	Invertebrate infauna	90th percentile	Bechtel Jacobs 1998b	--	0.824	Fresh	Invertebrate infauna	Geometric mean	Bechtel Jacobs 1998b
Lead	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Mercury	--	2.868	Fresh	Invertebrate infauna	90th percentile	Bechtel Jacobs 1998b	--	1.186	Fresh	Invertebrate infauna	Geometric mean	Bechtel Jacobs 1998b
Nickel	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Selenium	--	1.000	--	--	Assumed	--	--	1.000	--	--	Assumed	--
Silver	--	0.180	Fresh	Oligochaete	Mean	Hirsch 1998	--	0.180	Fresh	Oligochaete	Mean	Hirsch 1998
Zinc	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Polychlorinated Biphenyls												
Aroclor-1016	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1221	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1232	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1242	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1248	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1254	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Aroclor-1260	--	--	--	--	See Table L-19	--	--	--	--	--	See Table L-19	--
Pesticides												
4,4'-DDD	0.88	2.165	Marine/Estuarine	Worms	Single value	USACOE 2010	0.88	2.165	Marine/Estuarine	Worms	Single value	USACOE 2010
4,4'-DDE	0.88	2.165	Marine/Estuarine	Worms	Single value	DDD value	0.88	2.165	Marine/Estuarine	Worms	Single value	DDD value
4,4'-DDT	0.16	0.395	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.12	0.286	Marine/Estuarine	Worms	Median	USACOE 2010
Aldrin	0.42	0.596	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.42	0.596	Marine/Estuarine	Molluscs	Single value	USACOE 2010
alpha-BHC	0.74	1.049	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.74	1.049	Marine/Estuarine	Molluscs	Single value	USACOE 2010
alpha-Chlordane	0.88	2.165	Marine/Estuarine	Worms	Single value	USACOE 2010	0.88	2.165	Marine/Estuarine	Worms	Single value	USACOE 2010
beta-BHC	0.74	1.049	Marine/Estuarine	Molluscs	Single value	alpha-BHC value	0.74	1.049	Marine/Estuarine	Molluscs	Single value	alpha-BHC value
delta-BHC	0.74	1.049	Marine/Estuarine	Molluscs	Single value	alpha-BHC value	0.74	1.049	Marine/Estuarine	Molluscs	Single value	alpha-BHC value
Dieldrin	--	4.920	Fresh	Lumbriculus	Geometric mean	Standley 1997	--	4.920	Fresh	Lumbriculus	Geometric mean	Standley 1997
Endosulfan I	0.059	0.084	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)	0.059	0.084	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)
Endosulfan II	0.059	0.084	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)	0.059	0.084	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endosulfan sulfate)
Endrin	0.49	0.691	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endrin aldehyde)	0.49	0.691	Marine/Estuarine	Molluscs	Single value	USACOE 2010 (endrin aldehyde)
gamma-BHC (Lindane)	0.91	2.249	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.20	0.494	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
gamma-Chlordane	1.23	3.052	Marine/Estuarine	Worms	Single value	USACOE 2010	1.23	3.052	Marine/Estuarine	Worms	Single value	USACOE 2010
Heptachlor	0.061	0.086	Fresh/Marine	Molluscs	90th percentile	USACOE 2010	0.046	0.066	Fresh/Marine	Molluscs	Median	USACOE 2010
Heptachlor Epoxide	0.302	0.428	Marine/Estuarine	Molluscs	Single value	USACOE 2010	0.302	0.428	Marine/Estuarine	Molluscs	Single value	USACOE 2010
Methoxychlor	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Toxaphene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Volatile and Semivolatile Organic Compounds												
1,1,2,2-Tetrachloroethane	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
1,2,4,5-Tetrachlorobenzene	--	0.624	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.397	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
1,2,4-Trichlorobenzene	--	0.482	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.257	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
1,2-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
1,3-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
1,4-Dichlorobenzene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
4-Bromophenyl-phenylether	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
4-Chlorophenyl-phenylether	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Acenaphthene	0.76	1.080	Fresh/Marine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.052	0.074	Fresh/Marine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Acenaphthylene	1.05	1.485	Marine/Estuarine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.128	0.181	Marine/Estuarine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Anthracene	0.614	1.519	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.326	0.805	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Benzo(a)anthracene	0.209	0.516	Fresh/Marine	Crustaceans/worms/insects	90th percentile	USACOE 2010	0.092	0.228	Fresh/Marine	Crustaceans/worms/insects	Median	USACOE 2010
Benzo(a)pyrene	0.70	1.741	Fresh/Marine	Crustaceans/worms	90th percentile	USACOE 2010	0.035	0.087	Fresh/Marine	Crustaceans/worms	Median	USACOE 2010
Benzo(b)fluoranthene	0.250	0.618	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.002	0.006	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Benzo(g,h,i)perylene	0.151	0.373	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.002	0.004	Marine/Estuarine	Worms	Median	USACOE 2010

TABLE L-24

Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Benthic Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)						Baseline (Step 7)					
	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Principal Organisms	Basis	Reference
Benzo(k)fluoranthene	0.214	0.529	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.141	0.349	Marine/Estuarine	Worms	Median	USACOE 2010
Chrysene	0.249	0.616	Marine/Estuarine	Crustaceans/worms	90th percentile	USACOE 2010	0.106	0.263	Marine/Estuarine	Crustaceans/worms	Median	USACOE 2010
Dibenz(a,h)anthracene	0.188	0.266	Marine/Estuarine	Molluscs/bivalves	90th percentile	USEPA 2009b; USACOE 2010	0.033	0.047	Marine/Estuarine	Molluscs/bivalves	Median	USEPA 2009b; USACOE 2010
Fluoranthene	0.172	0.426	Fresh/Marine	Crustaceans/worms	90th percentile	USACOE 2010	0.089	0.220	Fresh/Marine	Crustaceans/worms	Median	USACOE 2010
Fluorene	0.88	2.187	Estuarine	Polychaetes	90th percentile	Maruya et al. 1997	0.299	0.739	Estuarine	Polychaetes	Median	Maruya et al. 1997
Hexachlorobenzene	--	0.857	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.512	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
Hexachlorobutadiene	--	0.612	Fresh	Amphipods/oligochaetes	Maximum	Oliver and Niimi 1988	--	0.385	Fresh	Amphipods/oligochaetes	Mean	Oliver and Niimi 1988
Hexachlorocyclopentadiene	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Hexachloroethane	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Indeno(1,2,3-cd)pyrene	0.122	0.301	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.002	0.004	Marine/Estuarine	Worms	Median	USACOE 2010
Pentachlorophenol	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--
Phenanthrene	0.285	0.703	Marine/Estuarine	Worms	90th percentile	USACOE 2010	0.247	0.610	Marine/Estuarine	Worms	Median	USACOE 2010
Pyrene	1.52	3.767	Fresh/Marine	Crustaceans/worms	90th percentile	USEPA 2009b; USACOE 2010	0.290	0.717	Fresh/Marine	Crustaceans/worms	Median	USEPA 2009b; USACOE 2010
Dioxin/Furans												
2,3,7,8-TCDD	1.00	1.000	--	--	Assumed	--	1.00	1.000	--	--	Assumed	--

[1] Wet-weight (ww) BSAFs are converted to dry-weight (dw) using the following values:

Lipids (%):	1.48	bivalves	2.58	macroinvertebrates	USACOE 2010
TOC (%):	4.97	Mean measured value (site-wide)			
Percent soilds:	0.21	USEPA 1993a			

TABLE L-25

Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Fish

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)					Baseline (Step 7)				
	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference
Metals										
Arsenic	--	0.126	Fresh	Mean	Pascoe et al. 1996	--	0.126	Fresh	Mean	Pascoe et al. 1996
Cadmium	--	0.164	Fresh	Mean	Pascoe et al. 1996	--	0.164	Fresh	Mean	Pascoe et al. 1996
Chromium	--	0.038	Fresh	Mean	Krantzberg and Boyd 1992	--	0.038	Fresh	Mean	Krantzberg and Boyd 1992
Copper	--	0.100	Fresh	Mean	Krantzberg and Boyd 1992	--	0.100	Fresh	Mean	Krantzberg and Boyd 1992
Lead	--	0.070	Fresh	Mean	Krantzberg and Boyd 1992	--	0.070	Fresh	Mean	Krantzberg and Boyd 1992
Mercury	--	4.580	Fresh	Maximum	Cope et al. 1990	--	3.250	Fresh	Mean	Cope et al. 1990
Nickel	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Selenium	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Silver	--	1.000	--	Assumed	--	--	1.000	--	Assumed	--
Zinc	--	0.147	Fresh	Mean	Pascoe et al. 1996	--	0.147	Fresh	Mean	Pascoe et al. 1996
Polychlorinated Biphenyls										
Aroclor-1016	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1221	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1232	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1242	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1248	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1254	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Aroclor-1260	1.85	5.96	Fresh/Marine	Median	USEPA 1997c	1.85	5.96	Fresh/Marine	Median	USEPA 1997c
Pesticides										
4,4'-DDD	1.54	4.95	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.74	2.38	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
4,4'-DDE	17.3	55.6	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.22	3.91	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
4,4'-DDT	1.75	5.63	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.80	2.56	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Aldrin	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
alpha-BHC	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
alpha-Chlordane	2.61	8.41	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.02	3.27	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
beta-BHC	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
delta-BHC	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Dieldrin	5.40	17.4	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.77	2.47	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Endosulfan I	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Endosulfan II	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Endrin	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
gamma-BHC (Lindane)	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
gamma-Chlordane	2.00	6.45	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	1.14	3.67	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Heptachlor	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Heptachlor Epoxide	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Methoxychlor	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Toxaphene	1.80	5.79	Fresh/Marine	Median	USEPA 1997c	1.80	5.79	Fresh/Marine	Median	USEPA 1997c
Volatile and Semivolatile Organic Compounds										
1,1,2,2-Tetrachloroethane	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.036	0.116	Marine	Median	Parkerton et al. 1993	0.036	0.116	Marine	Median	Parkerton et al. 1993
1,2,4-Trichlorobenzene	0.175	0.563	Marine	90th percentile	USEPA 2009b	0.132	0.425	Marine	Median	USEPA 2009b
1,2-Dichlorobenzene	0.112	0.361	Marine	Single value	USEPA 2009b	0.112	0.361	Marine	Single value	USEPA 2009b
1,3-Dichlorobenzene	0.020	0.064	Marine	Single value	USEPA 2009b	0.020	0.064	Marine	Single value	USEPA 2009b
1,4-Dichlorobenzene	0.014	0.045	Marine	Single value	USEPA 2009b	0.014	0.045	Marine	Single value	USEPA 2009b
4-Bromophenyl-phenylether	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
4-Chlorophenyl-phenylether	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Acenaphthene	0.043	0.138	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.035	0.113	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Acenaphthylene	0.027	0.086	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.014	0.044	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Anthracene	0.013	0.042	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.008	0.027	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(a)anthracene	0.031	0.100	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.008	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(a)pyrene	0.004	0.011	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.007	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(b)fluoranthene	0.004	0.013	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.008	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Benzo(g,h,i)perylene	0.057	0.183	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.004	0.013	Fresh/Marine	Median	USEPA 2009b; USACOE 2010

TABLE L-25

Biota Sediment Accumulation Factors (Wet Weight) and Sediment Bioaccumulation Factors (Dry Weight) for Fish

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Screening (Step 2)					Baseline (Step 7)				
	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference	BSAF (ww)	BAF (dw)[1]	Type	Basis	Reference
Benzo(k)fluoranthene	0.004	0.012	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.008	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Chrysene	0.022	0.072	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.009	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Dibenz(a,h)anthracene	0.004	0.012	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.007	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Fluoranthene	0.010	0.031	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.009	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Fluorene	0.124	0.401	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.024	0.076	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Hexachlorobenzene	0.090	0.290	Fresh/Marine	Median	USEPA 1997c	0.090	0.290	Fresh/Marine	Median	USEPA 1997c
Hexachlorobutadiene	0.036	0.116	Marine	Median	Parkerton et al. 1993	0.036	0.116	Marine	Median	Parkerton et al. 1993
Hexachlorocyclopentadiene	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Hexachloroethane	1.00	1.000	--	Assumed	--	1.00	1.000	--	Assumed	--
Indeno(1,2,3-cd)pyrene	0.040	0.129	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.002	0.008	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Pentachlorophenol	0.41	1.320	Marine	Median	Parkerton et al. 1993	0.41	1.320	Marine	Median	Parkerton et al. 1993
Phenanthrene	0.062	0.201	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.008	0.027	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Pyrene	0.046	0.149	Fresh/Marine	90th percentile	USEPA 2009b; USACOE 2010	0.003	0.011	Fresh/Marine	Median	USEPA 2009b; USACOE 2010
Dioxin/Furans										
2,3,7,8-TCDD	0.059	0.190	Fresh/Marine	Median	USEPA 1997c	0.059	0.190	Fresh/Marine	Median	USEPA 1997c

[1] Wet-weight (ww) BSAFs are converted to dry-weight (dw) using the following values:

Lipids (%):	4.00	Mean measured value (site-wide)
TOC (%):	4.97	Mean measured value (site-wide)
Percent soilds:	0.25	Mean measured value (site-wide)

TABLE L-26

Exposure Parameters for Upper Trophic Level Ecological Receptors - Screening (Step 2)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Minimum Body Weight (kg)		Maximum Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)									Soil/ Sediment Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terr Plants	Terr Invert	Mouse	Vole	Shrew	Aq Plants	Aq Invert	Fish/ Frogs	Reference	Value	Reference
Mammals																			
Meadow vole	0.0300	Silva and Downing 1995	0.0635	Silva and Downing 1995	0.01334	USEPA 1993a	0.00310	USEPA 1993a	95.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993a	2.4	Beyer et al. 1994
Mink	0.7260	Silva and Downing 1995	1.0200	Silva and Downing 1995	0.02856	USEPA 1993a	0.03494	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a	0.0	Sample and Suter 1994
Muskrat	0.7500	USEPA 1993a	1.5000	USEPA 1993a	0.14260	allometric equation (USEPA 1993a)[1]	0.07650	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	90.6	0.0	0.0	USEPA 1993a	9.4	Beyer et al. 1994 (raccoon)
Raccoon	4.2300	Silva and Downing 1995	7.5300	Silva and Downing 1995	0.60919	allometric equation (USEPA 1993a)[1]	0.13067	Conover 1989	0.0	0.0	0.0	0.0	0.0	40.0	43.6	7.0	USEPA 1993a	9.4	Beyer et al. 1994
Red fox	3.1700	Silva and Downing 1995	4.8700	Silva and Downing 1995	0.41154	allometric equation (USEPA 1993a)[1]	0.14763	Sample and Suter 1994	7.0	2.8	29.2	29.1	29.1	0.0	0.0	0.0	USEPA 1993a	2.8	Beyer et al. 1994
Short-tailed shrew	0.0133	USEPA 1993a	0.02131	USEPA 1993a	0.00475	USEPA 1993a	0.00189	USEPA 1993a	4.7	82.3	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993a; Sample and Suter 1994	13.0	Sample and Suter 1994
White-footed mouse	0.0141	Silva and Downing 1995	0.0305	Silva and Downing 1995	0.00915	Sample and Suter 1994	0.00073	Sample and Suter 1994	51.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951; Sample and Suter 1994	2.0	Beyer et al. 1994
Birds																			
American robin (omnivore)	0.0635	USEPA 1993a	0.1030	USEPA 1993a	0.01287	allometric equation (USEPA 1993a)[2]	0.00736	Levey and Karasov 1989	51.9	43.5	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.0635	USEPA 1993a	0.1030	USEPA 1993a	0.01287	allometric equation (USEPA 1993a)[2]	0.00511	Levey and Karasov 1989	0.0	95.4	0.0	0.0	0.0	0.0	0.0	0.0	exclusive diet	4.6	Sample and Suter 1994
Belted kingfisher	0.1250	Dunning 2008	0.2150	Dunning 2008	0.02107	allometric equation (USEPA 1993a)[2]	0.02619	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	16.0	84.0	USEPA 1993a	0.0	Sample and Suter 1994
Great blue heron	2.1000	Butler 1992	2.5000	Butler 1992	0.10901	allometric equation (USEPA 1993a)[2]	0.13565	allometric equation (Nagy 2001)[3]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a; Quinney and Smith 1980	0.0	Sample and Suter 1994
Mallard	0.6120	Bellrose 1980	1.7240	Bellrose 1980	0.08498	allometric equation (USEPA 1993a)[2]	0.07168	allometric equation (Nagy 2001)[4]	0.0	0.0	0.0	0.0	0.0	86.7	10.0	0.0	Palmer 1976	3.3	Beyer et al. 1994
Marsh wren	0.0098	Dunning 2008	0.0135	Dunning 2008	0.00330	allometric equation (USEPA 1993a)[2]	0.00298	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	95.0	0.0	USEPA 1993a	5.0	Assumed based on diet
Mourning dove	0.1050	Tomlinson et al. 1994	0.1630	Tomlinson et al. 1994	0.01750	allometric equation (USEPA 1993a)[2]	0.02090	allometric equation (Nagy 2001)[3]	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Tomlinson et al. 1994	5.0	Assumed based on diet
Osprey	1.2350	Dunning 2008	1.7500	Dunning 2008	0.08584	allometric equation (USEPA 1993a)[2]	0.09188	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a	0.0	Assumed based on diet
Red-tailed hawk	0.9570	USEPA 1993a	1.2350	USEPA 1993a	0.06796	allometric equation (USEPA 1993a)[2]	0.03952	Sample and Suter 1994	0.0	0.0	34.0	33.0	33.0	0.0	0.0	0.0	USEPA 1993a; Sample and Suter 1994	0.0	Sample and Suter 1994
Tree swallow	0.0156	Dunning 2008	0.0254	Dunning 2008	0.00504	allometric equation (USEPA 1993a)[2]	0.00119	Sample et al. 1997	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	Sample et al. 1997	0.0	Sample et al. 1997

1 - All mammals equation: $0.099\ (BW)^{0.90}$ (maximum body weight used)

2 - All birds equation: $0.059\ (BW)^{0.67}$ (maximum body weight used)

3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$ (maximum body weight used)

4 - Omnivorous birds equation: $(0.67*((BW*1000)^{0.627}))/1000$ (maximum body weight used)

TABLE L-27

Exposure Parameters for Upper Trophic Level Ecological Receptors - Baseline (Step 7)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Home Range (ha)		Dietary Composition (percent)									Soil/ Sediment Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terr Plants	Terr Invert	Mouse	Vole	Shrew	Aq Plants	Aq Invert	Fish/ Frogs	Reference	Value	Reference
Mammals																			
Meadow vole	0.0428	Silva and Downing 1995	0.00899	USEPA 1993a	0.00209	USEPA 1993a	0.013	USEPA 1993a	95.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993a	2.4	Beyer et al. 1994
Mink	0.7770	Silva and Downing 1995	0.02176	USEPA 1993a	0.02661	USEPA 1993a	770	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a	0.0	Sample and Suter 1994
Muskrat	1.1690	Silva and Downing 1995	0.11394	allometric equation (USEPA 1993a)[1]	0.05962	USEPA 1993a	0.170	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	90.6	0.0	0.0	USEPA 1993a	9.4	Beyer et al. 1994 (raccoon)
Raccoon	5.9400	Silva and Downing 1995	0.49209	allometric equation (USEPA 1993a)[1]	0.10308	Conover 1989	289	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	40.0	43.6	7.0	USEPA 1993a	9.4	Beyer et al. 1994
Red fox	4.0600	Silva and Downing 1995	0.34939	allometric equation (USEPA 1993a)[1]	0.12308	Sample and Suter 1994	400	USEPA 1993a	7.0	2.8	29.2	29.1	29.1	0.0	0.0	0.0	USEPA 1993a	2.8	Beyer et al. 1994
Short-tailed shrew	0.0169	USEPA 1993a	0.00376	USEPA 1993a	0.00149	USEPA 1993a	0.390	Sample and Suter 1994	4.7	82.3	0.0	0.0	0.0	0.0	0.0	0.0	USEPA 1993a; Sample and Suter 1994	13.0	Sample and Suter 1994
White-footed mouse	0.0208	Silva and Downing 1995	0.00624	Sample and Suter 1994	0.00050	Sample and Suter 1994	0.059	Sample and Suter 1994	51.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951; Sample and Suter 1994	2.0	Beyer et al. 1994
Birds																			
American robin (omnivore)	0.0773	USEPA 1993a	0.01062	allometric equation (USEPA 1993a)[2]	0.00552	Levey and Karasov 1989	0.500	USEPA 1993a (foraging)	51.9	43.5	0.0	0.0	0.0	0.0	0.0	0.0	Martin et al. 1951	4.6	Sample and Suter 1994
American robin (invertivore)	0.0773	USEPA 1993a	0.01062	allometric equation (USEPA 1993a)[2]	0.00383	Levey and Karasov 1989	0.500	USEPA 1993a (foraging)	0.0	95.4	0.0	0.0	0.0	0.0	0.0	0.0	exclusive diet	4.6	Sample and Suter 1994
Belted kingfisher	0.1480	Dunning 2008	0.01640	allometric equation (USEPA 1993a)[2]	0.01803	USEPA 1993a	800	Cornwell 1963 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	16.0	84.0	USEPA 1993a	0.0	Sample and Suter 1994
Great blue heron	2.2300	Quinney 1982	0.10098	allometric equation (USEPA 1993a)[2]	0.12543	allometric equation (Nagy 2001)[3]	4.50	USEPA 1993a (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a; Quinney and Smith 1980	0.0	Sample and Suter 1994
Mallard	1.1770	Bellrose 1980	0.06581	allometric equation (USEPA 1993a)[2]	0.05642	allometric equation (Nagy 2001)[4]	435	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	86.7	10.0	0.0	Palmer 1976	3.3	Beyer et al. 1994
Marsh wren	0.0113	Dunning 2008	0.00292	allometric equation (USEPA 1993a)[2]	0.00249	USEPA 1993a	0.050	USEPA 1993a	0.0	0.0	0.0	0.0	0.0	0.0	95.0	0.0	USEPA 1993a	5.0	Assumed based on diet
Mourning dove	0.1265	Tomlinson et al. 1994	0.01477	allometric equation (USEPA 1993a)[2]	0.01757	allometric equation (Nagy 2001)[3]	956	Losito and Mirarchi 1991	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Tomlinson et al. 1994	5.0	Assumed based on diet
Osprey	1.4860	Dunning 2008	0.07693	allometric equation (USEPA 1993a)[2]	0.07802	USEPA 1993a	9,500	USEPA 1993a (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	USEPA 1993a	0.0	Assumed based on diet
Red-tailed hawk	1.1260	Sample and Suter 1994	0.06388	allometric equation (USEPA 1993a)[2]	0.03603	Sample and Suter 1994	233	Sample and Suter 1994	0.0	0.0	34.0	33.0	33.0	0.0	0.0	0.0	USEPA 1993a; Sample and Suter 1994	0.0	Sample and Suter 1994
Tree swallow	0.0201	Dunning 2008	0.00431	allometric equation (USEPA 1993a)[2]	0.00094	Sample et al. 1997	3,850	Robertson et al. 1992 (foraging)	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	Sample et al. 1997	0.0	Sample et al. 1997

1 - All mammals equation: $0.099\ (BW)^{0.90}$

2 - All birds equation: $0.059\ (BW)^{0.67}$

3 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$

4 - Omnivorous birds equation: $(0.67*((BW*1000)^{0.627}))/1000$

TABLE L-28

Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
Inorganics	Aluminum	pH < 5.5	--	Eco-SSL	USEPA 2003a	
Inorganics	Antimony	78.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005a	
Inorganics	Arsenic	18.0	mg/kg	Eco-SSL - Plant	USEPA 2005b	
Inorganics	Barium	330	mg/kg	Eco-SSL - Invertebrate	USEPA 2005c	
Inorganics	Beryllium	40.0	mg/kg	Eco-SSL - Invertebrate	USEPA 2005d	
Inorganics	Cadmium	32.0	mg/kg	Eco-SSL - Plant	USEPA 2005e	
Inorganics	Chromium (total)	64.0	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Chromium (hexavalent)	0.40	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Cobalt	13.0	mg/kg	Eco-SSL - Plant	USEPA 2005f	
Inorganics	Copper	70.0	mg/kg	Eco-SSL - Plant	USEPA 2007a	
Inorganics	Cyanide	15.8	mg/kg		MHSPE 2000	Geometric mean of target and intervention values (complex)
Inorganics	Iron	5 < pH > 8	--	Eco-SSL	USEPA 2003b	
Inorganics	Lead	120	mg/kg	Eco-SSL - Plant	USEPA 2005g	
Inorganics	Manganese	220	mg/kg	Eco-SSL - Plant	USEPA 2007b	
Inorganics	Mercury	0.10	mg/kg	Invertebrate	Efroymson et al. 1997b	
Inorganics	Nickel	38.0	mg/kg	Eco-SSL - Plant	USEPA 2007c	
Inorganics	Selenium	0.52	mg/kg	Eco-SSL - Plant	USEPA 2007d	
Inorganics	Silver	560	mg/kg	Eco-SSL - Plant	USEPA 2006c	
Inorganics	Thallium	1.00	mg/kg	Plant	Efroymson et al. 1997a	
Inorganics	Vanadium	130	mg/kg	Soil Quality Guideline	CCME 2007	
Inorganics	Zinc	120	mg/kg	Eco-SSL - Invertebrate	USEPA 2007e	
Pesticides	4,4'-DDD	583	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	4,4'-DDE	114	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	4,4'-DDT	100	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Aldrin	3.63	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	alpha-BHC	226	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	alpha-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	beta-BHC	342	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	delta-BHC	226	ug/kg		alpha-BHC value	
Pesticides	Dieldrin	10.5	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Endosulfan I	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Endosulfan II	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Endosulfan sulfate	6.32	ug/kg		Endosulfan value	
Pesticides	Endrin	1.95	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	Endrin aldehyde	1.95	ug/kg		Endrin value	
Pesticides	Endrin ketone	1.95	ug/kg		Endrin value	
Pesticides	gamma-BHC (Lindane)	7.75	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Pesticides	gamma-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Heptachlor	52.9	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Pesticides	Heptachlor epoxide	52.9	ug/kg		Heptachlor value	
Pesticides	Methoxychlor	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Pesticides	Toxaphene	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
PCBs	Aroclor-1016	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1221	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1232	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5

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Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
PCBs	Aroclor-1242	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1248	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1254	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
PCBs	Aroclor-1260	8,000	ug/kg	Plant	Efroymson et al. 1997a	Lowest EC50 (40,000); UF of 5
SVOCs	1,1-Biphenyl	13,600	ug/kg	Plant	Efroymson et al. 1997a	EC50 (68,000); UF of 5
SVOCs	1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
SVOCs	1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
SVOCs	1,2,4,5-Tetrachlorobenzene	1,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
SVOCs	1,2-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	1,3-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
SVOCs	1,4-Dioxane	2,050	ug/kg		USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	NSV	--		--	
SVOCs	2,3,4,6-Tetrachlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2,4,5-Trichlorophenol	1,350	ug/kg	Plant	Efroymson et al. 1997a	NOEC
SVOCs	2,4,6-Trichlorophenol	580	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 58,000; UF of 100
SVOCs	2,4-Dichlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2,4-Dimethylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2,4-Dinitrophenol	20,000	ug/kg	Plant	Efroymson et al. 1997a	NOEC
SVOCs	2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
SVOCs	2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
SVOCs	2-Chloronaphthalene	LMW PAH	--		--	
SVOCs	2-Chlorophenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2-Methylnaphthalene	LMW PAH	--		--	
SVOCs	2-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	2-Nitroaniline	NSV	--		--	
SVOCs	2-Nitrophenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	3- and 4-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	3,3'-Dichlorobenzidine	NSV	--		--	
SVOCs	3-Nitroaniline	NSV	--		--	
SVOCs	4,6-Dinitro-2-methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Bromophenyl-phenylether	NSV	--		--	
SVOCs	4-Chloro-3-methylphenol	500	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Chloroaniline	500	ug/kg		MHSPE 2000	Geometric mean of target and intervention values

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Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
SVOCs	4-Chlorophenyl-phenylether	NSV	--		--	
SVOCs	4-Methylphenol	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
SVOCs	4-Nitroaniline	NSV	--		--	
SVOCs	4-Nitrophenol	380	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 38,000; UF of 100
SVOCs	Acenaphthene	LMW PAH	--		--	
SVOCs	Acenaphthylene	LMW PAH	--		--	
SVOCs	Acetophenone	NSV	--		--	
SVOCs	Anthracene	LMW PAH	--		--	
SVOCs	Atrazine	11.9	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
SVOCs	Benzaldehyde	58,400	ug/kg		Hulzebos et al. 1993	Plant EC50 of 292,000; UF of 5
SVOCs	Benzo(a)anthracene	HMW PAH	--		--	
SVOCs	Benzo(a)pyrene	HMW PAH	--		--	
SVOCs	Benzo(b)fluoranthene	HMW PAH	--		--	
SVOCs	Benzo(g,h,i)perylene	HMW PAH	--		--	
SVOCs	Benzo(k)fluoranthene	HMW PAH	--		--	
SVOCs	Benzoic acid	NSV	--		--	
SVOCs	Benzyl alcohol	NSV	--		--	
SVOCs	bis(2-Chloroethoxy)methane	NSV	--		--	
SVOCs	bis(2-Chloroethyl)ether	NSV	--		--	
SVOCs	bis(2-Chloroisopropyl)ether	NSV	--		--	
SVOCs	bis(2-Ethylhexyl)phthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Butylbenzylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Caprolactam	NSV	--		--	
SVOCs	Carbazole	7,000	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 35,000; UF of 5
SVOCs	Chrysene	HMW PAH	--		--	
SVOCs	Dibenz(a,h)anthracene	HMW PAH	--		--	
SVOCs	Dibenzofuran	4,600	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 23,000; UF of 5
SVOCs	Diethylphthalate	26,800	ug/kg	Plant	Efroymson et al. 1997a	EC50 (134,000); UF of 5
SVOCs	Dimethyl phthalate	10,640	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 1,064,000; UF of 100
SVOCs	Di-n-butylphthalate	40,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (200,000); UF of 5
SVOCs	Di-n-octylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
SVOCs	Fluoranthene	LMW PAH	--		--	
SVOCs	Fluorene	LMW PAH	--		--	
SVOCs	Hexachlorobenzene	1,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
SVOCs	Hexachlorobutadiene	NSV	--		--	
SVOCs	Hexachlorocyclopentadiene	2,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (10,000); UF of 5
SVOCs	Hexachloroethane	NSV	--		--	
SVOCs	Indeno(1,2,3-cd)pyrene	HMW PAH	--		--	
SVOCs	Isophorone	NSV	--		--	
SVOCs	Naphthalene	LMW PAH	--		--	
SVOCs	Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
SVOCs	n-Nitroso-di-n-propylamine	NSV	--		--	
SVOCs	n-Nitrosodiphenylamine	1,090	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 109,000; UF of 100
SVOCs	PAH (HMW)	18,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007h	

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Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
SVOCs	PAH (LMW)	29,000	ug/kg	Eco-SSL - Invertebrate	USEPA 2007h	
SVOCs	Pentachlorophenol	5,000	ug/kg	Eco-SSL - Plant	USEPA 2007i	
SVOCs	Phenanthrene	LMW PAH	--		--	
SVOCs	Phenol	1,880	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 188,000; UF of 100
SVOCs	Pyrene	HMW PAH	--		--	
VOCs	1,1,1-Trichloroethane	1,025	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1,2,2-Tetrachloroethane	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NSV	--		--	
VOCs	1,1,2-Trichloroethane	2,000	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1-Dichloroethane	548	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,1-Dichloroethene	173	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
VOCs	1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
VOCs	1,2-Dibromo-3-chloropropane	NSV	--		--	
VOCs	1,2-Dibromoethane	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	1,2-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,2-Dichloroethane	2,190	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	1,2-Dichloroethene (total)	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	1,2-Dichloropropane	38,800	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 3,880,000; UF of 100
VOCs	1,3-Dichlorobenzene	1,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
VOCs	2-Butanone	NSV	--		--	
VOCs	2-Hexanone	NSV	--		--	
VOCs	4-Methyl-2-pentanone	NSV	--		--	
VOCs	Acetone	NSV	--		--	
VOCs	Benzene	1,140	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Bromochloromethane	NSV	--		--	
VOCs	Bromodichloromethane	NSV	--		--	
VOCs	Bromoform	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	Bromomethane	NSV	--		--	
VOCs	Carbon disulfide	NSV	--		--	
VOCs	Carbon tetrachloride	3,400	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Chlorobenzene	2,400	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 240,000; UF of 100
VOCs	Chloroethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	Chloroform	1,844	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Chloromethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
VOCs	cis-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	cis-1,3-Dichloropropene	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	Cyclohexane	6,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
VOCs	Dibromochloromethane	NSV	--		--	
VOCs	Dichlorodifluoromethane(Freon-12)	NSV	--		--	

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Ecological Screening Values (ESVs) for Soils - Plants and Soil Invertebrates

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	ESV	Units	Type/Receptor	Reference	Comments
VOCs	Ethylbenzene	1,815	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Isopropylbenzene	NSV	--		--	
VOCs	m- and p-Xylene	1,300	ug/kg		Total xylenes	
VOCs	Methyl acetate	NSV	--		--	
VOCs	Methylcyclohexane	NSV	--		--	
VOCs	Methylene chloride	1,250	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Methyl-tert-butyl ether (MTBE)	NSV	--		--	
VOCs	o-Xylene	1,300	ug/kg		Total xylenes	
VOCs	Styrene	64,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (320,000); UF of 5
VOCs	Tetrachloroethene	179	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Toluene	40,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (200,000); UF of 5
VOCs	trans-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
VOCs	trans-1,3-Dichloropropene	5,000	ug/kg		Beyer 1990; CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
VOCs	Trichloroethene	500	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Trichlorofluoromethane(Freon-11)	NSV	--		--	
VOCs	Vinyl chloride	412	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
VOCs	Xylene, total	1,300	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Explosives	1,3,5-Trinitrobenzene	NSV	--		--	
Explosives	1,3-Dinitrobenzene	NSV	--		--	
Explosives	2,4,6-Trinitrotoluene	10,000	ug/kg	Plant	Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	
Explosives	2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
Explosives	2-Amino-4,6-dinitrotoluene	80,000	ug/kg	Plant	Talmage et al. 1999	
Explosives	2-Nitrotoluene	NSV	--		--	
Explosives	3-Nitrotoluene	NSV	--		--	
Explosives	4-Amino-2,6-dinitrotoluene	80,000	ug/kg	Plant	2-Amino-4,6-dinitrotoluene	
Explosives	4-Nitrotoluene	NSV	--		--	
Explosives	HMX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Explosives	Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
Explosives	RDX	10,000	ug/kg	Invertebrate	Talmage et al. 1999	
Explosives	Tetryl	10,000	ug/kg	Plant	Talmage et al. 1999	

NSV - No Screening Value

TABLE L-29

Ecological Screening Values (ESVs) for Freshwater

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Filtered Metals	Aluminum	Freshwater	AWQC	87.0	ug/L			USEPA 2009a	
Filtered Metals	Antimony	Freshwater	FCV	30.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Arsenic	Freshwater	AWQC	150	ug/L			USEPA 2009a	
Filtered Metals	Barium	Freshwater	SCV	4.00	ug/L			Suter and Tsao 1996	
Filtered Metals	Beryllium	Freshwater	SCV	0.66	ug/L			Suter and Tsao 1996	
Filtered Metals	Cadmium	Freshwater	AWQC	0.25	ug/L	100		USEPA 2009a	
Filtered Metals	Chromium (total)	Freshwater	AWQC	11.0	ug/L			USEPA 2009a	
Filtered Metals	Chromium (hexavalent)	Freshwater	AWQC	11.0	ug/L			USEPA 2009a	
Filtered Metals	Cobalt	Freshwater	SCV	23.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Copper	Freshwater	AWQC	8.96	ug/L	100		USEPA 2006a	
Filtered Metals	Iron	Freshwater	AWQC	1,000	ug/L			USEPA 2009a	
Filtered Metals	Lead	Freshwater	AWQC	2.52	ug/L	100		USEPA 2009a	
Filtered Metals	Manganese	Freshwater	SCV	120	ug/L			Suter and Tsao 1996	
Filtered Metals	Mercury	Freshwater	AWQC	0.77	ug/L			USEPA 2009a	
Filtered Metals	Nickel	Freshwater	AWQC	52.0	ug/L	100		USEPA 2009a	
Filtered Metals	Selenium	Freshwater	AWQC	4.61	ug/L			USEPA 2009a	
Filtered Metals	Silver	Freshwater	SCV	0.36	ug/L			Suter and Tsao 1996	
Filtered Metals	Thallium	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Vanadium	Freshwater	SCV	20.0	ug/L			Suter and Tsao 1996	
Filtered Metals	Zinc	Freshwater	AWQC	118	ug/L	100		USEPA 2009a	
Inorganics	Aluminum	Freshwater	AWQC	87.0	ug/L			USEPA 2009a	
Inorganics	Antimony	Freshwater	FCV	30.0	ug/L			Suter and Tsao 1996	
Inorganics	Arsenic	Freshwater	AWQC	150	ug/L			USEPA 2009a	
Inorganics	Barium	Freshwater	SCV	4.00	ug/L			Suter and Tsao 1996	
Inorganics	Beryllium	Freshwater	SCV	0.66	ug/L			Suter and Tsao 1996	
Inorganics	Cadmium	Freshwater	AWQC	0.27	ug/L	100		USEPA 2009a	
Inorganics	Chromium (total)	Freshwater	AWQC	11.4	ug/L			USEPA 2009a	
Inorganics	Chromium (hexavalent)	Freshwater	AWQC	11.4	ug/L			USEPA 2009a	
Inorganics	Cobalt	Freshwater	SCV	23.0	ug/L			Suter and Tsao 1996	
Inorganics	Copper	Freshwater	AWQC	9.33	ug/L	100		USEPA 2006a	
Inorganics	Cyanide	Freshwater	AWQC	5.20	ug/L			USEPA 2009a	
Inorganics	Iron	Freshwater	AWQC	1,000	ug/L			USEPA 2009a	
Inorganics	Lead	Freshwater	AWQC	3.18	ug/L	100		USEPA 2009a	
Inorganics	Manganese	Freshwater	SCV	120	ug/L			Suter and Tsao 1996	
Inorganics	Mercury	Freshwater	AWQC	0.91	ug/L			USEPA 2009a	
Inorganics	Nickel	Freshwater	AWQC	52.2	ug/L	100		USEPA 2009a	
Inorganics	Selenium	Freshwater	AWQC	5.00	ug/L			USEPA 2009a	
Inorganics	Silver	Freshwater	SCV	0.36	ug/L			Suter and Tsao 1996	
Inorganics	Thallium	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
Inorganics	Vanadium	Freshwater	SCV	20.0	ug/L			Suter and Tsao 1996	
Inorganics	Zinc	Freshwater	AWQC	120	ug/L	100		USEPA 2009a	
Pesticides	4,4'-DDD	Freshwater	SCV	0.011	ug/L			Suter and Tsao 1996	
Pesticides	4,4'-DDE	Freshwater	SCV	0.013	ug/L			DDT value	
Pesticides	4,4'-DDT	Freshwater	SCV	0.013	ug/L			USEPA 1996b	
Pesticides	Aldrin	Freshwater		0.30	ug/L			USEPA 2001	Acute AWQC/10

TABLE L-29

Ecological Screening Values (ESVs) for Freshwater

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
Pesticides	alpha-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	alpha-Chlordane	Freshwater	SCV	0.17	ug/L			Suter and Tsao 1996	
Pesticides	beta-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	delta-BHC	Freshwater	SCV	2.20	ug/L			Suter and Tsao 1996	
Pesticides	Dieldrin	Freshwater	AWQC - FCV	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan I	Freshwater	AWQC	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan II	Freshwater	AWQC	0.056	ug/L			USEPA 2009a	
Pesticides	Endosulfan sulfate	Freshwater	AWQC	0.056	ug/L			Endosulfan value	
Pesticides	Endrin	Freshwater	AWQC - FCV	0.036	ug/L			USEPA 2009a	
Pesticides	Endrin aldehyde	Freshwater		0.15	ug/L			Buchman 2008	
Pesticides	Endrin ketone	Freshwater		0.15	ug/L			Endrin aldehyde value	
Pesticides	gamma-BHC (Lindane)	Freshwater	FCV	0.08	ug/L			USEPA 1996b	
Pesticides	gamma-Chlordane	Freshwater	SCV	0.17	ug/L			Suter and Tsao 1996	
Pesticides	Heptachlor	Freshwater	SCV	0.0069	ug/L			USEPA 1996b	
Pesticides	Heptachlor epoxide	Freshwater	SCV	0.0069	ug/L			Heptachlor value	
Pesticides	Methoxychlor	Freshwater	AWQC	0.03	ug/L			USEPA 2009a	
Pesticides	Toxaphene	Freshwater	SCV	0.011	ug/L			USEPA 1996b	
PCBs	Aroclor-1016	Freshwater	SCV	0.14	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1221	Freshwater	SCV	0.28	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1232	Freshwater	SCV	0.58	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1242	Freshwater	SCV	0.053	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1248	Freshwater	SCV	0.081	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1254	Freshwater	SCV	0.033	ug/L			Suter and Tsao 1996	
PCBs	Aroclor-1260	Freshwater	SCV	0.14	ug/L			Suter and Tsao 1996	
SVOCs	1,1-Biphenyl	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
SVOCs	1,2,3-Trichlorobenzene	Freshwater		8.00	ug/L			USEPA 2006b	
SVOCs	1,2,4-Trichlorobenzene	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
SVOCs	1,2,4,5-Tetrachlorobenzene	Freshwater	Tier II SCV	3.00	ug/L			USEPA 2003c	
SVOCs	1,2-Dichlorobenzene	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
SVOCs	1,3-Dichlorobenzene	Freshwater	SCV	71.0	ug/L			USEPA 1996b	
SVOCs	1,4-Dichlorobenzene	Freshwater	SCV	15.0	ug/L			USEPA 1996b	
SVOCs	1,4-Dioxane	Freshwater	Tier II SCV	22,000	ug/L			USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	Freshwater		NSV	--			--	
SVOCs	2,3,4,6-Tetrachlorophenol	Freshwater	Tier II SCV	1.20	ug/L			USEPA 2003c	
SVOCs	2,4,5-Trichlorophenol	Freshwater		63.0	ug/L			Buchman 2008	
SVOCs	2,4,6-Trichlorophenol	Freshwater		4.90	ug/L			Buchman 2008	
SVOCs	2,4-Dichlorophenol	Freshwater	SCV	11.0	ug/L			USEPA 2006b	
SVOCs	2,4-Dimethylphenol	Freshwater		100	ug/L			Buchman 2008	
SVOCs	2,4-Dinitrophenol	Freshwater		19.0	ug/L			Buchman 2008	
SVOCs	2,4-Dinitrotoluene	Freshwater	SCV	44.0	ug/L			USEPA 2006b	
SVOCs	2,6-Dinitrotoluene	Freshwater	SCV	81.0	ug/L			USEPA 2006b	
SVOCs	2-Chloronaphthalene	Freshwater		0.40	ug/L			Buchman 2008	
SVOCs	2-Chlorophenol	Freshwater	FCV	24.0	ug/L			USEPA 2006b	
SVOCs	2-Methylnaphthalene	Freshwater		330	ug/L			Buchman 2008	
SVOCs	2-Methylphenol	Freshwater	SCV	13.0	ug/L			Suter and Tsao 1996	

TABLE L-29

Ecological Screening Values (ESVs) for Freshwater

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
SVOCs	2-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	2-Nitrophenol	Freshwater		1,920	ug/L			USEPA 2006b	
SVOCs	3- and 4-Methylphenol	Freshwater		543	ug/L			USEPA 2006b	4-Methylphenol
SVOCs	3,3'-Dichlorobenzidine	Freshwater	FCV	4.50	ug/L			USEPA 2006b	
SVOCs	3-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	4,6-Dinitro-2-methylphenol	Freshwater		2.30	ug/L			USEPA 2001	
SVOCs	4-Bromophenyl-phenylether	Freshwater	SCV	1.50	ug/L			USEPA 1996b	
SVOCs	4-Chloro-3-methylphenol	Freshwater		0.30	ug/L			USEPA 2001	
SVOCs	4-Chloroaniline	Freshwater		232	ug/L			USEPA 2006b	
SVOCs	4-Chlorophenyl-phenylether	Freshwater		NSV	--			--	
SVOCs	4-Methylphenol	Freshwater		543	ug/L			USEPA 2006b	
SVOCs	4-Nitroaniline	Freshwater		NSV	--			--	
SVOCs	4-Nitrophenol	Freshwater	SCV	300	ug/L			Suter and Tsao 1996	
SVOCs	Acenaphthene	Freshwater	FCV	23.0	ug/L			USEPA 1996b	
SVOCs	Acenaphthylene	Freshwater		4,840	ug/L			Buchman 2008	
SVOCs	Acetophenone	Freshwater		NSV	--			--	
SVOCs	Anthracene	Freshwater	SCV	0.73	ug/L			Suter and Tsao 1996	
SVOCs	Atrazine	Freshwater		1.80	ug/L			USEPA 2006b	
SVOCs	Benzaldehyde	Freshwater		NSV	--			--	
SVOCs	Benzo(a)anthracene	Freshwater	SCV	0.027	ug/L			Suter and Tsao 1996	
SVOCs	Benzo(a)pyrene	Freshwater	SCV	0.014	ug/L			Suter and Tsao 1996	
SVOCs	Benzo(b)fluoranthene	Freshwater		9.07	ug/L			Buchman 2008	
SVOCs	Benzo(g,h,i)perylene	Freshwater		7.64	ug/L			Buchman 2008	
SVOCs	Benzo(k)fluoranthene	Freshwater		9.07	ug/L			Benzo(b)fluoranthene value	
SVOCs	Benzoic acid	Freshwater	SCV	42.0	ug/L			Suter and Tsao 1996	
SVOCs	Benzyl alcohol	Freshwater	SCV	8.60	ug/L			Suter and Tsao 1996	
SVOCs	bis(2-Chloroethoxy)methane	Freshwater		NSV	--			--	
SVOCs	bis(2-Chloroethyl)ether	Freshwater		1,900	ug/L			Buchman 2008	
SVOCs	bis(2-Chloroisopropyl)ether	Freshwater		NSV	--			--	
SVOCs	bis(2-Ethylhexyl)phthalate	Freshwater	SCV	32.0	ug/L			USEPA 1996b	
SVOCs	Butylbenzylphthalate	Freshwater	SCV	19.0	ug/L			USEPA 1996b	
SVOCs	Caprolactam	Freshwater		NSV	--			--	
SVOCs	Carbazole	Freshwater		NSV	--			--	
SVOCs	Chrysene	Freshwater		NSV	--			--	
SVOCs	Dibenz(a,h)anthracene	Freshwater		NSV	--			--	
SVOCs	Dibenzofuran	Freshwater	SCV	3.70	ug/L			Suter and Tsao 1996	
SVOCs	Diethylphthalate	Freshwater	SCV	270	ug/L			USEPA 2008b	
SVOCs	Dimethyl phthalate	Freshwater		330	ug/L			USEPA 2001	
SVOCs	Di-n-butylphthalate	Freshwater	SCV	35.0	ug/L			Suter and Tsao 1996	
SVOCs	Di-n-octylphthalate	Freshwater		22.0	ug/L			USEPA 2006b	
SVOCs	Fluoranthene	Freshwater	FCV	8.10	ug/L			USEPA 1996b	
SVOCs	Fluorene	Freshwater	SCV	3.90	ug/L			USEPA 1996b	
SVOCs	Hexachlorobenzene	Freshwater		3.68	ug/L			Buchman 2008	Proposed AWQC
SVOCs	Hexachlorobutadiene	Freshwater		1.30	ug/L			USEPA 2006b	
SVOCs	Hexachlorocyclopentadiene	Freshwater		1.04	ug/L			Buchman 2008	LOEL/5

TABLE L-29

Ecological Screening Values (ESVs) for Freshwater

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
SVOCs	Hexachloroethane	Freshwater	SCV	12.0	ug/L			USEPA 1996b	
SVOCs	Indeno(1,2,3-cd)pyrene	Freshwater		4.31	ug/L			Buchman 2008	
SVOCs	Isophorone	Freshwater		1,170	ug/L			USEPA 2001	
SVOCs	Naphthalene	Freshwater	SCV	12.0	ug/L			Suter and Tsao 1996	
SVOCs	Nitrobenzene	Freshwater		270	ug/L			USEPA 2001	Acute/10
SVOCs	n-Nitroso-di-n-propylamine	Freshwater		NSV	--			--	
SVOCs	n-Nitrosodiphenylamine	Freshwater	SCV	210	ug/L			Suter and Tsao 1996	
SVOCs	Pentachlorophenol	Freshwater	AWQC	15.0	ug/L		7.8	USEPA 2009a	
SVOCs	Phenanthrene	Freshwater	FCV	6.30	ug/L			USEPA 1996b	
SVOCs	Phenol	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
SVOCs	Pyrene	Freshwater		0.025	ug/L			USEPA 2006b	
VOCs	1,1,1-Trichloroethane	Freshwater	SCV	11.0	ug/L			Suter and Tsao 1996	
VOCs	1,1,2,2-Tetrachloroethane	Freshwater	SCV	610	ug/L			Suter and Tsao 1996	
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Freshwater		NSV	--			--	
VOCs	1,1,2-Trichloroethane	Freshwater	SCV	1,200	ug/L			Suter and Tsao 1996	
VOCs	1,1-Dichloroethane	Freshwater	SCV	47.0	ug/L			Suter and Tsao 1996	
VOCs	1,1-Dichloroethene	Freshwater	SCV	25.0	ug/L			Suter and Tsao 1996	
VOCs	1,2,3-Trichlorobenzene	Freshwater		8.00	ug/L			USEPA 2006b	
VOCs	1,2,4-Trichlorobenzene	Freshwater	SCV	110	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dibromo-3-chloropropane	Freshwater		NSV	--			--	
VOCs	1,2-Dibromoethane	Freshwater		NSV	--			--	
VOCs	1,2-Dichlorobenzene	Freshwater	SCV	14.0	ug/L			USEPA 1996b	
VOCs	1,2-Dichloroethane	Freshwater	SCV	910	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dichloroethene (total)	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	1,2-Dichloropropane	Freshwater		525	ug/L			USEPA 2001	
VOCs	1,3-Dichlorobenzene	Freshwater	SCV	71.0	ug/L			USEPA 1996b	
VOCs	1,4-Dichlorobenzene	Freshwater	SCV	15.0	ug/L			USEPA 1996b	
VOCs	2-Butanone	Freshwater	SCV	14,000	ug/L			Suter and Tsao 1996	
VOCs	2-Hexanone	Freshwater	SCV	99.0	ug/L			Suter and Tsao 1996	
VOCs	4-Methyl-2-pentanone	Freshwater	SCV	170	ug/L			Suter and Tsao 1996	
VOCs	Acetone	Freshwater	SCV	1,500	ug/L			Suter and Tsao 1996	
VOCs	Benzene	Freshwater	SCV	130	ug/L			Suter and Tsao 1996	
VOCs	Bromochloromethane	Freshwater		NSV	--			--	
VOCs	Bromodichloromethane	Freshwater		NSV	--			--	
VOCs	Bromoform	Freshwater	SCV	320	ug/L			USEPA 1996b	
VOCs	Bromomethane	Freshwater		110	ug/L			USEPA 2001	
VOCs	Carbon disulfide	Freshwater	SCV	0.92	ug/L			Suter and Tsao 1996	
VOCs	Carbon tetrachloride	Freshwater	SCV	240	ug/L			USEPA 1996b	
VOCs	Chlorobenzene	Freshwater	SCV	64.0	ug/L			Suter and Tsao 1996	
VOCs	Chloroethane	Freshwater		NSV	--			--	
VOCs	Chloroform	Freshwater	SCV	28.0	ug/L			Suter and Tsao 1996	
VOCs	Chloromethane	Freshwater		5,500	ug/L			USEPA 2001	
VOCs	cis-1,2-Dichloroethene	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	cis-1,3-Dichloropropene	Freshwater		24.4	ug/L			USEPA 2001	
VOCs	Cyclohexane	Freshwater		NSV	--			--	

TABLE L-29

Ecological Screening Values (ESVs) for Freshwater

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Type	Basis[1]	ESV	Units	Hardness (mg/L)	pH	Reference	Comments
VOCs	Dibromochloromethane	Freshwater		NSV	--			--	
VOCs	Dichlorodifluoromethane(Freon-12)	Freshwater		NSV	--			--	
VOCs	Ethylbenzene	Freshwater	SCV	290	ug/L			USEPA 1996b	
VOCs	Isopropylbenzene	Freshwater		2.60	ug/L			USEPA 2006b	
VOCs	m- and p-Xylene	Freshwater		13.0	ug/L			Suter and Tsao 1996	Total xylenes
VOCs	Methyl acetate	Freshwater		NSV	--			--	
VOCs	Methylcyclohexane	Freshwater		NSV	--			--	
VOCs	Methylene chloride	Freshwater	SCV	2,200	ug/L			Suter and Tsao 1996	
VOCs	Methyl-tert-butyl ether (MTBE)	Freshwater		11,070	ug/L			USEPA 2006b	
VOCs	o-Xylene	Freshwater		13.0	ug/L			Suter and Tsao 1996	Total xylenes
VOCs	Styrene	Freshwater		72.0	ug/L			USEPA 2006b	
VOCs	Tetrachloroethene	Freshwater	SCV	98.0	ug/L			Suter and Tsao 1996	
VOCs	Toluene	Freshwater	SCV	9.80	ug/L			Suter and Tsao 1996	
VOCs	trans-1,2-Dichloroethene	Freshwater	SCV	590	ug/L			Suter and Tsao 1996	
VOCs	trans-1,3-Dichloropropene	Freshwater		24.4	ug/L			USEPA 2001	
VOCs	Trichloroethene	Freshwater	SCV	47.0	ug/L			Suter and Tsao 1996	
VOCs	Trichlorofluoromethane(Freon-11)	Freshwater		NSV	--			--	
VOCs	Vinyl chloride	Freshwater	FCV	930	ug/L			USEPA 2006b	
VOCs	Xylene, total	Freshwater	SCV	13.0	ug/L			Suter and Tsao 1996	
Explosives	1,3,5-Trinitrobenzene	Freshwater	SCV	11.0	ug/L			Talmage et al. 1999	
Explosives	1,3-Dinitrobenzene	Freshwater	SCV	17.0	ug/L			Talmage et al. 1999	
Explosives	2,4,6-Trinitrotoluene	Freshwater	SCV	93.0	ug/L			Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	Freshwater	SCV	44.0	ug/L			USEPA 2006b	
Explosives	2,6-Dinitrotoluene	Freshwater	SCV	81.0	ug/L			USEPA 2006b	
Explosives	2-Amino-4,6-dinitrotoluene	Freshwater	SCV	19.0	ug/L			Talmage et al. 1999	
Explosives	2-Nitrotoluene	Freshwater		3,400	ug/L			NAVFAC 2007	
Explosives	3-Nitrotoluene	Freshwater		750	ug/L			USEPA 2006b	
Explosives	4-Amino-2,6-dinitrotoluene	Freshwater		19.0	ug/L			2-Amino-4,6-dinitrotoluene	
Explosives	4-Nitrotoluene	Freshwater		1,900	ug/L			USEPA 2006b	
Explosives	HMX	Freshwater	SCV	330	ug/L			Talmage et al. 1999	
Explosives	Nitrobenzene	Freshwater		270	ug/L			USEPA 2001	Acute/10
Explosives	RDX	Freshwater	SCV	186	ug/L			Talmage et al. 1999	
Explosives	Tetryl	Freshwater		--	--			--	

NSV - No Screening Value

1 - AWQC: Ambient Water Quality Criterion; FCV: Final Chronic Value; FRV: Final Residue Value; NOEC: No Observed Effect Concentration; SCV: Secondary Chronic Value;

TABLE L-30

Area-Specific Hardness Values

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Group	Hardness (MG/L)
CAS04-SW01	CAS04-SW01-1209	12/7/2009	Upstream Pond	166
CAS04-SW02	CAS04-SW02-1209	12/7/2009	Upstream Pond	209
CAS04-SW03	CAS04-SW03-1209	12/7/2009	Upstream Pond	276
CAS04-SW04	CAS04-SW04-1209	12/7/2009	Upstream Pond	181
CAA03-SW01	CAA03-SW01-1209	12/7/2009	Upstream Pond	196
CAA03-SW02	CAA03-SW02-1209	12/7/2009	Upstream Pond	179
CAA03-SW03	CAA03-SW03-1209	12/7/2009	Upstream Pond	170
CAA03-SW04	CAA03-SW04-1209	12/7/2009	Upstream Pond	169
			Mean:	**193**
CAS04-SW05	CAS04-SW05-1209	12/8/2009	Site 4 Streams	338
CAS04-SW06	CAS04-SW06-1209	12/8/2009	Site 4 Streams	330
CAS04-SW07	CAS04-SW07-1209	12/8/2009	Site 4 Streams	335
CAS04-SW08	CAS04-SW08-1209	12/8/2009	Site 4 Streams	321
CAS04-SW09	CAS04-SW09-1209	12/8/2009	Site 4 Streams	297
			Mean:	**324**
			Mean Upstream Pond and Site 4 Streams:	**244**
CAYP-SWSD01	CAYP-SW01-1012	10/11/2012	Youth Pond	80
CAYP-SWSD02	CAYP-SW02-1012	10/11/2012	Youth Pond	84
CAYP-SWSD03	CAYP-SW03-1012	10/11/2012	Youth Pond	88
CAYP-SWSD04	CAYP-SW04-1012	10/11/2012	Youth Pond	90
CAYP-SWSD05	CAYP-SW05-1112	11/9/2012	Youth Pond	62
CAYP-SWSD06	CAYP-SW06-1112	11/9/2012	Youth Pond	240
			Mean:	**107**
			Mean ALL:	**201**

TABLE L-31

Ecological Screening Values (ESVs) for Freshwater Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
Inorganics	Aluminum	Freshwater	ARCS TEL	25,500	mg/kg	Buchman 2008		--	--	--	--	--
Inorganics	Antimony	Freshwater	UET	3.00	mg/kg	Buchman 2008	Microtox	--	--	--	--	--
Inorganics	Arsenic	Freshwater	TEC	9.79	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Barium	Freshwater	TEC	20.0	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Beryllium	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Cadmium	Freshwater	TEC	0.99	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Chromium (total)	Freshwater	TEC	43.4	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Chromium (hexavalent)	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Cobalt	Freshwater	TEC	50.0	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Copper	Freshwater	TEC	31.6	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Cyanide	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Iron	Freshwater	LEL	20,000	mg/kg	Persuad et al. 1993		--	--	--	--	--
Inorganics	Lead	Freshwater	TEC	35.8	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Manganese	Freshwater	LEL	460	mg/kg	Persuad et al. 1993		--	--	--	--	--
Inorganics	Mercury	Freshwater	TEC	0.18	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Nickel	Freshwater	TEC	22.7	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Inorganics	Selenium	Freshwater		2.00	mg/kg	USEPA 2006b		--	--	--	--	--
Inorganics	Silver	Freshwater	TEC	1.00	mg/kg	MacDonald et al. 2003		--	--	--	--	--
Inorganics	Thallium	Freshwater		NSV	--	--		--	--	--	--	--
Inorganics	Vanadium	Marine	AET	57.0	mg/kg	Buchman 2008	Neanthes	--	--	--	--	--
Inorganics	Zinc	Freshwater	TEC	121	mg/kg	MacDonald et al. 2000a		--	--	--	--	--
Pesticides	4,4'-DDD	Freshwater	TEC	4.88	ug/kg	MacDonald et al. 2000a		110	ug/kg	1	Jones et al. 1997	
Pesticides	4,4'-DDE	Freshwater	TEC	3.16	ug/kg	MacDonald et al. 2000a		340	ug/kg	1	DDT value	
Pesticides	4,4'-DDT	Freshwater	TEC	4.16	ug/kg	MacDonald et al. 2000a		340	ug/kg	1	Jones et al. 1997	
Pesticides	Aldrin	Freshwater	LEL	2.00	ug/kg	Persuad et al. 1993		NSV	--		--	
Pesticides	alpha-BHC	Freshwater	LEL	6.00	ug/kg	Persuad et al. 1993		120	ug/kg	1	Jones et al. 1997	
Pesticides	alpha-Chlordane	Freshwater	TEC	3.24	ug/kg	MacDonald et al. 2000a		2,800	ug/kg	1	Jones et al. 1997	
Pesticides	beta-BHC	Freshwater	LEL	5.00	ug/kg	Persuad et al. 1993		120	ug/kg	1	Jones et al. 1997	
Pesticides	delta-BHC	Freshwater	LEL	3.00	ug/kg	Persuad et al. 1993	HCH-technical	120	ug/kg	1	Jones et al. 1997	
Pesticides	Dieldrin	Freshwater	TEC	1.90	ug/kg	MacDonald et al. 2000a		52.0	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan I	Freshwater		NSV	--	--		2.90	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan II	Freshwater		NSV	--	--		14.0	ug/kg	1	USEPA 1996b	
Pesticides	Endosulfan sulfate	Freshwater		NSV	--	--		5.40	ug/kg	1	USEPA 1996b	
Pesticides	Endrin	Freshwater	TEC	2.22	ug/kg	MacDonald et al. 2000a		20.0	ug/kg	1	USEPA 1996b	
Pesticides	Endrin aldehyde	Freshwater	TEC	2.22	ug/kg	Endrin value		20.0	ug/kg	1	Endrin value	
Pesticides	Endrin ketone	Freshwater	TEC	2.22	ug/kg	Endrin value		20.0	ug/kg	1	Endrin value	
Pesticides	gamma-BHC (Lindane)	Freshwater	TEC	2.37	ug/kg	MacDonald et al. 2000a		3.70	ug/kg	1	USEPA 1996b	
Pesticides	gamma-Chlordane	Freshwater	TEC	3.24	ug/kg	MacDonald et al. 2000a		2,800	ug/kg	1	Jones et al. 1997	
Pesticides	Heptachlor	Freshwater		NSV	--	--		68.0	ug/kg	1	Jones et al. 1997	
Pesticides	Heptachlor epoxide	Freshwater	TEC	2.47	ug/kg	MacDonald et al. 2000a		68.0	ug/kg	1	Heptachlor value	
Pesticides	Methoxychlor	Freshwater		NSV	--	--		19.0	ug/kg	1	USEPA 1996b	
Pesticides	Toxaphene	Freshwater		NSV	--	--		28.0	ug/kg	1	USEPA 1996b	
PCBs	Aroclor-1016	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Aroclor-1221 value	
PCBs	Aroclor-1221	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		120	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1232	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		600	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1242	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		170	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1248	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		1,000	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1254	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		810	ug/kg	1	Jones et al. 1997	
PCBs	Aroclor-1260	Freshwater	TEC	59.8	ug/kg	MacDonald et al. 2000b		810	ug/kg	1	Aroclor-1254 value	
SVOCs	1,1-Biphenyl	Freshwater		NSV	--	--		1,100	ug/kg	1	USEPA 1996b	
SVOCs	1,2,3-Trichlorobenzene	Freshwater		NSV	--	--		858	ug/kg	1	USEPA 2006b	
SVOCs	1,2,4-Trichlorobenzene	Freshwater		NSV	--	--		9,200	ug/kg	1	USEPA 1996b	
SVOCs	1,2,4,5-Tetrachlorobenzene	Freshwater		NSV	--	--		1,093	ug/kg	1	USEPA 2006b	
SVOCs	1,2-Dichlorobenzene	Freshwater		NSV	--	--		340	ug/kg	1	USEPA 1996b	
SVOCs	1,3-Dichlorobenzene	Freshwater		NSV	--	--		1,700	ug/kg	1	USEPA 1996b	
SVOCs	1,4-Dichlorobenzene	Freshwater		NSV	--	--		350	ug/kg	1	USEPA 1996b	
SVOCs	1,4-Dioxane	Freshwater		NSV	--	--		119	ug/kg	1	USEPA 2003c	
SVOCs	2,2'-Oxybis(1-chloropropane)	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,3,4,6-Tetrachlorophenol	Freshwater		NSV	--	--		284	ug/kg	1	USEPA 2006b	
SVOCs	2,4,5-Trichlorophenol	Freshwater		NSV	--	--		NSV	--		--	

TABLE L-31

Ecological Screening Values (ESVs) for Freshwater Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
SVOCs	2,4,6-Trichlorophenol	Freshwater		NSV	--	--		213	ug/kg	1	USEPA 2006b	
SVOCs	2,4-Dichlorophenol	Freshwater		NSV	--	--		117	ug/kg	1	USEPA 2006b	
SVOCs	2,4-Dimethylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dinitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2,4-Dinitrotoluene	Freshwater		NSV	--	--		41.6	ug/kg	1	USEPA 2006b	
SVOCs	2,6-Dinitrotoluene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Chloronaphthalene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Chlorophenol	Freshwater		NSV	--	--		31.2	ug/kg	1	USEPA 2006b	
SVOCs	2-Methylnaphthalene	Marine	ER-L	70.0	ug/kg	Long et al. 1995		NSV	--		--	
SVOCs	2-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	2-Nitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	3- and 4-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	3,3'-Dichlorobenzidine	Freshwater		NSV	--	--		127	ug/kg	1	USEPA 2006b	
SVOCs	3-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4,6-Dinitro-2-methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Bromophenyl-phenylether	Freshwater		NSV	--	--		1,300	ug/kg	1	USEPA 1996b	
SVOCs	4-Chloro-3-methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Chloroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Chlorophenyl-phenylether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Methylphenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Nitroaniline	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	4-Nitrophenol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Acenaphthene	Freshwater	UET	290	ug/kg	Buchman 2008	Microtox (at 1% TOC)	620	ug/kg	1	USEPA 1996b	
SVOCs	Acenaphthylene	Freshwater	UET	160	ug/kg	Buchman 2008	Microtox (at 1% TOC)	NSV	--		--	
SVOCs	Acetophenone	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Anthracene	Freshwater	TEC	57.2	ug/kg	MacDonald et al. 2000a		220	ug/kg	1	Jones et al. 1997	
SVOCs	Atrazine	Freshwater		NSV	--	--		6.62	ug/kg	1	USEPA 2006b	
SVOCs	Benzaldehyde	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Benzo(a)anthracene	Freshwater	TEC	108	ug/kg	MacDonald et al. 2000a		110	ug/kg	1	Jones et al. 1997	
SVOCs	Benzo(a)pyrene	Freshwater	TEC	150	ug/kg	MacDonald et al. 2000a		140	ug/kg	1	Jones et al. 1997	
SVOCs	Benzo(b)fluoranthene	Freshwater		240	ug/kg	Benzo(k)fluoanthene value		NSV	--		--	
SVOCs	Benzo(g,h,i)perylene	Freshwater	LEL	170	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Benzo(k)fluoranthene	Freshwater	LEL	240	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Benzoic acid	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Benzyl alcohol	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroethoxy)methane	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroethyl)ether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Chloroisopropyl)ether	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	bis(2-Ethylhexyl)phthalate	Freshwater	UET	750	ug/kg	Buchman 2008	Microtox (at 1% TOC)	890,000	ug/kg	1	Jones et al. 1997	
SVOCs	Butylbenzylphthalate	Freshwater		NSV	--	--		11,000	ug/kg	1	USEPA 1996b	
SVOCs	Caprolactam	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Carbazole	Freshwater	AET	140	ug/kg	Cubbage et al. 1997		NSV	--		--	
SVOCs	Chrysene	Freshwater	TEC	166	ug/kg	MacDonald et al. 2000a		NSV	--		--	
SVOCs	Dibenz(a,h)anthracene	Freshwater	TEC	33.0	ug/kg	MacDonald et al. 2000a		NSV	--		--	
SVOCs	Dibenzofuran	Freshwater	UET	5,100	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	2,000	ug/kg	1	USEPA 1996b	
SVOCs	Diethylphthalate	Freshwater	TEC	630	ug/kg	MacDonald et al. 2003		770	ug/kg	1	USEPA 2008b	
SVOCs	Dimethyl phthalate	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Di-n-butylphthalate	Freshwater	UET	110	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	11,000	ug/kg	1	USEPA 1996b	
SVOCs	Di-n-octylphthalate	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Fluoranthene	Freshwater	TEC	423	ug/kg	MacDonald et al. 2000a		2,900	ug/kg	1	USEPA 1996b	
SVOCs	Fluorene	Freshwater	TEC	77.4	ug/kg	MacDonald et al. 2000a		540	ug/kg	1	USEPA 1996b	
SVOCs	Hexachlorobenzene	Freshwater	LEL	20.0	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Hexachlorobutadiene	Freshwater		NSV	--	--		550	ug/kg	1	MacDonald et al. 2003	
SVOCs	Hexachlorocyclopentadiene	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Hexachloroethane	Freshwater		NSV	--	--		1,000	ug/kg	1	USEPA 1996b	
SVOCs	Indeno(1,2,3-cd)pyrene	Freshwater	LEL	200	ug/kg	Persuad et al. 1993		NSV	--		--	
SVOCs	Isophorone	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	Naphthalene	Freshwater	TEC	176	ug/kg	MacDonald et al. 2000a		480	ug/kg	1	USEPA 1996b	
SVOCs	Nitrobenzene	Freshwater		NSV	--	--		1,779	ug/kg	1	NAVFAC 2007	

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Ecological Screening Values (ESVs) for Freshwater Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
SVOCs	n-Nitroso-di-n-propylamine	Freshwater		NSV	--	--		NSV	--		--	
SVOCs	n-Nitrosodiphenylamine	Freshwater		NSV	--	--		2,684	ug/kg	1	USEPA 2006b	
SVOCs	PAH (total)	Freshwater	ARCS TEC	3,553	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	PAH (HMW)	Freshwater	ARCS TEC	2,900	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	PAH (LMW)	Freshwater	ARCS TEC	786	ug/kg	Jones et al. 1997		NSV	--		--	
SVOCs	Pentachlorophenol	Freshwater		NSV	--	--		504	ug/kg	1	USEPA 2006b	
SVOCs	Phenanthrene	Freshwater	TEC	204	ug/kg	MacDonald et al. 2000a		850	ug/kg	1	USEPA 1996b	
SVOCs	Phenol	Freshwater	UET	48.0	ug/kg	Buchman 2008	Hyalella (at 1% TOC)	31.0	ug/kg	1	Jones et al. 1997	
SVOCs	Pyrene	Freshwater	TEC	195	ug/kg	MacDonald et al. 2000a		NSV	--		--	
VOCs	1,1,1-Trichloroethane	Freshwater		NSV	--	--		170	ug/kg	1	USEPA 1996b	
VOCs	1,1,2,2-Tetrachloroethane	Freshwater		NSV	--	--		940	ug/kg	1	USEPA 1996b	
VOCs	1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,1,2-Trichloroethane	Freshwater		NSV	--	--		1,200	ug/kg	1	Jones et al. 1997	
VOCs	1,1-Dichloroethane	Freshwater		NSV	--	--		27.0	ug/kg	1	Jones et al. 1997	
VOCs	1,1-Dichloroethene	Freshwater		NSV	--	--		31.0	ug/kg	1	Jones et al. 1997	
VOCs	1,2,3-Trichlorobenzene	Freshwater		NSV	--	--		858	ug/kg	1	USEPA 2006b	
VOCs	1,2,4-Trichlorobenzene	Freshwater		NSV	--	--		9,200	ug/kg	1	USEPA 1996b	
VOCs	1,2-Dibromo-3-chloropropane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,2-Dibromoethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,2-Dichlorobenzene	Freshwater		NSV	--	--		340	ug/kg	1	USEPA 1996b	
VOCs	1,2-Dichloroethane	Freshwater		NSV	--	--		250	ug/kg	1	Jones et al. 1997	
VOCs	1,2-Dichloroethene (total)	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	1,2-Dichloropropane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	1,3-Dichlorobenzene	Freshwater		NSV	--	--		1,700	ug/kg	1	USEPA 1996b	
VOCs	1,4-Dichlorobenzene	Freshwater		NSV	--	--		350	ug/kg	1	USEPA 1996b	
VOCs	2-Butanone	Freshwater		NSV	--	--		270	ug/kg	1	Jones et al. 1997	Polar
VOCs	2-Hexanone	Freshwater		NSV	--	--		NSV	--		--	
VOCs	4-Methyl-2-pentanone	Freshwater		NSV	--	--		33.0	ug/kg	1	Jones et al. 1997	Polar
VOCs	Acetone	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Benzene	Freshwater		NSV	--	--		57.0	ug/kg	1	USEPA 1996b	
VOCs	Bromochloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Bromodichloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Bromoform	Freshwater		NSV	--	--		650	ug/kg	1	USEPA 1996b	
VOCs	Bromomethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Carbon disulfide	Freshwater		NSV	--	--		0.85	ug/kg	1	Jones et al. 1997	
VOCs	Carbon tetrachloride	Freshwater		NSV	--	--		1,200	ug/kg	1	USEPA 1996b	
VOCs	Chlorobenzene	Freshwater		NSV	--	--		820	ug/kg	1	USEPA 1996b	
VOCs	Chloroethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Chloroform	Freshwater		NSV	--	--		22.0	ug/kg	1	Jones et al. 1997	
VOCs	Chloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	cis-1,2-Dichloroethene	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	cis-1,3-Dichloropropene	Freshwater		NSV	--	--		0.051	ug/kg	1	Jones et al. 1997	
VOCs	Cyclohexane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Dibromochloromethane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Dichlorodifluoromethane(Freon-12)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Ethylbenzene	Freshwater		NSV	--	--		3,600	ug/kg	1	USEPA 1996b	
VOCs	Isopropylbenzene (Cumene)	Freshwater		NSV	--	--		86.0	ug/kg	1	USEPA 2006b	
VOCs	m- and p-Xylene	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	Total xylenes
VOCs	Methyl acetate	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Methylcyclohexane	Freshwater		NSV	--	--		NSV	--		--	
VOCs	Methylene chloride	Freshwater		NSV	--	--		370	ug/kg	1	Jones et al. 1997	
VOCs	Methyl-tert-butyl ether (MTBE)	Freshwater		NSV	--	--		NSV	--		--	
VOCs	o-Xylene	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	Total xylenes
VOCs	Styrene	Freshwater		NSV	--	--		559	ug/kg	1	USEPA 2006b	
VOCs	Tetrachloroethene	Freshwater		NSV	--	--		530	ug/kg	1	USEPA 1996b	
VOCs	Toluene	Freshwater		NSV	--	--		670	ug/kg	1	USEPA 1996b	
VOCs	trans-1,2-Dichloroethene	Freshwater		NSV	--	--		400	ug/kg	1	Jones et al. 1997	
VOCs	trans-1,3-Dichloropropene	Freshwater		NSV	--	--		0.051	ug/kg	1	Jones et al. 1997	
VOCs	Trichloroethene	Freshwater		NSV	--	--		1,600	ug/kg	1	USEPA 1996b	
VOCs	Trichlorofluoromethane(Freon-11)	Freshwater		NSV	--	--		NSV	--		--	

TABLE L-31

Ecological Screening Values (ESVs) for Freshwater Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Analytical Group	Chemical	Screening Level Concentration (SLC) Values						Equilibrium Partitioning (EqP) Values				
		Type	Basis[1]	ESV	Units	Reference	Comments	ESV	Units	TOC (%)	Reference	Comments
VOCs	Vinyl chloride	Freshwater		NSV	--	--		278	ug/kg	1	Calculated	
VOCs	Xylene, total	Freshwater		NSV	--	--		160	ug/kg	1	Jones et al. 1997	
Explosives	1,3,5-Trinitrobenzene	Freshwater		NSV	--	--		2.40	ug/kg	1	Talmage et al. 1999	
Explosives	1,3-Dinitrobenzene	Freshwater		NSV	--	--		6.70	ug/kg	1	Talmage et al. 1999	
Explosives	2,4,6-Trinitrotoluene	Freshwater		NSV	--	--		92.0	ug/kg	1	Talmage et al. 1999	
Explosives	2,4-Dinitrotoluene	Freshwater		NSV	--	--		41.6	ug/kg	1	USEPA 2006b	
Explosives	2,6-Dinitrotoluene	Freshwater		NSV	--	--		NSV	--		--	
Explosives	2-Amino-4,6-dinitrotoluene	Freshwater		NSV	--	--		13.2	ug/kg	1	NAVFAC 2007	
Explosives	2-Nitrotoluene	Freshwater		NSV	--	--		6,204	ug/kg	1	NAVFAC 2007	
Explosives	3-Nitrotoluene	Freshwater		NSV	--	--		1,922	ug/kg	1	NAVFAC 2007	
Explosives	4-Amino-2,6-dinitrotoluene	Freshwater		NSV	--	--		23.2	ug/kg	1	NAVFAC 2007	
Explosives	4-Nitrotoluene	Freshwater		NSV	--	--		4,062	ug/kg	1	USEPA 2006b	
Explosives	HMX	Freshwater		NSV	--	--		4.74	ug/kg	1	Talmage et al. 1999	
Explosives	Nitrobenzene	Freshwater		NSV	--	--		1,779	ug/kg	1	NAVFAC 2007	
Explosives	RDX	Freshwater		NSV	--	--		12.7	ug/kg	1	Talmage et al. 1999	
Explosives	Tetryl	Freshwater		NSV	--	--		NSV	--		--	

1 - AET: Apparent Effects Threshold; ER-L: Effects Range-Low; LEL: Lowest Effect Level; TEC: Threshold Effect Concentration; TEL: Threshold Effect Level; UET: Upper Effects Threshold

TABLE L-32

Area-Specific Total Organic Carbon Values - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAS004-4SD01	CAS004-4-SED01-00-1199	0 - 4	11/12/1999	Upstream Pond	NS
CAS004-4SD02	CAS004-4-SD02-00-1199	0 - 4	11/14/1999	Upstream Pond	NS
CAS004-4SD03	CAS004-4-SD03-00-1199	0 - 4	11/13/1999	Upstream Pond	NS
CAS004-4SD04	CAS004-4-SD04-00-1199	0 - 4	11/13/1999	Upstream Pond	NS
CAS04-SD01	CAS04-SD01-1209A	0 - 4	12/9/2009	Upstream Pond	25,000
CAS04-SD02	CAS04-SD02-1209A	0 - 4	12/9/2009	Upstream Pond	62,000
CAS04-SD03	CAS04-SD03-1209A	0 - 4	12/9/2009	Upstream Pond	40,000
CAS04-SD04	CAS04-SD04-1209A	0 - 4	12/9/2009	Upstream Pond	16,000
CAA03-SD01	CAA03-SD01-1209A	0 - 4	12/9/2009	Upstream Pond	43,000
CAA03-SD02	CAA03-SD02-1209A	0 - 4	12/9/2009	Upstream Pond	250,000
CAA03-SD03	CAA03-SD03-1209A	0 - 4	12/9/2009	Upstream Pond	60,000
CAA03-SD04	CAA03-SD04-1209A	0 - 4	12/9/2009	Upstream Pond	38,000
CAS04-SD10	CAS04-SD10-1012	0 - 4	10/23/2012	Upstream Pond	88,000
CAS04-SD11	CAS04-SD11-1012	0 - 4	10/2/2012	Upstream Pond	58,000
CAS04-SD12	CAS04-SD12-1012	0 - 4	10/2/2012	Upstream Pond	100,000
CAS04-SD13	CAS04-SD13-1012	0 - 4	10/3/2012	Upstream Pond	12,000
CAS04-SD14	CAS04-SD14-1012	0 - 4	10/3/2012	Upstream Pond	33,000
CAS04-SD18	CAS04-SD18-1012	0 - 4	10/2/2012	Upstream Pond	36,000
CAS04-SD19	CAS04-SD19-1012	0 - 4	10/2/2012	Upstream Pond	66,000
CAS04-SD20	CAS04-SD20-1012	0 - 4	10/2/2012	Upstream Pond	92,000
CAS04-SD21	CAS04-SD21-1012	0 - 4	10/2/2012	Upstream Pond	34,000
CAS04-SD22	CAS04-SD22-1012	0 - 4	10/2/2012	Upstream Pond	62,000
CAS04-SD23	CAS04-SD23-1012	0 - 4	10/2/2012	Upstream Pond	46,000
				Mean:	**61,105**
				%	**6.11**
CAS04-SD05	CAS04-SD05-1209A	0 - 4	12/8/2009	Site 4 Streams	36,000
CAS04-SD06	CAS04-SD06-1209A	0 - 4	12/8/2009	Site 4 Streams	19,000
CAS04-SD07	CAS04-SD07-1209A	0 - 4	12/8/2009	Site 4 Streams	2,300
CAS04-SD08	CAS04-SD08-1209A	0 - 4	12/8/2009	Site 4 Streams	9,900
CAS04-SD09	CAS04-SD09-1209A	0 - 4	12/8/2009	Site 4 Streams	40,000
CAS04-SD15	CAS04-SD15-1012	0 - 4	10/11/2012	Site 4 Streams	21,000
CAS04-SD16	CAS04-SD16-1012	0 - 4	10/11/2012	Site 4 Streams	8,200
CAS04-SD17	CAS04-SD17-1012	0 - 4	10/11/2012	Site 4 Streams	53,000
				Mean:	**23,675**
				%	**2.37**
				Upstream Pond and Site 4 Streams Mean:	**50,015**
				%	**5.00**
CAYP-SWSD01	CAYP-SD01-1012	0 - 4	10/12/2012	Youth Pond	15,000
CAYP-SWSD02	CAYP-SD02-1012	0 - 4	10/22/2012	Youth Pond	89,000
CAYP-SWSD03	CAYP-SD03-1012	0 - 4	10/11/2012	Youth Pond	74,000
CAYP-SWSD04	CAYP-SD04-1112	0 - 4	11/9/2012	Youth Pond	46,000
CAYP-SWSD05	CAYP-SD05-1112	0 - 4	11/9/2012	Youth Pond	100,000
CAYP-SWSD06	CAYP-SD06-1112	0 - 4	11/9/2012	Youth Pond	13,000
CAYP-SD07	CAYP-SD07-1012	0 - 4	10/22/2012	Youth Pond	78,000
CAYP-SD08	CAYP-SD08-1012	0 - 4	10/12/2012	Youth Pond	46,000
CAYP-SD09	CAYP-SD09-1012	0 - 4	10/22/2012	Youth Pond	80,000
CAYP-SD10	CAYP-SD10-1012	0 - 4	10/22/2012	Youth Pond	120,000
CAYP-SD12	CAYP-SD12-1012	0 - 4	10/22/2012	Youth Pond	180,000
CAYP-SD13	CAYP-SD13-1012	0 - 4	10/12/2012	Youth Pond	41,000
				Mean:	**73,500**
				%	**7.35**
CAYP-SD11	CAYP-SD11-1012	0 - 4	10/11/2012	York River Ditch	9,600
				Mean:	**9,600**

TABLE L-32

Area-Specific Total Organic Carbon Values - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
				%	**0.96**
CAYP-SD14	CAYP-SD14-1012	0 - 4	10/12/2012	Northern Ditch	2,700
CAYP-SD15	CAYP-SD15-1012	0 - 4	10/12/2012	Northern Ditch	2,700
CAYP-SO03	CAYP-SS03-1012	0 - 6	10/19/2012	Northern Ditch	17,000
CAYP-SO04	CAYP-SS04-1012	0 - 6	10/19/2012	Northern Ditch	7,100
CAYP-SO05	CAYP-SS05-1012	0 - 6	10/19/2012	Northern Ditch	11,000
CAYP-SO06	CAYP-SS06-1012	0 - 6	10/19/2012	Northern Ditch	4,100
				Mean:	**7,433**
				%	**0.74**
				All Youth Pond Mean:	**49,274**
				%	**4.93**
				Mean ALL:	**49,709**
				%	**4.97**

TABLE L-33

Area-Specific Total Organic Carbon Values - Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Depth (inches)	Date	Group	Total Organic Carbon (mg/kg)
CAS004-4SD01	CAS004-4-SED01-01-1199	4 - 8	11/12/1999	Upstream Pond	NS
CAS004-4SD02	CAS004-4-SD02-01-1199	4 - 8	11/14/1999	Upstream Pond	NS
CAS004-4SD03	CAS004-4-SD03-01-1199	4 - 8	11/13/1999	Upstream Pond	NS
CAS004-4SD04	CAS004-4-SD04-01-1199	4 - 8	11/13/1999	Upstream Pond	NS
CAS04-SD01	CAS04-SD01P-1209B	4 - 8	12/9/2009	Upstream Pond	17,000
CAS04-SD02	CAS04-SD02-1209B	4 - 8	12/9/2009	Upstream Pond	28,000
CAS04-SD03	CAS04-SD03-1209B	4 - 8	12/9/2009	Upstream Pond	19,000
CAS04-SD04	CAS04-SD04-1209B	4 - 8	12/9/2009	Upstream Pond	22,000
CAA03-SD01	CAA03-SD01-1209B	4 - 8	12/9/2009	Upstream Pond	40,000
CAA03-SD02	CAA03-SD02-1209B	4 - 8	12/9/2009	Upstream Pond	71,000
CAA03-SD03	CAA03-SD03-1209B	4 - 8	12/9/2009	Upstream Pond	6,500
CAA03-SD04	CAA03-SD04-1209B	4 - 8	12/9/2009	Upstream Pond	7,300
				Mean:	**26,350**
				%	**2.64**
CAS04-SD05	CAS04-SD05-1209B	4 - 8	12/8/2009	Site 4 Streams	14,000
CAS04-SD06	CAS04-SD06-1209B	4 - 8	12/8/2009	Site 4 Streams	34,000
CAS04-SD07	CAS04-SD07-1209B	4 - 8	12/8/2009	Site 4 Streams	2,400
CAS04-SD08	CAS04-SD08-1209B	4 - 8	12/8/2009	Site 4 Streams	2,500
CAS04-SD09	CAS04-SD09-1209B	4 - 8	12/8/2009	Site 4 Streams	16,000
				Mean:	**13,780**
				%	**1.38**
CAYP-SWSD01	CAYP-SSD01-1012	4 - 8	10/12/2012	Youth Pond	3,200
CAYP-SWSD02	CAYP-SSD02-1012	4 - 8	10/22/2012	Youth Pond	73,000
CAYP-SWSD03	CAYP-SSD03-1012	4 - 8	10/11/2012	Youth Pond	28,000
CAYP-SWSD04	CAYP-SSD04-1112	4 - 8	11/9/2012	Youth Pond	33,000
CAYP-SWSD05	CAYP-SSD05-1112	4 - 8	11/9/2012	Youth Pond	69,000
CAYP-SWSD06	CAYP-SSD06-1112	4 - 8	11/9/2012	Youth Pond	12,000
CAYP-SD07	CAYP-SSD07-1012	4 - 8	10/22/2012	Youth Pond	69,000
CAYP-SD08	CAYP-SSD08-1012	4 - 8	10/12/2012	Youth Pond	16,000
CAYP-SD09	CAYP-SSD09-1012	4 - 8	10/22/2012	Youth Pond	64,000
CAYP-SD10	CAYP-SSD10-1012	4 - 8	10/22/2012	Youth Pond	99,000
CAYP-SD12	CAYP-SSD12-1012	4 - 8	10/22/2012	Youth Pond	140,000
CAYP-SD13	CAYP-SSD13-1012	4 - 8	10/12/2012	Youth Pond	52,000
				Mean:	**54,850**
				%	**5.49**
CAYP-SD11	CAYP-SSD11-1012	4 - 8	10/11/2012	York River Ditch	8,800
				Mean:	**8,800**
				%	**0.88**
				Mean ALL:	**36,412**
				%	**3.64**

TABLE L-34

Fish Tissue-Based Ecological Screening Values (wet weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Metals (MG/KG)									
Aluminum	Whole body less gut	Rainbow trout	juvenile	8.53	NOEC - S	42.7	NOEC x 5	Aluminum sulfate	Jarvinen and Ankley 1999
Antimony	Whole body	Rainbow trout	fingerling	5.00	NOEC - S	9.00	LOEC - S	Antimony potassium tartrate	Jarvinen and Ankley 1999
Arsenic	Whole body	Bluegill	juvenile	1.80	NOEC - S,G	2.24	LOEC - S,G	Sodium arsenite	Jarvinen and Ankley 1999
Barium	--	--	--	NSV	--	NSV	--	--	--
Beryllium	Whole body	Bluegill	juvenile	5.13	NOEC - S	25.7	NOEC x 5	--	USACOE ERED 2013
Cadmium	Whole body	Bluegill	juvenile	0.036	NOEC - S	0.35	LOEC - S	Cadmium sulfate	Jarvinen and Ankley 1999
Chromium	Whole body	Mummichog; killifish	adult	0.263	NOEC - G	1.32	NOEC x 5	--	USACOE ERED 2013
Cobalt	--	--	--	NSV	--	NSV	--	--	--
Copper	Whole body	Mosquitofish	juvenile	1.51	NOEC - S,G,R	7.55	NOEC x 5	--	USACOE ERED 2013
Iron	--	--	--	NSV	--	NSV	--	--	--
Lead	Whole body	Brook trout	embryo-juvenile	2.50	NOEC - G	4.00	LOEC - G	Lead nitrate	Jarvinen and Ankley 1999
Manganese	--	--	--	NSV	--	NSV	--	--	--
Mercury	Whole body	Multiple	--	0.21	t-TEL - G,R	0.21	t-TEL - G,R	--	Bechvar et al. 2005
Nickel	Muscle	Rainbow trout	150-200g	0.82	NOEC - S	4.10	NOEC x 5	Nickel chloride	Jarvinen and Ankley 1999
Selenium	Whole body	Bluegill	juvenile	0.80	NOEC - S	1.08	LOEC - S	selenate/selenite (6:1)	Jarvinen and Ankley 1999
Silver	Whole body	Bluegill	juvenile	0.12	NOEC - S	0.60	NOEC x 5	--	USACOE ERED 2013
Thallium	Whole body	Bluegill	immature	2.72	NOEC - S	13.6	NOEC x 5	--	USACOE ERED 2013
Vanadium	Whole body	Flagfish	adult	5.74	NOEC - S,G,R	28.7	NOEC x 5	Vanadium pentoxide	Jarvinen and Ankley 1999
Zinc	Whole body	Atlantic salmon	juvenile	60.0	NOEC - S,G	300	NOEC x 5	Zinc sulfate	Jarvinen and Ankley 1999
Polychlorinated Biphenyls (MG/KG)									
Aroclor-1016	Whole body	Sheepshead minnow	adult	110	NOEC - S	550	NOEC x 5		Jarvinen and Ankley 1999
Aroclor-1221	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1232	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1242	Whole body	Channel catfish	fingerling	14.3	NOEC - S,G	71.5	NOEC x 5	--	Jarvinen and Ankley 1999
Aroclor-1248	Whole body	Fathead minnow	embryo-adult	2.80	NOEC - S,G,R	11.0	LOEC - G	--	Jarvinen and Ankley 1999
Aroclor-1254	Whole body	Channel catfish	fingerling	21.0	NOEC - S,G	105	NOEC x 5	--	Jarvinen and Ankley 1999
Aroclor-1260	Whole body	Channel catfish	fingerling	32.0	NOEC - S,G	160	NOEC x 5	--	Jarvinen and Ankley 1999
Total PCBs	Whole body	--	--	2.80	--	11.0	--	Lowest Aroclor value	
Dioxin-Like PCB Congeners (MG/KG)									
2,3,7,8-TCDD	Whole body	Mosquitofish	adult	0.0235	LOEC / 5	0.1174	LOEC - S	--	Jarvinen and Ankley 1999

[1] NOEC - No Observed Effect Concentration; LOEC - Lowest Observed Effect Concentration; TEL - Threshold Effect Level. S - Survival; G - Growth; R - Reproduction; P - Physiological

TABLE L-35

Frog Tissue-Based Ecological Screening Values (wet-weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Type	Organism	Life Stage	NOEC (wet-weight)	Basis[1]	LOEC (wet-weight)	Basis[1]	Comment	Reference
Metals (MG/KG)									
Aluminum	Whole body	Green frog	adult	11.4	NOEC - P	57.0	NOEC x 5	--	USACOE ERED 2013
Antimony	--	--	--	NSV	--	NSV	--	--	--
Arsenic	--	--	--	NSV	--	NSV	--	--	--
Barium	Whole body	Green frog	larval	7.00	NOEC - P	35.0	NOEC x 5	--	USACOE ERED 2013
Beryllium	--	--	--	NSV	--	NSV	--	--	--
Cadmium	Whole body	*Xenopus laevis*	larval	3.80	NOEC - S,G	19.0	NOEC x 5	Cadmium chloride	Jarvinen and Ankley 1999
Chromium	--	--	--	NSV	--	NSV	--	--	--
Cobalt	--	--	--	NSV	--	NSV	--	--	--
Copper	Whole body	Green frog	adult	13.0	NOEC - P	65.0	NOEC x 5	--	USACOE ERED 2013
Iron	Whole body	Green frog	juvenile	3,800	NOEC - P	19,000	NOEC x 5	--	USACOE ERED 2013
Lead	Whole body	Green frog	juvenile	0.78	NOEC - P	3.90	NOEC x 5	--	USACOE ERED 2013
Manganese	--	--	--	NSV	--	NSV	--	--	--
Mercury	--	--	--	NSV	--	NSV	--	--	--
Nickel	Whole body	Green frog	adult	0.122	NOEC - P	0.61	NOEC x 5	--	USACOE ERED 2013
Selenium	--	--	--	NSV	--	NSV	--	--	--
Silver	--	--	--	NSV	--	NSV	--	--	--
Thallium	--	--	--	NSV	--	NSV	--	--	--
Vanadium	--	--	--	NSV	--	NSV	--	--	--
Zinc	Whole body	Green frog	juvenile	9.80	NOEC - P	49.0	NOEC x 5	--	USACOE ERED 2013
Polychlorinated Biphenyls (MG/KG)									
Aroclor-1016	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1221	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1232	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1242	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1248	--	--	--	NSV	--	NSV	--	--	--
Aroclor-1254	Whole body	*Xenopus laevis*	larval	22.8	LOEC / 5	114	LOEC - G	--	USACOE ERED 2013
Aroclor-1260	--	--	--	NSV	--	NSV	--	--	--
Total PCBs	Whole body	--	--	22.8	--	114	--	Aroclor-1254 value	
Dioxin-Like PCB Congeners (MG/KG)									
2,3,7,8-TCDD	--	--	--	NSV	--	NSV	--	--	--

[1] NOEC - No Observed Effect Concentration; LOEC - Lowest Observed Effect Concentration; TEL - Threshold Effect Level. S - Survival; G - Growth; R - Reproduction; P - Physiological

TABLE L-36

Uncertainty Factors

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Convert From	Convert To	Uncertainty Factor
Chronic NOAEL or NOEC	Chronic NOAEL or NOEC	1
Chronic LOAEL or LOEC	Chronic NOAEL or NOEC	5
Chronic NOAEL or NOEC	Chronic LOAEL or LOEC	5
Subchronic NOAEL or NOEC	Chronic NOAEL or NOEC	10
Subchronic LOAEL or LOEC	Chronic NOAEL or NOEC	20
Acute NOAEL or NOEC	Chronic NOAEL or NOEC	30
Acute LOAEL or LOEC	Chronic NOAEL or NOEC	50
LD50 or LC50	Chronic NOAEL or NOEC	100

Uncertainty factors from Wentsel et al. (1996)
Durations are defined as follows (USEPA 1999; Sample et al. 1996):
- Acute: <3 days (plants, invertebrates) and <14 days (fish, birds, mammals)
- Subchronic: 3 - 6 days (plants, invertebrates) and 14 - 90 days (fish, birds, mammals)
- Chronic: >7 days (plants, invertebrates) and >90 days or during critical life stage (fish, birds, mammals)

TABLE L-37

Eco-SSL Values for Birds and Mammals

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Bird	Mammal	Units	Reference
Metals				
Arsenic	43.0	46.0	mg/kg	USEPA 2005b
Cadmium	0.77	0.36	mg/kg	USEPA 2005e
Chromium	26.0	34.0	mg/kg	USEPA 2008a
Copper	28.0	49.0	mg/kg	USEPA 2007a
Lead	11.0	56.0	mg/kg	USEPA 2005g
Nickel	210	130	mg/kg	USEPA 2007c
Selenium	1.20	0.63	mg/kg	USEPA 2007d
Silver	4.20	14.0	mg/kg	USEPA 2006c
Zinc	46.0	79.0	mg/kg	USEPA 2007e
Organics				
4,4'-DDT (and metabolites)	0.093	0.021	mg/kg	USEPA 2007f
Dieldrin	0.022	0.0049	mg/kg	USEPA 2007g
Pentachlorophenol	2.10	2.80	mg/kg	USEPA 2007i
PAHs - LMW	--	100	mg/kg	USEPA 2007h
PAHs - HMW	--	1.10	mg/kg	USEPA 2007h

TABLE L-38

Ingestion-Based Toxicity Reference Values (TRVs) for Mammals

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Meadow vole	Mink	Muskrat	Raccoon	Red fox	Short-tailed shrew	White-footed mouse
Metals																		
Arsenic	Arsenite (As+3)	mouse	3 generations	Yes	oral in water/food	reproduction	1.26	Sample et al. 1996	0.252 a	--	0.56	X		X			X	X
Arsenic	--	dog	chronic	--	oral	survival, growth, reproduction	1.66	USEPA 2005b	1.04	USEPA 2005b	1.31		X		X	X		
Cadmium	--	rat	chronic	--	oral	survival, growth, reproduction	7.70	USEPA 2005e	0.77	USEPA 2005e	2.43	X	X	X	X	X	X	X
Chromium	Cr+3	multiple	chronic	--	oral	survival, growth, reproduction	12.0 b	--	2.40	USEPA 2008a	5.37	X	X	X	X	X	X	X
Copper	--	pig	chronic	--	oral	survival, growth, reproduction	9.34	USEPA 2007a	5.60	USEPA 2007a	7.23	X		X			X	X
Copper	Copper sulfate	mink	357 days	Yes	oral in diet	reproduction	15.1	Sample et al. 1996	11.7	Sample et al. 1996	13.3		X		X	X		
Lead	--	rat	chronic	--	oral	survival, growth, reproduction	8.90	USEPA 2005g	4.70	USEPA 2005g	6.47	X	X	X	X	X	X	X
Mercury	Methyl mercury chloride	rat	3 generations	Yes	oral in diet	reproduction	0.160	Sample et al. 1996	0.032	Sample et al. 1996	0.072	X		X			X	X
Mercury	Methyl mercury chloride	mink	93 days	No	oral in diet	survival/weight loss/ataxia	0.247 c	Sample et al. 1996	0.150 c	Sample et al. 1996	0.192		X		X	X		
Nickel	--	multiple	chronic	--	oral	survival, growth, reproduction	3.40	USEPA 2007c	1.70	USEPA 2007c	2.40	X	X	X	X	X	X	X
Selenium	Potassium selenate (SeO4)	rat	1 year	Yes	oral in water	reproduction	0.33	Sample et al. 1996	0.20	Sample et al. 1996	0.26	X	X	X	X	X	X	X
Silver	--	pig	chronic	--	oral	survival, growth, reproduction	60.2	USEPA 2006c	12.0 a	--	26.9	X	X	X	X	X	X	X
Zinc	--	multiple	chronic	--	oral	survival, growth, reproduction	377 b	--	75.4	USEPA 2007e	169	X	X	X	X	X	X	X
Polychlorinated Biphenyls																		
Aroclor-1016	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1016	--	mink	18 months	Yes	oral in diet	reproduction	3.43	Sample et al. 1996	1.37	Sample et al. 1996	2.17		X		X	X		
Aroclor-1221	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1221	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Aroclor-1242 value	0.137 a	Aroclor-1242 value	0.306		X		X	X		
Aroclor-1232	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1232	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Aroclor-1242 value	0.137 a	Aroclor-1242 value	0.306		X		X	X		
Aroclor-1242	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1242	--	mink	7 months	Yes	oral in diet	reproduction	0.685	Sample et al. 1996	0.137 a	--	0.306		X		X	X		
Aroclor-1248	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1248	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Aroclor-1254 value	0.137	Aroclor-1254 value	0.306		X		X	X		
Aroclor-1254	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Sample et al. 1996	0.136 a	--	0.304	X		X			X	X
Aroclor-1254	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Sample et al. 1996	0.137	Sample et al. 1996	0.306		X		X	X		
Aroclor-1260	--	oldfield mouse	12 months	Yes	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X		X			X	X
Aroclor-1260	--	mink	4.5 months	Yes	oral in diet	reproduction	0.685	Aroclor-1254 value	0.137	Aroclor-1254 value	0.306		X		X	X		
Pesticides																		
4,4'-DDD	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
4,4'-DDE	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
4,4'-DDT	--	rat	chronic	--	oral	survival, growth, reproduction	0.735	USEPA 2007f	0.147	USEPA 2007f	0.329	X	X	X	X	X	X	X
Aldrin	--	rat	3 generations	Yes	oral in diet	reproduction	1.00	Sample et al. 1996	0.20	Sample et al. 1996	0.45	X	X	X	X	X	X	X
alpha-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
alpha-Chlordane	Chlordane	mouse	6 generations	Yes	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X	X	X	X	X	X
beta-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
delta-BHC	BHC - mixed isomers	rat	4 generations	Yes	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X	X	X	X	X	X
Dieldrin	--	rat	chronic	--	oral	survival, growth, reproduction	0.030	USEPA 2007g	0.015	USEPA 2007g	0.021	X	X	X	X	X	X	X
Endosulfan I	Endosulfan	rat	30 days	No	oral (gavage)	reproduction	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X	X	X	X	X	X
Endosulfan II	Endosulfan	rat	30 days	No	oral (gavage)	reproduction	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X	X	X	X	X	X
Endrin	--	mouse	120 days	Yes	oral in diet	reproduction	0.920	Sample et al. 1996	0.184 a	--	0.411	X	X	X	X	X	X	X
gamma-BHC (Lindane)	--	rat	3 generations	Yes	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X	X	X	X	X	X
gamma-Chlordane	Chlordane	mouse	6 generations	Yes	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X	X	X	X	X	X
Heptachlor	--	mink	181 days	Yes	oral in diet	reproduction	1.00	Sample et al. 1996	0.20 a	--	0.45	X	X	X	X	X	X	X
Heptachlor epoxide	--	mink	181 days	Yes	oral in diet	reproduction	1.00	Heptachlor value	0.20 a	--	0.45	X	X	X	X	X	X	X
Methoxychlor	--	rat	11 months	Yes	oral in diet	reproduction	8.00	Sample et al. 1996	4.00	Sample et al. 1996	5.66	X	X	X	X	X	X	X
Toxaphene	--	rat	3 generations	Yes	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X	X	X	X	X	X
Volatile and Semivolatile Organic Compounds																		
1,1,2,2-Tetrachloroethane	--	rat	78 weeks	Yes	oral (gavage)	reproduction	380 b	--	76.0	ATSDR 2008	170	X	X	X	X	X	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X
1,2,4-Trichlorobenzene	--	rat	3 generations	Yes	oral in water	reproduction	106	Coulston and Kolbye 1994	53.0	Coulston and Kolbye 1994	75.0	X	X	X	X	X	X	X
1,2-Dichlorobenzene	--	rat	chronic	No	oral (gavage)	liver/kidney	429 b	--	85.7	Coulston and Kolbye 1994	192	X	X	X	X	X	X	X
1,3-Dichlorobenzene	--	rat	chronic	No	oral (gavage)	liver/kidney	429 b	--	85.7	Value for 1,2-Dichlorobenzene	192	X	X	X	X	X	X	X
1,4-Dichlorobenzene	--	rat	2 generations	Yes	oral (gavage)	developmental	90.0	ATSDR 2006	30.0	ATSDR 2006	52.0	X	X	X	X	X	X	X
4-Bromophenyl-phenylether	--	--	--		--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X
4-Chlorophenyl-phenylether	--	--	--		--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X
Acenaphthene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Acenaphthylene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Anthracene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Benzo(a)anthracene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(a)pyrene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(b)fluoranthene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(g,h,i)perylene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Benzo(k)fluoranthene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Chrysene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Dibenz(a,h)anthracene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Fluoranthene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Fluorene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Hexachlorobenzene	--	rat	4 generations	Yes	oral in diet	reproduction	4.00	ATSDR 2002	2.00	ATSDR 2002	2.83	X	X	X	X	X	X	X

TABLE L-38

Ingestion-Based Toxicity Reference Values (TRVs) for Mammals

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Meadow vole	Mink	Muskrat	Raccoon	Red fox	Short-tailed shrew	White-footed mouse
Hexachlorobutadiene	--	rat	GD 1-22; LD 1-21	Yes	oral in diet	developmental	20.0	ATSDR 1994	2.00	ATSDR 1994	6.32	X	X	X	X	X	X	X
Hexachlorocyclopentadiene	--	mouse	GD 6-15	Yes	oral (gavage)	developmental	375 b	--	75.0	ATSDR 1999	168	X	X	X	X	X	X	X
Hexachloroethane	--	rat	GD 6-16	Yes	oral (gavage)	reproduction	500	ATSDR 1997	100	ATSDR 1997	224	X	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene	--	mouse	65 weeks	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Pentachlorophenol	--	multiple	chronic	--	oral	survival, growth, reproduction	42.1 b	--	8.42	USEPA 2007i	18.8	X	X	X	X	X	X	X
Phenanthrene	--	rat	chronic	--	oral	survival, growth, reproduction	328	USEPA 2007h	65.6	USEPA 2007h	147	X	X	X	X	X	X	X
Pyrene	--	mouse	chronic	--	oral	survival, growth, reproduction	3.07	USEPA 2007h	0.615	USEPA 2007h	1.37	X	X	X	X	X	X	X
Dioxin/Furans																		
2,3,7,8-TCDD	--	rat	3 generations	Yes	oral in diet	reproduction	0.00001	Sample et al. 1996	0.000001	Sample et al. 1996	0.000003	X	X	X	X	X	X	X

NA - Not Available

[a] Uncertainty factor of 5 applied to LOAEL

[b] Uncertainty factor of 5 applied to NOAEL

[c] Does not include subchronic uncertainty factor of 10 applied by Sample et al (1996) since the study duration meets the criteria for a chronic study in Table L-36

[d] Uncertainty factor of 100 applied to LD50

TABLE L-39

Ingestion-Based Toxicity Reference Values (TRVs) for Birds

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	American robin	Belted kingfisher	Great blue heron	Mallard	Mourning dove	Osprey	Red-tailed hawk	Tree swallow
Metals																			
Arsenic	Copper acetoarsenite	brown-headed cowbird	7 months	No	oral in diet	survival	7.38	Sample et al. 1996	2.46	Sample et al. 1996	4.26	X						X	X
Arsenic	--	chicken	chronic	--	oral	survival, growth,reproduction	11.2 b	--	2.24	USEPA 2005b	5.01					X			
Arsenic	Sodium arsenite	mallard	128 days	No	oral in diet	survival	12.8	Sample et al. 1996	5.14	Sample et al. 1996	8.12		X	X	X		X		
Cadmium	--	multiple	chronic	--	oral	survival, growth,reproduction	7.35 b	--	1.47	USEPA 2005e	3.29	X	X	X	X	X	X	X	X
Chromium	Cr+3	multiple	chronic	--	oral	survival, growth,reproduction	13.3 b	--	2.66	USEPA 2008a	5.95	X	X	X	X	X	X	X	X
Copper	--	chicken	chronic	--	oral	survival, growth,reproduction	12.1	USEPA 2007a	4.05	USEPA 2007a	7.00	X	X	X	X	X	X	X	X
Lead	--	chicken	chronic	--	oral	survival, growth,reproduction	3.26	USEPA 2005g	1.63	USEPA 2005g	2.31				X	X			
Lead	Metallic	American kestrel	7 months	Yes	oral in diet	reproduction	19.3 b	--	3.85	Sample et al. 1996	8.61	X	X	X			X	X	X
Mercury	Mercury chloride	Japanese quail	1 year	Yes	oral in diet	reproduction	0.90	Sample et al. 1996	0.45	Sample et al. 1996	0.64					X			
Mercury	--	red-tailed hawk	12 weeks	Yes	oral in diet	survival/neurological	1.20	USEPA 1995b	0.49	USEPA 1995b	0.77	X					X	X	
Mercury	Methyl mercury	mallard	3 generations	Yes	oral in diet	reproduction	0.078	USEPA 1997b	0.026	USEPA 1997b	0.045		X	X	X				X
Nickel	--	multiple	chronic	--	oral	survival, growth,reproduction	33.6 b	--	6.71	USEPA 2007c	15.0	X	X	X	X	X	X	X	X
Selenium	Selanomethionine	mallard	100 days	Yes	oral in diet	reproduction	0.80	Sample et al. 1996	0.40	Sample et al. 1996	0.57				X				X
Selenium	Selanomethionine	black-crowned night-heron	94 days	Yes	oral in diet	reproduction	9.00 b	--	1.80	Sample et al. 1996	4.02		X	X			X		
Selenium	Selanomethionine	screech owl	13.7 weeks	Yes	oral in diet	reproduction	1.50	Sample et al. 1996	0.44	Sample et al. 1996	0.81	X						X	
Selenium	--	chicken	chronic	--	oral	survival, growth,reproduction	0.58	USEPA 2007d	0.29	USEPA 2007d	0.41					X			
Silver	--	turkey	chronic	--	oral	survival, growth	20.2	USEPA 2006c	4.04 a	--	9.03	X	X	X	X	X	X	X	X
Zinc	--	multiple	chronic	--	oral	survival, growth,reproduction	331 b	--	66.1	USEPA 2007e	148	X	X	X	X	X	X	X	X
Polychlorinated Biphenyls																			
Aroclor-1016	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1016	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1016	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1221	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1221	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1221	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1232	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1232	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1232	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1242	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1242	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	--	0.41	Sample et al. 1996	0.92	X					X	X	
Aroclor-1242	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1248	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1248	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1248	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Aroclor-1254	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Sample et al. 1996	0.36 a	--	0.80					X			
Aroclor-1254	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1254	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	--	1.50	USEPA 1995b	3.35		X	X	X				X
Aroclor-1260	--	ring-necked pheasant	17 weeks	Yes	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80					X			
Aroclor-1260	--	screech owl	2 generations	Yes	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X					X	X	
Aroclor-1260	--	mallard	1 month	Yes	oral in diet	reproduction	7.50 b	Aroclor-1254 value	1.50	Aroclor-1254 value	3.35		X	X	X				X
Pesticides																			
4,4'-DDD	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58	X				X			
4,4'-DDD	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18							X	
4,4'-DDD	--	mallard	2 years	Yes	oral in diet	reproduction	0.60	DDE value	0.12	DDE value	0.27				X				X
4,4'-DDD	--	bald eagle	112 days	No	oral in diet	survival	3.00	DDT value	0.30	DDT value	0.95		X	X			X		
4,4'-DDE	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58	X				X			
4,4'-DDE	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40 b	--	0.08	Blus 1996	0.18							X	
4,4'-DDE	--	mallard	2 years	Yes	oral in diet	reproduction	0.60	USEPA 1995b	0.12	USEPA 1995b	0.27				X				X
4,4'-DDE	--	bald eagle	112 days	No	oral in diet	survival	3.00	DDT value	0.30	DDT value	0.95		X	X			X		
4,4'-DDT	--	Japanese quail	3 generations	Yes	oral in diet	reproduction	5.00	USEPA 1995b	0.50	USEPA 1995b	1.58	X				X			
4,4'-DDT	--	barn owl	2 years	Yes	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18							X	
4,4'-DDT	--	mallard	2 years	Yes	oral in diet	reproduction	1.50	USEPA 1995b	0.60	USEPA 1995b	0.95				X				X
4,4'-DDT	--	bald eagle	112 days	No	oral in diet	survival	3.00	USEPA 1995b	0.30	USEPA 1995b	0.95		X	X			X		
Aldrin	--	ring-necked pheasant	5 days	No	oral in diet	survival	0.351 b	--	0.070 e	Hill et al. 1975	0.157	X				X		X	
Aldrin	--	mallard	5 days	No	oral in diet	survival	0.775 b	--	0.155 e	Hill et al. 1975	0.347		X	X	X		X		X
alpha-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X	X	X	X	X	X
alpha-Chlordane	Chlordane	red-winged blackbird	84 days	Yes	oral in diet	survival	10.7	Sample et al. 1996	2.14	Sample et al. 1996	4.79	X						X	X
alpha-Chlordane	--	northern bobwhite	not specified	Yes	oral in diet	reproduction	5.95 b	--	1.19	Wiemeyer 1996	2.66					X			
alpha-Chlordane	--	mallard	not specified	Yes	oral in diet	reproduction	4.00 b	--	0.80	Wiemeyer 1996	1.79		X	X	X		X		
beta-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X	X	X	X	X	X
delta-BHC	BHC - mixed isomers	Japanese quail	90 days	Yes	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X	X	X	X	X	X
Dieldrin	--	mallard	chronic	--	oral	survival, growth,reproduction	3.78	USEPA 2007g	0.071	USEPA 2007g	0.52	X	X	X	X	X	X	X	X
Endosulfan I	--	gray partridge	4 weeks	Yes	oral in diet	reproduction	50.0 b	--	10.0	Sample et al. 1996	22.4	X	X	X	X	X	X	X	X
Endosulfan II	--	gray partridge	4 weeks	Yes	oral in diet	reproduction	50.0 b	--	10.0	Sample et al. 1996	22.4	X	X	X	X	X	X	X	X
Endrin	--	mallard	>200 days	Yes	oral in diet	reproduction	1.50 b	--	0.30	Sample et al. 1996	0.67		X	X	X	X			X
Endrin	--	screech owl	>83 days	Yes	oral in diet	reproduction	0.104	Sample et al. 1996	0.021 a	--	0.046	X					X	X	
gamma-BHC (Lindane)	--	mallard	8 weeks	Yes	oral (gavage)	reproduction	20.0	Sample et al. 1996	4.00 a	--	8.94	X	X	X	X	X	X	X	X
gamma-Chlordane	Chlordane	red-winged blackbird	84 days	Yes	oral in diet	survival	10.7	Sample et al. 1996	2.14	Sample et al. 1996	4.79	X						X	X
gamma-Chlordane	--	northern bobwhite	not specified	Yes	oral in diet	reproduction	5.95 b	--	1.19	Wiemeyer 1996	2.66					X			
gamma-Chlordane	--	mallard	not specified	Yes	oral in diet	reproduction	4.00 b	--	0.80	Wiemeyer 1996	1.79		X	X	X		X		
Heptachlor	--	ring-necked pheasant	5 days	No	oral in diet	survival	1.38 b	--	0.28 e	Hill et al. 1975	0.62	X				X		X	
Heptachlor	--	mallard	5 days	No	oral in diet	survival	2.40 b	--	0.48 e	Hill et al. 1975	1.07		X	X	X		X		X
Heptachlor epoxide	--	ring-necked pheasant	5 days	No	oral in diet	survival	1.38 b	--	0.28 e	Heptachlor value	0.62	X				X		X	
Heptachlor epoxide	--	mallard	5 days	No	oral in diet	survival	2.40 b	--	0.48 e	Heptachlor value	1.07		X	X	X		X		X

TABLE L-39

Ingestion-Based Toxicity Reference Values (TRVs) for Birds

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Chemical Form	Test Organism	Duration	Critical Life Stage?	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	American robin	Belted kingfisher	Great blue heron	Mallard	Mourning dove	Osprey	Red-tailed hawk	Tree swallow
Methoxychlor	--	chicken	16 weeks	Yes	oral in diet	reproduction	1,775 b	--	355	Wiemeyer 1996	794	X	X	X	X	X	X	X	X
Toxaphene	--	American black duck	2 seasons	Yes	oral in diet	reproduction	5.00	Wiemeyer 1996	1.00	Wiemeyer 1996	2.24	X	X	X	X	X	X	X	X
Volatile and Semivolatile Organic Compounds																			
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
1,2,4-Trichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402 b	1,4-Dichlorobenzene value	80.4 d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,2-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402 b	1,4-Dichlorobenzene value	80.4 d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,3-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402 b	1,4-Dichlorobenzene value	80.4 d	1,4-Dichlorobenzene value	180	X	X	X	X	X	X	X	X
1,4-Dichlorobenzene	--	northern bobwhite	14 days	No	oral	survival	402 b	--	80.4 d	TERRETOX 2002	180	X	X	X	X	X	X	X	X
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
Acenaphthene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Acenaphthylene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(a)anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(a)pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Rigdon and Neal 1963	15.9	X	X	X	X	X	X	X	X
Benzo(b)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(g,h,i)perylene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Benzo(k)fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Chrysene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Dibenz(a,h)anthracene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Fluoranthene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Fluorene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Hexachlorobenzene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	0.565	Coulston and Kolbye 1994; TERRETOX 2002	0.113	Coulston and Kolbye 1994; TERRETOX 2002	0.253	X	X	X	X	X	X	X	X
Hexachlorobutadiene	--	Japanese quail	90 days	Yes	oral in diet	reproduction	17.0 b	--	3.39	Coulston and Kolbye 1994; TERRETOX 2002	7.58	X	X	X	X	X	X	X	X
Hexachlorocyclopentadiene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
Hexachloroethane	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Pentachlorophenol	--	chicken	chronic	--	oral	survival, growth,reproduction	67.3	USEPA 2007h	6.73	USEPA 2007i	21.3	X	X	X	X	X	X	X	X
Phenanthrene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Pyrene	--	chicken	35 days	No	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X	X	X	X	X	X
Dioxin/Furans																			
2,3,7,8-TCDD	--	ring-necked pheasant	10 weeks	Yes	injection	reproduction	0.00014	Sample et al. 1996	0.000014	Sample et al. 1996	0.000044	X	X	X	X	X	X	X	X

NA - Not Available

[a] Uncertainty factor of 5 applied to LOAEL

[b] Uncertainty factor of 5 applied to NOAEL

[c] Subchronic to chronic uncertainty factor of 10 applied

[d] Subchronic to chronic uncertainty factor of 20 applied

[e] Uncertainty factor of 100 applied to LD50

TABLE L-40

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 and Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	-- - --	35 / 35	2,560	29,400	CAS04-SS02-1109	pH < 5.5	8 / 35	--	**YES**
Antimony	0.32 - 12.6	21 / 35	0.070	0.67	CAS004-4HA04-00-1199	78.0	0 / 35	0.01	NO
Arsenic	-- - --	35 / 35	1.00	346	CAS04-SS13-1012	18.0	1 / 35	19.2	**YES**
Barium	-- - --	35 / 35	11.3	164	CAS004-4HA04-00-1199	330	0 / 35	0.50	NO
Beryllium	0.32 - 0.68	29 / 35	0.19	0.76	CAS04-SS02-1109	40.0	0 / 35	0.02	NO
Cadmium	0.020 - 1.20	18 / 35	0.040	3.30	CAS004-4HA05-00-1199	32.0	0 / 35	0.10	NO
Calcium [3]	-- - --	35 / 35	137	18,800	CAA03-SS06-1109	NSV	-- / --	NSV	NO
Chromium (hexavalent)	0.21 - 0.25	2 / 5	0.24	0.53	CAYP-SS02-1012	0.40	1 / 5	1.33	**YES**
Chromium	-- - --	37 / 37	5.80	63.0	CAS04-SS13-1012	64.0	0 / 37	0.98	NO
Cobalt	1.40 - 1.40	34 / 35	0.72	11.5	CAS04-SS13-1012	13.0	0 / 35	0.88	NO
Copper	2.90 - 4.50	32 / 35	1.80	150	CAS004-4HA05-00-1199	70.0	2 / 35	2.14	**YES**
Cyanide	0.020 - 0.84	3 / 27	0.070	0.13	CAS004-4HA02-00-1199	15.8	0 / 27	0.01	NO
Iron	-- - --	35 / 35	3,450	116,000	CAS04-SS13-1012	5 < pH > 8	8 / 35	--	**YES**
Lead	11.6 - 13.6	32 / 35	7.90	793	CAA03-SS06-1109	120	2 / 35	6.61	**YES**
Magnesium [3]	-- - --	35 / 35	287	4,060	CAA03-SS07-1109	NSV	-- / --	NSV	NO
Manganese	-- - --	35 / 35	19.1	511	CAS04-SS13-1012	220	6 / 35	2.32	**YES**
Mercury	0.035 - 0.035	34 / 35	0.0059	0.88	CAS004-4HA05-00-1199	0.10	5 / 35	8.80	**YES**
Nickel	2.20 - 4.10	32 / 35	1.80	46.7	CAS04-SS13-1012	38.0	3 / 35	1.23	**YES**
Potassium [3]	-- - --	35 / 35	257	2,830	CAA03-SS07-1109	NSV	-- / --	NSV	NO
Selenium	0.59 - 2.80	21 / 35	0.16	1.00	CAS004-4HA04-00-1199	0.52	5 / 35	1.92	**YES**
Silver	0.28 - 5.20	8 / 35	0.090	20.6	CAS004-4HA06-00-1199	560	0 / 35	0.04	NO
Sodium [3]	23.1 - 73.8	22 / 35	9.47	176	CAA03-SS06-1109	NSV	-- / --	NSV	NO
Thallium	0.070 - 2.37	2 / 35	0.47	1.10	CAS004-4HA06-00-1199	1.00	1 / 35	1.10	**YES**
Vanadium	-- - --	35 / 35	8.33	63.6	CAS04-SS02-1109	130	0 / 35	0.49	NO
Zinc	28.6 - 32.5	33 / 35	9.70	324	CAS004-4HA05-00-1199	120	9 / 35	2.70	**YES**
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	8.30 - 270	0 / 35	--	--	--	8,000	-- / --	0.03	NO
Aroclor-1221	8.30 - 560	0 / 35	--	--	--	8,000	-- / --	0.07	NO
Aroclor-1232	9.70 - 270	0 / 35	--	--	--	8,000	-- / --	0.03	NO
Aroclor-1242	8.30 - 52.0	1 / 35	1,000	1,000	CAS004-4HA05-00-1199	8,000	0 / 35	0.13	NO
Aroclor-1248	8.30 - 270	0 / 35	--	--	--	8,000	-- / --	0.03	NO
Aroclor-1254	8.30 - 270	0 / 35	--	--	--	8,000	-- / --	0.03	NO
Aroclor-1260	8.30 - 26.0	11 / 35	19.0	2,700	CAS004-4HA05-00-1199	8,000	0 / 35	0.34	NO
Pesticides (UG/KG)									
4,4'-DDD	3.50 - 27.0	8 / 27	2.30	280	CAA03-SS06-1109	583	0 / 27	0.48	NO
4,4'-DDE	0.67 - 27.0	11 / 27	0.80	83.0	CAA03-SS02-1109	114	0 / 27	0.73	NO
4,4'-DDT	1.00 - 13.0	14 / 27	1.60	220	CAS004-4HA05-00-1199	100	1 / 27	2.20	**YES**
Aldrin	1.60 - 40.0	1 / 27	33.0	33.0	CAS004-4HA05-00-1199	3.63	1 / 27	9.09	**YES**
alpha-BHC	1.60 - 40.0	0 / 27	--	--	--	226	-- / --	0.18	NO
alpha-Chlordane	1.60 - 40.0	2 / 27	0.54	0.99	CAA03-SS02-1109	11.0	0 / 27	0.09	NO

TABLE L-40

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 and Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
beta-BHC	1.60 - 40.0	0 / 27	--	--	--	342	-- / --	0.12	NO
delta-BHC	1.60 - 14.0	1 / 27	140	140	CAA03-SS06-1109	226	0 / 27	0.62	NO
Dieldrin	3.20 - 27.0	2 / 27	1.40	650	CAA03-SS06-1109	10.5	1 / 27	61.9	**YES**
Endosulfan I	1.60 - 14.0	2 / 27	0.91	2,200	CAA03-SS06-1109	6.32	1 / 27	348	**YES**
Endosulfan II	3.20 - 78.0	2 / 27	4.40	5.70	CAS004-4HA03-00-1199	6.32	0 / 27	0.90	NO
Endosulfan sulfate	3.20 - 78.0	2 / 27	1.90	8.90	CAA03-SS02-1109	6.32	1 / 27	1.41	**YES**
Endrin	3.20 - 13.0	9 / 27	3.50	130	CAA03-SS06-1109	1.95	9 / 27	66.7	**YES**
Endrin aldehyde	3.20 - 78.0	8 / 27	1.00	77.0	CAS004-4HA05-00-1199	1.95	6 / 27	39.5	**YES**
Endrin ketone	3.20 - 78.0	2 / 27	4.50	87.0	CAS004-4HA05-00-1199	1.95	2 / 27	44.6	**YES**
gamma-BHC (Lindane)	1.70 - 14.0	4 / 27	0.82	860	CAA03-SS06-1109	7.75	2 / 27	111	**YES**
gamma-Chlordane	1.60 - 40.0	1 / 27	15.0	15.0	CAS004-4HA05-00-1199	11.0	1 / 27	1.36	**YES**
Heptachlor	1.60 - 40.0	0 / 27	--	--	--	52.9	-- / --	0.76	NO
Heptachlor epoxide	1.60 - 40.0	0 / 27	--	--	--	52.9	-- / --	0.76	NO
Methoxychlor	12.0 - 400	0 / 27	--	--	--	500	-- / --	0.80	NO
Toxaphene	32.0 - 1,400	0 / 27	--	--	--	500	-- / --	2.80	**YES**
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	130 - 420	1 / 21	3,800	3,800	CAA03-SS06-1109	13,600	0 / 21	0.28	NO
1,2,4,5-Tetrachlorobenzene	130 - 540	0 / 21	--	--	--	1,000	-- / --	0.54	NO
2,2'-Oxybis(1-chloropropane)	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
2,3,4,6-Tetrachlorophenol	250 - 520	0 / 6	--	--	--	500	-- / --	1.04	**YES**
2,4,5-Trichlorophenol	130 - 14,000	0 / 27	--	--	--	1,350	-- / --	10.4	**YES**
2,4,6-Trichlorophenol	130 - 5,500	0 / 27	--	--	--	580	-- / --	9.48	**YES**
2,4-Dichlorophenol	130 - 5,500	0 / 27	--	--	--	500	-- / --	11.0	**YES**
2,4-Dimethylphenol	130 - 5,500	1 / 27	420	420	CAA03-SS06-1109	1,000	0 / 27	0.42	NO
2,4-Dinitrophenol	380 - 14,000	0 / 27	--	--	--	20,000	-- / --	0.70	NO
2,4-Dinitrotoluene	130 - 500	0 / 27	--	--	--	11,000	-- / --	0.05	NO
2,6-Dinitrotoluene	130 - 500	0 / 27	--	--	--	8,500	-- / --	0.06	NO
2-Chloronaphthalene	21.0 - 49,000	0 / 27	--	--	--	LMW PAH	-- / --	--	--
2-Chlorophenol	130 - 5,500	0 / 27	--	--	--	500	-- / --	11.0	**YES**
2-Methylnaphthalene	10.0 - 49,000	8 / 35	2.50	48.0	CAS04-SS09-1012	LMW PAH	-- / --	--	--
2-Methylphenol	130 - 5,500	1 / 27	440	440	CAA03-SS06-1109	1,000	0 / 27	0.44	NO
2-Nitroaniline	130 - 14,000	0 / 27	--	--	--	NSV	-- / --	NSV	NO
2-Nitrophenol	130 - 5,500	0 / 27	--	--	--	1,000	-- / --	5.50	**YES**
3- and 4-Methylphenol	250 - 730	1 / 21	1,200	1,200	CAA03-SS06-1109	1,000	1 / 21	1.20	**YES**
3,3'-Dichlorobenzidine	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
3-Nitroaniline	130 - 14,000	0 / 27	--	--	--	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	380 - 14,000	0 / 27	--	--	--	1,000	-- / --	14.0	**YES**
4-Bromophenyl-phenylether	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
4-Chloro-3-methylphenol	130 - 5,500	0 / 27	--	--	--	500	-- / --	11.0	**YES**
4-Chloroaniline	130 - 5,500	0 / 27	--	--	--	500	-- / --	11.0	**YES**
4-Chlorophenyl-phenylether	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO

TABLE L-40

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 and Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
4-Methylphenol	380 - 5,500	0 / 6	--	--	--	1,000	-- / --	5.50	**YES**
4-Nitroaniline	130 - 14,000	0 / 27	--	--	--	NSV	-- / --	NSV	NO
4-Nitrophenol	130 - 14,000	0 / 27	--	--	--	380	-- / --	36.8	**YES**
Acenaphthene	10.0 - 5,500	14 / 35	3.00	24,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Acenaphthylene	10.0 - 5,500	13 / 35	3.00	4,100	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Acetophenone	130 - 690	0 / 21	--	--	--	NSV	-- / --	NSV	NO
Anthracene	21.0 - 5,500	27 / 35	1.70	140,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Atrazine	130 - 420	0 / 21	--	--	--	11.9	-- / --	35.3	**YES**
Benzaldehyde	130 - 440	1 / 21	200	200	CAA03-SS08-1109	58,400	0 / 21	0.003	NO
Benzo(a)anthracene	380 - 2,600	32 / 35	10.0	180,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Benzo(a)pyrene	380 - 2,600	32 / 35	4.40	130,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Benzo(b)fluoranthene	18.0 - 380	32 / 35	10.0	200,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Benzo(g,h,i)perylene	2.60 - 2,600	25 / 34	2.50	66,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Benzo(k)fluoranthene	21.0 - 380	29 / 35	3.70	81,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
bis(2-Chloroethoxy)methane	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
bis(2-Ethylhexyl)phthalate	49.0 - 240,000	3 / 27	66.0	3,500	CAYP-SS05-1012	30,000	0 / 27	0.12	NO
Butylbenzylphthalate	130 - 5,500	1 / 27	2,800	2,800	CAA03-SS07-1109	30,000	0 / 27	0.09	NO
Caprolactam	250 - 540	0 / 10	--	--	--	NSV	-- / --	NSV	NO
Carbazole	22.0 - 5,500	16 / 27	2.10	120,000	CAA03-SS06-1109	7,000	1 / 27	17.1	**YES**
Chrysene	22.0 - 380	32 / 35	4.00	210,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Dibenz(a,h)anthracene	21.0 - 5,500	21 / 35	3.60	22,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Dibenzofuran	130 - 5,500	2 / 27	380	19,000	CAA03-SS06-1109	4,600	1 / 27	4.13	**YES**
Diethylphthalate	130 - 5,500	0 / 27	--	--	--	26,800	-- / --	0.21	NO
Dimethyl phthalate	130 - 5,500	0 / 27	--	--	--	10,640	-- / --	0.52	NO
Di-n-butylphthalate	41.0 - 240,000	0 / 27	--	--	--	40,000	-- / --	6.00	**YES**
Di-n-octylphthalate	130 - 5,500	1 / 27	770	770	CAA03-SS07-1109	30,000	0 / 27	0.03	NO
Fluoranthene	380 - 380	34 / 35	14.0	500,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Fluorene	10.0 - 5,500	14 / 35	4.70	40,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Hexachlorobenzene	21.0 - 49,000	0 / 27	--	--	--	1,000	-- / --	49.0	**YES**
Hexachlorobutadiene	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
Hexachlorocyclopentadiene	130 - 5,500	0 / 27	--	--	--	2,000	-- / --	2.75	**YES**
Hexachloroethane	21.0 - 49,000	0 / 27	--	--	--	NSV	-- / --	NSV	NO
Indeno(1,2,3-cd)pyrene	18.0 - 2,600	30 / 35	9.80	69,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Isophorone	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
Naphthalene	10.0 - 5,500	10 / 35	6.60	26,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
n-Nitroso-di-n-propylamine	130 - 5,500	0 / 27	--	--	--	NSV	-- / --	NSV	NO
n-Nitrosodiphenylamine	250 - 5,500	0 / 27	--	--	--	1,090	-- / --	5.05	**YES**
Nitrobenzene	130 - 500	0 / 27	--	--	--	2,260	-- / --	0.22	NO
PAH (HMW)	1,710 - 1,710	34 / 35	88.8	1,348,000	CAA03-SS06-1109	18,000	2 / 35	74.9	**YES**
PAH (LMW)	1,710 - 1,710	34 / 35	65.1	1,253,100	CAA03-SS06-1109	29,000	2 / 35	43.2	**YES**

TABLE L-40

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 and Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Pentachlorophenol	100 - 240,000	0 / 27	--	--	--	5,000	-- / --	48.0	**YES**
Phenanthrene	32.0 - 2,600	31 / 35	7.70	470,000	CAA03-SS06-1109	LMW PAH	-- / --	--	--
Phenol	130 - 5,500	1 / 27	600	600	CAA03-SS06-1109	1,880	0 / 27	0.32	NO
Pyrene	380 - 380	34 / 35	6.90	390,000	CAA03-SS06-1109	HMW PAH	-- / --	--	--
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	1.10 - 14.8	0 / 26	--	--	--	1,025	-- / --	0.01	NO
1,1,2,2-Tetrachloroethane	1.10 - 14.8	0 / 26	--	--	--	5,000	-- / --	0.003	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1.10 - 8.00	0 / 21	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	1.10 - 14.8	0 / 26	--	--	--	2,000	-- / --	0.01	NO
1,1-Dichloroethane	1.10 - 14.8	0 / 26	--	--	--	548	-- / --	0.03	NO
1,1-Dichloroethene	1.10 - 14.8	0 / 26	--	--	--	173	-- / --	0.09	NO
1,2,3-Trichlorobenzene	1.10 - 1.50	0 / 6	--	--	--	1,150	-- / --	0.001	NO
1,2,4-Trichlorobenzene	1.10 - 5,500	0 / 27	--	--	--	1,270	-- / --	4.33	**YES**
1,2-Dibromo-3-chloropropane	1.10 - 7.00	0 / 21	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromoethane	1.10 - 7.00	0 / 21	--	--	--	300	-- / --	0.02	NO
1,2-Dichlorobenzene	1.10 - 5,500	0 / 27	--	--	--	1,000	-- / --	5.50	**YES**
1,2-Dichloroethane	1.10 - 14.8	0 / 26	--	--	--	2,190	-- / --	0.01	NO
1,2-Dichloroethene (total)	11.2 - 14.8	0 / 5	--	--	--	447	-- / --	0.03	NO
1,2-Dichloropropane	1.10 - 14.8	0 / 26	--	--	--	38,800	-- / --	0.0004	NO
1,3-Dichlorobenzene	1.10 - 5,500	0 / 27	--	--	--	1,000	-- / --	5.50	**YES**
1,4-Dichlorobenzene	1.10 - 5,500	0 / 27	--	--	--	1,280	-- / --	4.30	**YES**
2-Butanone	2.80 - 34.0	3 / 26	3.50	24.0	CAA03-SS09-1109	NSV	-- / --	NSV	**YES**
2-Hexanone	2.80 - 34.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
4-Methyl-2-pentanone	2.80 - 34.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Acetone	5.00 - 110	8 / 26	9.60	640	CAA03-SS09-1109	NSV	-- / --	NSV	**YES**
Benzene	1.10 - 14.8	0 / 26	--	--	--	1,140	-- / --	0.01	NO
Bromochloromethane	1.10 - 1.50	0 / 6	--	--	--	NSV	-- / --	NSV	NO
Bromodichloromethane	1.10 - 14.8	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Bromoform	1.10 - 14.8	0 / 26	--	--	--	300	-- / --	0.05	NO
Bromomethane	1.10 - 14.8	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Carbon disulfide	5.00 - 14.8	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Carbon tetrachloride	1.10 - 14.8	0 / 26	--	--	--	3,400	-- / --	0.004	NO
Chlorobenzene	1.10 - 14.8	0 / 26	--	--	--	2,400	-- / --	0.01	NO
Chloroethane	1.10 - 14.8	0 / 26	--	--	--	5,000	-- / --	0.003	NO
Chloroform	1.10 - 14.8	3 / 26	0.60	0.90	CAA03-SS09-1109	1,844	0 / 26	0.0005	NO
Chloromethane	1.10 - 14.8	0 / 26	--	--	--	5,000	-- / --	0.003	NO
cis-1,2-Dichloroethene	1.10 - 8.00	0 / 21	--	--	--	447	-- / --	0.02	NO
cis-1,3-Dichloropropene	1.10 - 14.8	0 / 26	--	--	--	5,000	-- / --	0.003	NO
Cyclohexane	1.10 - 7.00	0 / 21	--	--	--	6,000	-- / --	0.001	NO
Dibromochloromethane	1.10 - 14.8	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Dichlorodifluoromethane (Freon-12)	1.10 - 14.0	0 / 21	--	--	--	NSV	-- / --	NSV	NO

TABLE L-40

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 and Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Ethylbenzene	1.10 - 14.8	0 / 26	--	--	--	1,815	-- / --	0.01	NO
Isopropylbenzene	1.10 - 7.00	0 / 21	--	--	--	NSV	-- / --	NSV	NO
m- and p-Xylene	2.30 - 15.0	0 / 21	--	--	--	1,300	-- / --	0.01	NO
Methyl acetate	5.60 - 12.0	0 / 21	--	--	--	NSV	-- / --	NSV	NO
Methylcyclohexane	1.10 - 7.00	0 / 21	--	--	--	NSV	-- / --	NSV	NO
Methylene chloride	5.60 - 34.0	3 / 27	9.00	13.0	CAA03-SS06-1109	1,250	0 / 27	0.01	NO
Methyl-tert-butyl ether (MTBE)	1.10 - 12.0	0 / 21	--	--	--	NSV	-- / --	NSV	NO
o-Xylene	1.10 - 7.00	0 / 21	--	--	--	1,300	-- / --	0.01	NO
Styrene	1.10 - 14.8	4 / 26	1.00	10.0	CAA03-SS10-1109	64,000	0 / 26	0.0002	NO
Tetrachloroethene	1.10 - 14.8	0 / 26	--	--	--	179	-- / --	0.08	NO
Toluene	1.10 - 14.8	2 / 26	2.00	3.00	CAA03-SS10-1109	40,000	0 / 26	0.0001	NO
trans-1,2-Dichloroethene	1.10 - 10.0	0 / 21	--	--	--	447	-- / --	0.02	NO
trans-1,3-Dichloropropene	1.10 - 14.8	0 / 26	--	--	--	5,000	-- / --	0.003	NO
Trichloroethene	1.10 - 14.8	0 / 26	--	--	--	500	-- / --	0.03	NO
Trichlorofluoromethane (Freon-11)	1.10 - 14.0	0 / 21	--	--	--	NSV	-- / --	NSV	NO
Vinyl chloride	1.10 - 14.8	0 / 26	--	--	--	412	-- / --	0.04	NO
Xylene, total	11.2 - 20.0	1 / 20	2.00	2.00	CAS004-4HA02-00-1199	1,300	0 / 20	0.002	NO
Explosives (UG/KG)									
1,3,5-Trinitrobenzene	300 - 500	0 / 12	--	--	--	NSV	-- / --	NSV	NO
1,3-Dinitrobenzene	300 - 500	0 / 12	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trinitrotoluene	300 - 500	0 / 12	--	--	--	10,000	-- / --	0.05	NO
2-Amino-4,6-dinitrotoluene	300 - 500	0 / 12	--	--	--	80,000	-- / --	0.01	NO
2-Nitrotoluene	300 - 500	0 / 12	--	--	--	NSV	-- / --	NSV	NO
3-Nitrotoluene	300 - 500	0 / 12	--	--	--	NSV	-- / --	NSV	NO
4-Amino-2,6-dinitrotoluene	300 - 500	0 / 12	--	--	--	80,000	-- / --	0.01	NO
4-Nitrotoluene	300 - 500	0 / 12	--	--	--	NSV	-- / --	NSV	NO
HMX	300 - 500	0 / 12	--	--	--	10,000	-- / --	0.05	NO
RDX	300 - 500	0 / 12	--	--	--	10,000	-- / --	0.05	NO
Tetryl	300 - 500	0 / 12	--	--	--	10,000	-- / --	0.05	NO
Other Parameters									
pH	-- - --	29 / 29	3.90	8.80	CAA03-SS07-1109	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	29 / 29	3,800	84,000	CAS04-SS10-1012	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-41

Exceedances - Site 4/Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAA03-SS01	CAA03-SS02	CAA03-SS03	CAA03-SS04	CAA03-SS05	CAA03-SS06	CAA03-SS07	CAA03-SS08		CAA03-SS09	CAA03-SS10	CAS004-4HA06	CAS04-SS05	CAS04-SO08	CAS04-SO09	CAS04-SO10	CAS04-SO11	CAS04-SO12		CAS04-SO13	CAS04-SO15	CAS004-4HA01
			CAA03-SS01-1109	CAA03-SS02-1109	CAA03-SS03-1109	CAA03-SS04-1109	CAA03-SS05-1109	CAA03-SS06-1109	CAA03-SS07-1109	CAA03-SS08-1109	CAA03-SS08P-1109	CAA03-SS09-1109	CAA03-SS10-1109	CAS004-4HA06-00-1199	CAS04-SS05-1109	CAS04-SS08-1012	CAS04-SS09-1012	CAS04-SS10-1012	CAS04-SS11-1012	CAS04-SS12-1012	CAS04-SS12P-1012	CAS04-SS13-1012	CAS04-SS15-1012	CAS004-4HA01-00-1199
			Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 South
			11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	10/23/12	11/12/99
Inorganics (MG/KG)																								
Aluminum	pH < 5.5	12,200	12,600	8,930	10,800	9,870	8,080	10,600	8,070	11,800	12,600	4,100	3,960	6,320 L	18,000	10,300	8,030	10,700	7,290	9,390	9,100	7,850	NA	4,560 L
Antimony	78.0	--	0.13 L	0.19 L	0.25 L	0.17 L	0.07 L	0.21 L	0.07 J	0.15	0.15	0.08 J	0.07 J	0.44 UJ	0.14 L	0.35 U	0.42 U	1.1 U	0.46 J	0.32 U	0.32 U	0.47 L	NA	0.49 U
Arsenic	18.0	6.36	7.30	3.00	3.20	3.40	1.60	3.70	2.80	3.50	3.40	2.20	1.00	2.70 L	3.60	4.60	3.10	2.40	8.50	2.90	2.70	346 J	NA	2.90 L
Barium	330	--	38.5	43.6 J	47.3 J	47.7 J	36.0 J	55.1 J	57.0	28.7	29.1	11.3	16.9	101 J	22.2 J	41.5	36.5	61.8	34.9	43.4	42.1	59.3 L	NA	20.3 J
Beryllium	40.0	--	0.66	0.67	0.49	0.46 J	0.44 J	0.72	0.69	0.34 J	0.34 J	0.19 J	0.24 J	0.32 B	0.42	0.58	0.52	0.60 J	0.39 J	0.48	0.46	0.34 L	NA	0.33 B
Cadmium	32.0	--	0.95 U	0.12 J	0.06 J	0.04 J	0.04 J	0.33 J	0.70 J	1.10 U	1.20 U	0.92 U	0.02 B	0.34 U	0.77 U	0.11 J	0.19 J	2.70	1.20 U	0.02 B	0.006 B	1.20 UL	NA	0.08 U
Chromium (hexavalent)	0.40	No value	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.24 UL	NA
Chromium	64.0	--	24.9 K	15.2	13.1	16.7	9.00	17.8	22.8	18.4	18.8	8.40	5.80	56.6	26.6	16.0	12.5	16.1	34.0	11.1	10.7	63.0 J	11.9 K	9.40
Cobalt	13.0	--	2.90	3.40	2.70	2.50	2.50	4.40	4.90	1.80	1.90	0.72	0.84	8.80 J	2.30	3.10	2.20	2.30	4.50	2.40	2.30	11.5 J	NA	1.40 U
Copper	70.0	4.25	5.30 K	9.40	4.90	5.00	3.80	31.8	17.7	4.80	4.20	1.90 J	1.90 J	77.8 J	3.10	37.1	31.0	31.5	58.9	2.90 B	2.70 B	68.7 K	NA	4.50 B
Cyanide	15.8	--	0.84 U	0.84 U	0.70 U	0.84 U	0.77 U	0.70 U	0.77 U	0.84 U	0.84 U	0.70 U	0.77 U	0.07 L	0.77 U	NA	NA	NA	NA	NA	NA	NA	NA	0.02 UL
Iron	5 < pH > 8	19,900	18,800	10,900 J	9,710 J	9,740 J	6,720 J	18,300 J	13,500	12,100	12,200	6,140	3,450	61,700 L	15,000 J	11,700	8,860	9,240	53,200	8,040	7,730	116,000 J	NA	8,900 L
Lead	120	17.4	9.40 K	35.4	25.1	14.5	10.3	793	37.0	18.6	18.2	9.20	10.6	105 J	23.7	13.6 B	25.9	53.3	12.9 B	11.6 B	10.0 B	31.7 L	NA	12.8
Manganese	220	324	85.1 K	155 J	121 J	106 J	98.9 J	253 J	315	39.9	35.8	19.1	27.9	302 J	24.7 J	125	91.8	70.2	263	103	107	511 J	NA	48.7
Mercury	0.10	0.111	0.01 J	0.12	0.04	0.03 J	0.02 J	0.04 J	0.035 U	0.05	0.04	0.01 J	0.03 J	0.06 J	0.03 J	0.08	0.04	0.10	0.02 J	0.02 J	0.02 J	0.06 L	NA	0.04 J
Nickel	38.0	9.52	5.50 J	9.80	5.30	5.20	3.70 J	9.00	8.80	4.50	4.70 J	1.80 J	1.90 J	39.6	5.60	6.20	5.10	6.50	38.0	4.00	3.80	46.7 J	NA	2.20 B
Selenium	0.52	0.51	0.36 J	0.44 J	0.45 J	0.51	0.33 J	0.84	0.16 J	0.42 J	0.47 J	0.21 J	0.24 J	0.60 U	0.32 J	0.31 J	0.59 U	1.50 U	2.80 U	0.21 J	0.45 U	0.87 L	NA	0.67 U
Silver	560	--	1.40 U	1.60 U	1.40 U	1.50 U	1.50 U	2.10 U	1.30 U	0.25 J	0.27 J	0.29 J	0.10 J	20.6 L	1.20 U	0.28 U	0.15 J	0.09 J	0.99 B	0.05 J	0.09 J	1.30 L	NA	2.80 B
Thallium	1.00	No value	0.13 B	0.17 B	0.12 B	0.13 B	0.10 B	0.13 B	0.19 B	0.14 B	0.13 B	0.09 B	0.07 B	1.10 L	0.20 B	0.35 U	0.42 U	1.10 U	2.00 U	0.32 U	0.32 U	0.47 L	NA	0.54 UL
Vanadium	130	--	27.2	19.5	20.0	17.8	14.6	26.9	24.3	29.1	29.5	11.4	8.60	35.7 J	41.7	21.2	18.8	21.6	13.9	15.9	15.6	20.4 L	NA	13.9
Zinc	120	26.5	21.8 K	52.7	52.8	64.6	16.8	89.6	154	21.6	20.6	10.0	9.70	122 J	20.3	89.5	76.5	242	17.5	20.0	19.0	66.4 L	NA	28.6 B
Polychlorinated Biphenyls (UG/KG)																								
Aroclor-1242	8,000	--	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	39 U	20 U	8.3 U	9.6 U	20 UL	9.0 U	8.9 U	8.9 U	10 U	NA	38 U
Aroclor-1260	8,000	--	17 U	21 UL	20 U	21 U	20 UL	21 UJ	18 U	22 U	23 U	20 U	19 U	91 K	19 J	8.3 U	9.6 U	20 UL	9.0 U	8.9 U	8.9 U	10 U	NA	53
Pesticides (UG/KG)																								
4,4'-DDD	583	--	2.3 J	25 J	6.0 J	7.4 J	2.3 J	280 J	7.7 J	4.0 UJ	4.2 UJ	3.6 U	3.5 U	7.6 K	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
4,4'-DDE	114	--	0.96 B	83	3.5 J	7.3	1.2 J	52 J	3.2 U	4.0 UJ	0.8 J	3.6 U	1.7 J	3.9 U	0.9 L	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
4,4'-DDT	100	--	1.0 B	78	3.9 J	5.4 J	1.6 J	88 J	13 J	3.1 J	4.2 UJ	3.6 U	3.4 J	18 K	1.7 J	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
Aldrin	3.63	--	1.6 UJ	2.0 U	1.9 U	2.0 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
alpha-Chlordane	11.0	--	1.6 UJ	0.99 J	1.9 U	2.0 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
delta-BHC	226	--	1.6 UJ	2.0 U	1.9 U	2.0 U	1.9 UJ	140 J	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
Dieldrin	10.5	--	3.2 UJ	3.9 U	3.7 U	1.4 J	3.8 UJ	650 J	3.2 U	4.0 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
Endosulfan I	6.32	--	1.6 UJ	2.0 U	1.9 U	2.0 U	1.9 UJ	2,200 J	1.7 U	0.79 J	0.91 J	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
Endosulfan II	6.32	--	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4.0 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	4.4 J
Endosulfan sulfate	6.32	--	1.9 J	8.9 J	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4.0 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
Endrin	1.95	--	3.2 UJ	3.9 U	16	10	3.8 UJ	130 J	3.2 U	6.8 J	16 J	55	3.9	3.9 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	6.3 J
Endrin aldehyde	1.95	--	3.2 UJ	3.9 U	3.8 J	2.6 J	3.8 UJ	78 U	3.2 U	3.5 J	5.4 J	3.6 U	2.2 J	3.9 U	1.0 J	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
Endrin ketone	1.95	--	3.2 UJ	3.9 U	3.7 U	3.9 U	3.8 UJ	78 U	3.2 U	4.0 UJ	4.2 UJ	3.6 U	3.5 U	3.9 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA	3.8 U
gamma-BHC (Lindane)	7.75	--	5.2 J	9.6	0.82 J	2.0 U	1.9 UJ	860	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
gamma-Chlordane	11.0	--	1.6 UJ	2.0 U	1.9 U	2.0 U	1.9 UJ	40 U	1.7 U	2.1 UJ	2.1 UJ	1.8 U	1.8 U	2.0 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA	2.0 U
Semivolatile Organic Compounds (UG/KG)																								
1,1-Biphenyl	13,600	--	380 U	390 U	390 U	380 U	340 U	3,800	340 U	420 U	410 U	350 U	350 U	NA	380 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	1,000	--	580 U	600 U	590 U	580 U	520 U	420 J	520 U	640 U	630 U	530 U	530 U	3,900 U	570 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
2-Methylnaphthalene	LMW PAH	--	23 J	25	6.8 J	23 U	21 U	49,000 U	20 J	26 U	25 U	21 U	21 U	3,900 U	23 U	2.5 J	48	7.0 J	10 U	10 U	10 U	9.2 J	NA	380 U
2-Methylphenol	1,000	--	700 U	720 U	700 U	690 U	620 U	440 J	630 U	770 U	750 U	640 U	630 U	3,900 U	680 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
3- and 4-Methylphenol	1,000	--	660 U	680 U	670 U	660 U	590 U	1,200	590 U	730 U	720 U	610 U	600 U	NA	650 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	LMW PAH	--	61	65	27	6.9 J	21 U	24,000 J	50	26 U	25 U	21 U	21 U	3,900 U	23 U	7.5 J	130	20 J	7.5 J	10 U	10 U	53 K	NA	380 U
Acenaphthylene	LMW PAH	--	30	240	72	26	3.8 J	4,100 J	19 J	26 U	25 U	21 U	21 U	3,900 U	23 U	3.0 J	36	15 J	18 J	10 U	10 U	62	NA	380 U
Anthracene	LMW PAH	--	140	260	200	37	3.8 J	140,000	150	26 U	2.7 J	21 U	21 U	1,700 J	1.8 J	19 J	260	59	48	2.2 J	1.4 J	190 K	NA	380 U
Benzaldehyde	58,400	--	420 UJ	430 U	420 U	420 U	370 U	440 U	380 U	460 U	200 J	380 U	380 U	NA	410 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	HMW PAH	--	590	1,600	740	200	26	180,000	1,100	20 J	28	14 J	18 J	8,800	10 J	120	1,200	400	370	17 J	11 J	960	NA	380 U
Benzo(a)pyrene	HMW PAH	--	480	1,200	440	160	20 J	130,000	950	16 J	22 J	11 J	14 J	7,000	4.4 J	96	970	330	310	15 J	10 J	830	NA	380 U
Benzo(b)fluoranthene	HMW PAH	--	840	2,100	670	190 J	28 J	200,000	1,400	29	40	20 J	26	6,800	10 J	160	1,600	590	460	22 B	17 B	1,200	NA	380 U
Benzo(g,h,i)perylene	HMW PAH	--	130 L	440 L	70 L	23 L	21 UL	66,000 L	320 J	3.8 B	2.6 B	21 R	2.6 B	3,400 J	23 UL	54	520	180	140	8.6 J	6.6 J	320 K	NA	380 U
Benzo(k)fluoranthene	HMW PAH	--	190	650	140	71	9.2 J	81,000	560	26 U	25 U	21 U	21 U	6,800	23 U	58	560	170	180	9.0 J	6.0 J	420	NA	380 U
bis(2-Ethylhexyl)phthalate	30,000	--	120 U	120 U	120 U	120 U	100 U	240,000 U	780 J	130 U	120 U	110 U	100 U	3,900 U	66 J	NA	NA	NA	NA	NA	NA	NA	NA	49 B
Butylbenzylphthalate	30,000	--	380 U	390 U	390 U	380 U	340 U	400 U	2,800	420 U	410 U	350 U	350 U	3,900 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Carbazole	7,000	--	230 J	190	80	18 J	3.2 J	120,000 J	90 J	3.0 J	5.6 J	3.8 J	4.0 J	3,900 U	2.1 J	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Chrysene	HMW PAH	--	730	1,300	580	170 J	17 J	210,000	1,400	18 J	26	12 J	16 J	8,600	23 U	130	1,500	420	380	17 J	11 J	930	NA	380 U
Dibenz(a,h)anthracene	HMW PAH	--	110 J	200 K	83 K	37 K	21 U	22,000 K	160	4.3 J	4.6 J	21 U	3.6 J	1,400 J	23 U	25	190	90	67	3.6 J	3.5 J	160 K	NA	380 U
Dibenzofuran	4,600	--	380 U	390 U	390 U	380 U	340 U	19,000	340 U	420 U	410 U	350 U	350 U	3,900 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Di-n-octylphthalate	30,000	--	740 U	760 U	750 U	740 U	670 U	780 U	770	820 U	800 U	680 U	680 U	3,900 U	730 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Fluoranthene	LMW PAH	--	1,700	3,000	1,600	350	44	500,000	2,400	40	57	31	40	14,000	14 J	250	3,000	840	670	29	19 J	1,800	NA	380 U
Fluorene	LMW PAH	--	90	130	110	11 J	21 U	40,000 J	50	26 U	25 U	21 U	21 U	3,900 U	23 U	10 J	200	32 J	16 J	10 U	10 U	92 K	NA	380 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	610 K	240 J	280 J	160 J	33 J	69,000 J	920 J	25 B	29	18 B	20 B	3,400 J	23 U	120 J	850	430 J	260 J	19 J	11 J	770	NA	380 U
Naphthalene	LMW PAH	--	64	31	7.7 J	23 U	21 U	26,000 J	17 J	26 U	25 U	21 U	21 U	3,900 U	23 U	6.6 J	130	11 J	10 U	10 U	10 U	13 J	NA	380 U
PAH (HMW)	18,000	--	5,080	10,130	4,003	1,281	180	1,348,000	9,610	151	217	124	135	57,200	88.8	1,003	9,790	3,310	2,717	128	86.6	6,990	NA	1,710 U
PAH (LMW)	29,000	--	3,420	5,563	3,335	595	121	1,253,100	3,917	154	176	124	140	32,900	92.5	469	6,204	1,424	1,090	70.2	54.9	3,209	NA	1,710 U
Phenanthrene	LMW PAH	--	1,300	1,800	1,300	130	17 J	470,000	1,200	23 J	41	19 J	26	5,500	7.7 J	170	2,400	440	320	14 J	9.5 J	990	NA	380 U
Phenol	1,880	--	540 U	560 U	550 U	540 U	490 U	600	490 U	600 U	590 U	500 U	500 U	3,900 U	540 U	NA	NA	NA	NA	NA	NA	NA	NA	380 U
Pyrene	HMW PAH	--	1,400	2,400	1,000	270	26	390,000	2,800	36	54	26	36	11,000	6.9 J	240	2,400 J	700	550	28	19 J	1,400	NA	380 U
Volatile Organic Compounds (UG/KG)																								
2-Butanone	NSV	--	25 UJ	29 UJ	32 UJ	28 UJ	25 UJ	29 UJ	25 UJ	31 UJ	34 UJ	24 J	22 J	12.1 UL	30 UJ	NA	NA	NA	NA	NA	NA	NA	NA	11.2 U
Acetone	NSV	--	82 B	74 B	71 B	78 B	100 J	43 B	54 B	110 B	100 B	640 J	560 J	12.1 UL	120 J	NA	NA	NA	NA	NA	NA	NA	NA	5.0 B
Chloroform	1,844	--	6.0 UJ	7.0 UJ	8.0 UJ	7.0 UJ	0.6 J	7.0 UJ	6.0 UJ	7.0 UJ	8.0 UJ	0.9 J	0.6 J	12.1 UL	7.0 UJ	NA	NA	NA	NA	NA	NA	NA	NA	11.2 U
Methylene chloride	1,250	--	25 UJ	9.0 J	32 UJ	12 J	25 UJ	13 J	25 UJ	31 UJ	34 UJ	31 UJ	34 UJ	12.1 UL	30 UJ	NA	NA	NA	NA	NA	NA	NA	NA	7.0 B
Styrene	64,000	--	5.0 UJ	6.0 UJ	6.0 UJ	6.0 UJ	5.0 UJ	6.0 UJ	5.0 UJ	1.0 J	7.0 UJ	6.0 UJ	10 J	12.1 UL	6.0 UJ	NA	NA	NA	NA	NA	NA	NA	NA	11.2 U
Toluene	40,000	--	5.0 UJ	6.0 UJ	6.0 UJ	4.0 B	5.0 UJ	6.0 UJ	5.0 UJ	6.0 UJ	7.0 UJ	6.0 UJ	3.0 J	12.1 UL	6.0 UJ	NA	NA	NA	NA	NA	NA	NA	NA	11.2 U
Xylene, total	1,300	--	15 UJ	17 UJ	19 UJ	17 UJ	15 UJ	18 UJ	15 UJ	19 UJ	20 UJ	18 UJ	20 UJ	12.1 UL	18 UJ	NA	NA	NA	NA	NA	NA	NA	NA	11.2 U
Other Parameters																								
pH	--	--	8.50	7.70	7.60	7.00	6.40	8.30	8.80	6.50	5.90	4.60	5.00	NA	4.60	7.50	6.50	5.60	4.90	6.80	NA	7.10	NA	NA
Total organic carbon (MG/KG)	--	--	6,200	36,000	26,000	24,000	12,000	33,000	8,400	37,000	51,000	18,000	18,000	NA	18,000	10,000	36,000	84,000	11,000	14,000	NA	55,000	NA	NA

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-41

Exceedances - Site 4/Youth Pond Surface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virgi

Chemical	Soil ESV	Background UTL	CAS004-4HA02		CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SS01	CAS04-SS02	CAS04-SS03	CAS04-SS04	CAS04-SO14		CAS04-SO06	CAS04-SO07	CAYP-SO01	CAYP-SO02	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
			CAS004-4HA02-00-1199	CAS004-4HA02D-00-1199	CAS004-4HA03-00-1199	CAS004-4HA04-00-1199	CAS004-4HA05-00-1199	CAS04-SS01-1109	CAS04-SS02-1109	CAS04-SS03-1109	CAS04-SS04-1109	CAS04-SS14-1012	CAS04-SS14P-1012	CAS04-SS06-1012	CAS04-SS07-1012	CAYP-SS01-1012	CAYP-SS02-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
			Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 East	Site 4 East	YP Developed	YP Developed	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch
			11/12/99	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09	11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Inorganics (MG/KG)																						
Aluminum	pH < 5.5	12,200	**5,810 L**	**7,160 L**	**6,760 L**	**9,560 L**	**6,260 L**	**6,360**	**29,400**	**4,560**	**5,990**	NA	NA	**19,600**	**15,600**	**5,330**	**11,000**	**6,840**	**6,900**	**5,710**	**4,460**	**2,560**
Antimony	78.0	--	0.46 U	0.55 U	0.47 U	**0.67 J**	12.6 B	**0.08 L**	**0.2 L**	**0.09 L**	**0.08 L**	NA	NA	**0.23 J**	**0.12 J**	1.7 U	2.1 U	2.37 U	1.96 U	1.55 U	**0.56 J**	1.98 UL
Arsenic	18.0	6.36	**2.70 L**	**2.60 L**	**3.00 L**	**4.10 L**	**3.50 L**	**1.60**	**6.40**	**1.40**	**1.10**	NA	NA	**7.20**	**5.20**	**3.79**	**4.72**	**7.69**	**7.54**	**4.86**	**6.08**	**3.65 J**
Barium	330	--	**36.6 J**	**27.1 J**	**25.5 J**	**164**	**68.0**	**17.6**	**32.1**	**14.8**	**24.8 J**	NA	NA	**32.7**	**20.6**	**37.4**	**32.3**	**41.2**	**41.2**	**35.4**	**25.5**	**20.6**
Beryllium	40.0	--	0.64 B	0.36 B	0.35 B	0.68 B	0.65 B	**0.24 J**	**0.76**	**0.22 J**	**0.46 J**	NA	NA	**0.56**	**0.34 J**	**0.337**	**0.309**	**0.748**	**0.726**	**0.491**	**0.315**	**0.297**
Cadmium	32.0	--	0.07 U	0.08 U	0.07 U	**0.74 J**	**3.30**	0.91 U	1.20 U	0.98 U	0.96 U	NA	NA	**0.22 J**	0.13 B	**0.581**	**0.0744 J**	**0.934**	**1.03**	**0.671**	**0.808**	**0.245**
Chromium (hexavalent)	0.40	No value	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.21 U	0.21 U	NA	NA	NA	**0.53**	0.25 U	0.25 U	NA	NA	**0.24 J**
Chromium	64.0	--	**8.70**	**9.60**	**11.8**	**16.9**	**19.0**	**9.20 K**	**45.2 K**	**7.30 K**	**6.90**	**7.40**	**7.20**	**27.8**	**21.8**	**10.9**	**15.7**	**10.4**	**10.9**	**10.5**	**17.8**	**11.5**
Cobalt	13.0	--	**2.80 J**	**3.70 J**	**1.70 J**	**4.10 J**	**4.60 J**	**1.20**	**3.50**	**1.10**	**2.10**	NA	NA	**2.70**	**2.40**	**2.82**	**1.50**	**2.48**	**2.48**	**2.69**	**2.59**	**1.18**
Copper	70.0	4.25	**10.5**	**12.0**	3.80 B	**26.0**	**150**	**1.80 K**	**4.40 K**	**2.40 K**	**2.50**	NA	NA	**4.60**	**2.90**	**19.7**	**5.54**	**30.3**	**34.1**	**17.2**	**26.4**	**7.08**
Cyanide	15.8	--	**0.12 L**	**0.13 L**	0.02 UL	0.03 UL	**0.11 L**	0.77 U	0.84 U	0.70 U	0.77 U	NA	NA	NA	NA	0.24 U	0.23 U	0.23 U	0.23 U	0.22 U	0.22 U	0.22 U
Iron	5 < pH > 8	19,900	**9,840 L**	**8,570 L**	**8,910 L**	**14,600 L**	**14,300 L**	**7,090**	**28,300**	**6,210**	**4,370 J**	NA	NA	**20,300**	**17,400**	**11,200**	**19,400**	**6,510**	**6,870**	**11,300**	**10,500**	**7,230**
Lead	120	17.4	**22.7**	**24.0**	**11.6**	**39.5**	**129**	**7.90 K**	**12.6 K**	**11.7 K**	**10.0**	NA	NA	**24.0**	**13.5**	**39.6**	**14.9**	**15.8**	**17.4**	**14.7**	**71.9**	**9.21**
Manganese	220	324	**233**	**127**	**43.2**	**151**	**175**	**27.7 K**	**33.6 K**	**28.8 K**	**59.0 J**	NA	NA	**40.8**	**30.2**	**177**	**52.8**	**217**	**205**	**189**	**88.3**	**28.9 K**
Mercury	0.10	0.111	**0.31**	**0.36**	**0.09 J**	**0.75**	**0.88**	**0.01 J**	**0.03 J**	**0.02 J**	**0.03 J**	NA	NA	**0.08**	**0.05**	**0.0245**	**0.0656**	**0.0213**	**0.0221**	**0.00587 J**	**0.0352**	**0.00667 J**
Nickel	38.0	9.52	3.80 B	4.10 B	4.00 B	**10.1 J**	**12.1**	**2.30 J**	**8.10 J**	**2.20 J**	**3.10 J**	NA	NA	**6.00**	**4.80**	**4.75**	**2.47**	**5.24**	**5.60**	**5.57**	**4.64**	**2.13**
Selenium	0.52	0.51	0.63 U	0.75 U	0.64 U	**1.00 J**	0.81 U	**0.22 J**	**0.27 J**	**0.18 J**	**0.28 J**	NA	NA	0.74 B	**0.59 J**	1.70 U	2.10 U	2.37 U	1.96 U	1.55 U	**0.663 J**	1.98 U
Silver	560	--	2.60 B	3.00 B	2.40 B	5.20 B	5.20 B	1.40 U	1.80 U	1.50 U	1.40 U	NA	NA	0.34 U	0.28 U	0.426 U	0.526 U	0.592 U	0.49 U	0.387 U	0.299 U	0.494 U
Thallium	1.00	No value	0.50 UL	0.60 UL	0.51 UL	0.72 UL	0.65 UL	0.09 B	0.21 B	0.08 B	0.08 B	NA	NA	0.18 B	0.16 B	1.70 U	2.10 U	2.37 U	1.96 U	1.55 U	1.20 U	1.98 U
Vanadium	130	--	**13.9**	**15.1**	**16.6**	**22.2**	**23.5**	**13.3**	**63.6**	**11.9**	**9.80**	NA	NA	**43.3**	**34.1**	**13.5**	**27.4**	**11.9**	**12.2**	**10.4**	**14.9**	**8.33**
Zinc	120	26.5	**106**	**102**	32.5 B	**273**	**324**	**13.0 K**	**28.8 K**	**10.4 K**	**14.9**	NA	NA	**29.5**	**21.3**	**164**	**50.7**	**234**	**258**	**272**	**271**	**107 K**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1242	8,000	--	42 U	42 U	40 U	52 U	**1,000 K**	20 U	22 U	20 U	19 U	NA	NA	12 U	9.3 U	26 U	25 UL	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1260	8,000	--	**64 J**	**75 J**	**53 J**	**600 J**	**2,700 K**	20 U	**35**	20 U	**33**	NA	NA	**55**	9.3 U	26 U	25 UL	25 UL	25 UL	25 UL	**26 L**	24 UL
Pesticides (UG/KG)																						
4,4'-DDD	583	--	4.2 U	4.2 U	4.0 U	5.2 U	27 U	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UJ
4,4'-DDE	114	--	**9.6 J**	4.2 U	4.0 U	**43 J**	27 U	0.67 B	4.1 U	0.72 B	**1.2 L**	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
4,4'-DDT	100	--	**7.0 J**	**4.6 J**	4.0 U	**9.4**	**220 K**	1.3 B	4.1 U	2.2 B	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	**20 J**	12 UL
Aldrin	3.63	--	2.1 U	2.2 U	2.1 U	2.7 U	**33 K**	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
alpha-Chlordane	11.0	--	2.1 U	2.2 U	2.1 U	2.7 U	14 U	1.9 UJ	2.1 U	1.9 U	**0.54 J**	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
delta-BHC	226	--	2.1 U	2.2 U	2.1 U	2.7 U	14 U	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Dieldrin	10.5	--	4.2 U	4.2 U	4.0 U	5.2 U	27 U	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan I	6.32	--	2.1 U	2.2 U	2.1 U	2.7 U	14 U	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan III	6.32	--	4.2 U	4.2 U	**5.7 J**	5.2 U	27 U	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan sulfate	6.32	--	4.2 U	4.2 U	4.0 U	5.2 U	27 U	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin	1.95	--	4.2 U	4.2 U	4.0 U	5.2 U	**28 K**	3.7 UJ	4.1 U	**3.5 J**	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin aldehyde	1.95	--	4.2 U	4.2 U	4.0 U	5.2 U	**77 K**	3.7 UJ	4.1 U	**1.9 J**	**2.1 J**	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin ketone	1.95	--	4.2 U	**4.5**	4.0 U	5.2 U	**87 K**	3.7 UJ	4.1 U	3.8 U	3.5 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-BHC (Lindane)	7.75	--	2.1 U	2.2 U	2.1 U	2.7 U	14 U	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-Chlordane	11.0	--	2.1 U	2.2 U	2.1 U	2.7 U	**15 K**	1.9 UJ	2.1 U	1.9 U	1.8 U	NA	NA	NA	NA	13 UL	13 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Semivolatile Organic Compounds (UG/KG)																						
1,1-Biphenyl	13,600	--	NA	NA	NA	NA	NA	340 U	410 U	360 U	360 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2,4-Dimethylphenol	1,000	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	520 U	620 U	550 U	550 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
2-Methylnaphthalene	LMW PAH	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	21 U	25 U	22 U	22 U	NA	NA	13 U	10 U	330 U	32 U	31 U	31 U	31 U	30 U	30 UL
2-Methylphenol	1,000	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	620 U	740 U	660 U	660 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
3- and 4-Methylphenol	1,000	--	NA	NA	NA	NA	NA	590 U	700 U	620 U	630 U	NA	NA	NA	NA	520 U	250 U	250 UL	250 UL	500 UL	480 UL	480 UL
Acenaphthene	LMW PAH	--	**330 J**	2,100 U	400 U	2,600 U	5,500 U	21 U	25 U	22 U	22 U	NA	NA	**3.0 J**	10 U	330 U	32 U	31 U	31 U	31 U	**36 J**	30 U
Acenaphthylene	LMW PAH	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	21 U	25 U	22 U	22 U	NA	NA	13 U	10 U	330 U	32 U	31 U	31 U	31 U	**70**	30 U
Anthracene	LMW PAH	--	**530 J**	2,100 U	400 U	2,600 U	5,500 U	**4.0 J**	**4.2 J**	**1.7 J**	**2.4 J**	NA	NA	**6.0 J**	**2.1 J**	**420 J**	32 U	31 U	31 U	**31 J**	**120**	**22 J**
Benzaldehyde	58,400	--	NA	NA	NA	NA	NA	370 UJ	440 UJ	390 UJ	400 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Benzo(a)anthracene	HMW PAH	--	**1,100 J**	**290 J**	400 U	2,600 U	**1,100 J**	**16 J**	**23 J**	**14 J**	**16 J**	NA	NA	**24 J**	**12 J**	**1,300**	**92**	**51**	**41**	**110**	**450**	**88**
Benzo(a)pyrene	HMW PAH	--	**950 J**	**440 J**	400 U	2,600 U	**2,300 J**	**7.8 J**	**14 J**	**5.8 J**	**10 J**	NA	NA	**20 J**	**9.3 J**	**1,100**	**79**	**45**	**38 J**	**94**	**450**	**77**
Benzo(b)fluoranthene	HMW PAH	--	**1,100 J**	**320 J**	**76 J**	**330 J**	**1,700 J**	**18 J**	**29**	**16 J**	**20 J**	NA	NA	**37**	18 B	**1,800**	**190**	**80**	**69**	**170**	**810**	**130**
Benzo(g,h,i)perylene	HMW PAH	--	**650 J**	**340 J**	**61 J**	2,600 U	**1,200 J**	21 UL	**2.5 L**	22 UL	22 UL	NA	NA	**12 J**	**7.0 J**	**530**	**43**	**32 J**	**27 J**	**42**	**190**	**49**
Benzo(k)fluoranthene	HMW PAH	--	**770 J**	**470 J**	**53 J**	**320 J**	**1,700 J**	**3.7 J**	**6.3 J**	22 U	**5.5 J**	NA	NA	**9.3 J**	**5.9 J**	**640**	**59**	**30 J**	**24 J**	**45**	**260**	**48**
bis(2-Ethylhexyl)phthalate	30,000	--	16,000 B	3,000 B	100 B	11,000 B	5,500 U	100 U	120 U	110 U	110 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	**3,500 L**	240 UL
Butylbenzylphthalate	30,000	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	340 U	410 U	360 U	360 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Carbazole	7,000	--	**250 J**	2,100 U	400 U	2,600 U	5,500 U	**2.6 J**	**3.8 J**	22 U	**3.6 J**	NA	NA	NA	NA	**420 J**	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Chrysene	HMW PAH	--	**1,300 J**	**520 J**	**75 J**	**410 J**	**2,200 J**	**4.0 J**	**8.6 J**	22 U	**7.7 J**	NA	NA	**29 J**	**12 J**	**1,400**	**120**	**58**	**47**	**120**	**580**	**97**
Dibenz(a,h)anthracene	HMW PAH	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	**10 J**	**13 J**	22 U	22 U	NA	NA	**4.1 J**	**4.0 J**	330 U	**17 J**	31 U	31 U	31 U	**54**	30 U
Dibenzofuran	4,600	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	340 U	410 U	360 U	360 U	NA	NA	NA	NA	**380 J**	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Di-n-octylphthalate	30,000	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	660 U	790 U	700 U	700 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Fluoranthene	LMW PAH	--	**2,700**	**660 J**	**49 J**	**510 J**	**1,800 J**	**21**	**36**	**17 J**	**29**	NA	NA	**48**	**22**	**3,400**	**75**	**100**	**92**	**260**	**1,100**	**180**
Fluorene	LMW PAH	--	**250 J**	2,100 U	400 U	2,600 U	5,500 U	21 U	25 U	22 U	22 U	NA	NA	**4.7 J**	10 U	330 U	32 U	31 U	31 U	31 U	**67**	30 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	**600 J**	**250 J**	**48 J**	2,600 U	**1,300 J**	**12 K**	**18 K**	**9.8 K**	**20 J**	NA	NA	**27 J**	**13 J**	**520**	**42**	**28 J**	**24 J**	**40 J**	**190**	**44**
Naphthalene	LMW PAH	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	21 U	25 U	22 U	22 U	NA	NA	13 U	10 U	330 U	32 U	31 U	31 U	31 U	**28 J**	30 U
PAH (HMW)	18,000	--	**9,820**	**4,480**	**959**	**8,000**	**17,250**	**96.0**	**135**	**96.6**	**118**	NA	NA	**215**	**96.2**	**10,055**	**721**	**425**	**363**	**837**	**3,874**	**698**
PAH (LMW)	29,000	--	**10,410**	**8,570**	**1,649**	**10,910**	**22,450**	**104**	**136**	**93.1**	**112**	NA	NA	**119**	**65.1**	**7,675**	**252**	**312**	**300**	**674**	**2,256**	**507**
Phenanthrene	LMW PAH	--	**2,400**	**560 J**	400 U	2,600 U	**1,400 J**	**16 J**	**21 J**	**8.4 J**	**15 J**	NA	NA	**38**	**16 J**	**2,900**	32 U	**54**	**50**	**180**	**700**	**110**
Phenol	1,880	--	2,100 U	2,100 U	400 U	2,600 U	5,500 U	480 U	580 U	510 U	520 U	NA	NA	NA	NA	260 U	130 U	130 UL	130 UL	250 UL	240 UL	240 UL
Pyrene	HMW PAH	--	**2,300**	**800 J**	**46 J**	**440 J**	**3,000 J**	**14 J**	**21 J**	**7.0 J**	**17 J**	NA	NA	**53**	**24**	**2,600**	**79**	**85**	**77**	**200**	**890**	**150**
Volatile Organic Compounds (UG/KG)																						
2-Butanone	NSV	--	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	26 U	31 U	28 UJ	30 UJ	NA	NA	NA	NA	3.3 U	2.8 U	**3.5 J**	**3.2 J**	3.1 U	3.0 U	3.0 U
Acetone	NSV	--	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	70 B	**100**	78 B	**94 J**	NA	NA	NA	NA	16 U	14 U	**45**	**27 J**	15 U	**9.6 J**	15 U
Chloroform	1,844	--	13.4 U	11.9 U	11.6 U	14.8 U	14.8 R	6.0 U	7.0 U	7.0 UJ	7.0 UJ	NA	NA	NA	NA	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Methylene chloride	1,250	--	8.0 B	11.9 U	9.0 B	11 B	11 B	26 U	31 U	28 UJ	30 UJ	NA	NA	NA	NA	6.6 U	5.6 U	7.2 U	7.6 U	6.2 U	6.0 U	6.0 U
Styrene	64,000	--	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	5.0 U	**2.0 J**	**2.0 J**	6.0 UJ	NA	NA	NA	NA	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Toluene	40,000	--	13.4 U	11.9 U	11.6 U	14.8 UL	14.8 R	5.0 U	6.0 U	6.0 UJ	**2.0 J**	NA	NA	NA	NA	1.3 U	1.1 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Xylene, total	1,300	--	**2.0 J**	11.9 U	11.6 U	14.8 UL	14.8 R	16 U	18 U	17 UJ	18 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters																						
pH	--	--	NA	NA	NA	NA	NA	**5.00**	**6.00**	**5.20**	**5.50**	NA	NA	**4.00**	**3.90**	**6.70**	**6.70**	**6.40**	NA	**6.90**	**6.30**	**6.70**
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	**5,600**	**16,000**	**17,000**	**17,000**	NA	NA	**59,000**	**32,000**	**11,000**	**3,800**	**17,000**	NA	**7,100**	**11,000**	**4,100**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-42

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Surface Soil - NW

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	18 / 18	3,960	18,000	CAS04-SS05-1109	9,305	3,254	10,639	pH < 5.5	4 / 18	--	mean pH in range		--	-- / --	--	NO
Arsenic	-- - --	18 / 18	1.00	346	CAS04-SS13-1012	22.5	80.7	55.6	18.0	1 / 18	19.2	3.09	1.25	6.36	3 / 18	54.4	**YES**
Chromium (hexavalent)	0.24 - 0.24	0 / 1	--	--	--	0.12	--	--	0.40	-- / --	0.60	--	0.30	--	-- / --	--	NO
Copper	2.90 - 2.90	17 / 18	1.90	77.8	CAS004-4HA06-00-1199	22.0	24.7	32.1	70.0	1 / 18	1.11	0.46	0.31	--	-- / --	--	NO
Iron	-- - --	18 / 18	3,450	116,000	CAS04-SS13-1012	21,844	28,197	33,406	5 < pH > 8	6 / 18	--	mean pH in range		--	-- / --	--	NO
Lead	11.6 - 13.6	15 / 18	9.20	793	CAA03-SS06-1109	67.9	183	143	120	1 / 18	6.61	1.19	0.57	17.4	10 / 18	45.6	**YES**
Manganese	-- - --	18 / 18	19.1	511	CAS04-SS13-1012	151	130	204	220	5 / 18	2.32	0.93	0.69	--	-- / --	--	NO
Mercury	0.035 - 0.035	17 / 18	0.010	0.12	CAA03-SS02-1109	0.043	0.031	0.056	0.10	2 / 18	1.20	0.56	0.43	--	-- / --	--	NO
Nickel	-- - --	18 / 18	1.80	46.7	CAS04-SS13-1012	11.5	14.0	17.3	38.0	3 / 18	1.23	0.45	0.30	--	-- / --	--	NO
Selenium	0.59 - 2.80	14 / 18	0.16	0.87	CAS04-SS13-1012	0.47	0.31	0.60	0.52	2 / 18	1.67	1.15	0.90	0.51	2 / 18	1.71	**YES**
Thallium	0.070 - 2.00	2 / 18	0.47	1.10	CAS004-4HA06-00-1199	0.24	0.33	0.38	1.00	1 / 18	1.10	0.38	0.24	--	-- / --	--	NO
Zinc	-- - --	18 / 18	9.70	242	CAS04-SS10-1012	63.8	60.7	88.6	120	3 / 18	2.02	0.74	0.53	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDT	1.00 - 3.60	10 / 12	1.60	88.0	CAA03-SS06-1109	18.2	30.8	34.2	100	0 / 12	0.88	0.34	0.18	--	-- / --	--	NO
Aldrin	1.60 - 40.0	0 / 12	--	--	--	2.53	5.50	5.38	3.63	-- / --	11.0	1.48	0.70	--	-- / --	--	NO
Dieldrin	3.20 - 4.20	2 / 12	1.40	650	CAA03-SS06-1109	55.8	187	153	10.5	1 / 12	61.9	14.6	5.32	--	-- / --	--	**YES**
Endosulfan I	1.60 - 2.00	2 / 12	0.91	2,200	CAA03-SS06-1109	184	635	513	6.32	1 / 12	348	81.2	29.1	--	-- / --	--	**YES**
Endosulfan II	3.20 - 78.0	0 / 12	--	--	--	4.94	10.7	10.5	6.32	-- / --	12.3	1.66	0.78	--	-- / --	--	NO
Endosulfan sulfate	3.20 - 78.0	2 / 12	1.90	8.90	CAA03-SS02-1109	5.55	10.7	11.1	6.32	1 / 12	1.41	1.76	0.88	--	-- / --	--	**YES**
Endrin	3.20 - 3.90	6 / 12	3.90	130	CAA03-SS06-1109	20.1	37.8	39.7	1.95	6 / 12	66.7	20.4	10.3	--	-- / --	--	**YES**
Endrin aldehyde	3.20 - 78.0	5 / 12	1.00	5.40	CAA03-SS08-1109	5.40	10.6	10.9	1.95	4 / 12	2.77	--	2.77	--	-- / --	--	**YES**
Endrin ketone	3.20 - 78.0	0 / 12	--	--	--	4.94	10.7	10.5	1.95	-- / --	40.0	5.39	2.53	--	-- / --	--	NO
gamma-BHC (Lindane)	1.70 - 2.10	4 / 12	0.82	860	CAA03-SS06-1109	73.6	248	202	7.75	2 / 12	111	26.1	9.50	--	-- / --	--	**YES**
gamma-Chlordane	1.60 - 40.0	0 / 12	--	--	--	2.53	5.50	5.38	11.0	-- / --	3.64	0.49	0.23	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
3- and 4-Methylphenol	590 - 730	1 / 11	1,200	1,200	CAA03-SS06-1109	402	266	547	1,000	1 / 11	1.20	0.55	0.40	--	-- / --	--	NO
Carbazole	3,900 - 3,900	11 / 12	2.10	120,000	CAA03-SS06-1109	10,215	34,578	28,141	7,000	1 / 12	17.1	4.02	1.46	--	-- / --	--	**YES**
Dibenzofuran	340 - 3,900	1 / 12	19,000	19,000	CAA03-SS06-1109	1,901	5,409	4,705	4,600	1 / 12	4.13	1.02	0.41	--	-- / --	--	**YES**
PAH (HMW)	-- - --	18 / 18	88.8	1,348,000	CAA03-SS06-1109	81,110	316,447	210,863	18,000	2 / 18	74.9	11.7	4.51	--	-- / --	--	**YES**
PAH (LMW)	-- - --	18 / 18	70.2	1,253,100	CAA03-SS06-1109	73,108	294,584	193,896	29,000	2 / 18	43.2	6.69	2.52	--	-- / --	--	**YES**
Volatile Organic Compounds (UG/KG)																	
2-Butanone	12.1 - 34.0	2 / 12	22.0	24.0	CAA03-SS09-1109	15.0	4.63	17.4	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	12.1 - 110	4 / 12	100	640	CAA03-SS09-1109	140	218	253	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Other Parameters																	
pH	-- - --	17 / 17	4.60	8.80	CAA03-SS07-1109	6.67	1.35	7.24	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	17 / 17	6,200	84,000	CAS04-SS10-1012	27,094	20,581	35,809	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-43

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Surface Soil - South

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	9 / 9	4,560	29,400	CAS04-SS02-1109	8,957	7,809	13,797	pH < 5.5	2 / 9	--	mean pH < 5.5		12,200	1 / 9	2.41	NO
Arsenic	-- - --	9 / 9	1.10	6.40	CAS04-SS02-1109	2.97	1.63	3.98	18.0	0 / 9	0.36	0.22	0.16	--	-- / --	--	NO
Chromium (hexavalent)	0.21 - 0.21	0 / 1	--	--	--	0.11	--	--	0.40	-- / --	0.53	--	0.26	--	-- / --	--	NO
Copper	3.80 - 4.50	7 / 9	1.80	150	CAS004-4HA05-00-1199	22.6	48.4	52.6	70.0	1 / 9	2.14	0.75	0.32	--	-- / --	--	NO
Iron	-- - --	9 / 9	4,370	28,300	CAS04-SS02-1109	11,391	7,194	15,851	5 < pH > 8	0 / 9	--	--	--	--	-- / --	--	NO
Lead	-- - --	9 / 9	7.90	129	CAS004-4HA05-00-1199	28.8	38.8	52.9	120	1 / 9	1.08	0.44	0.24	--	-- / --	--	NO
Manganese	-- - --	9 / 9	27.7	233	CAS004-4HA02-00-1199	88.9	76.7	136	220	1 / 9	1.06	0.62	0.40	--	-- / --	--	NO
Mercury	-- - --	9 / 9	0.010	0.88	CAS004-4HA05-00-1199	0.25	0.34	0.46	0.10	3 / 9	8.80	4.60	2.47	0.111	3 / 9	7.93	**YES**
Nickel	2.20 - 4.10	6 / 9	2.20	12.1	CAS004-4HA05-00-1199	4.78	4.14	7.35	38.0	0 / 9	0.32	0.19	0.13	--	-- / --	--	NO
Selenium	0.64 - 0.81	5 / 9	0.18	1.00	CAS004-4HA04-00-1199	0.38	0.24	0.53	0.52	1 / 9	1.92	1.01	0.72	0.51	1 / 9	1.96	**YES**
Thallium	0.080 - 0.72	0 / 9	--	--	--	0.19	0.13	0.28	1.00	-- / --	0.72	0.28	0.19	--	-- / --	--	NO
Zinc	28.6 - 32.5	7 / 9	10.4	324	CAS004-4HA05-00-1199	89.0	123	165	120	2 / 9	2.70	1.38	0.74	26.5	4 / 9	12.2	**YES**
Pesticides (UG/KG)																	
4,4'-DDT	1.30 - 4.10	3 / 9	7.00	220	CAS004-4HA05-00-1199	27.3	72.3	72.1	100	1 / 9	2.20	0.72	0.27	--	-- / --	--	NO
Aldrin	1.80 - 2.70	1 / 9	33.0	33.0	CAS004-4HA05-00-1199	4.59	10.7	11.2	3.63	1 / 9	9.09	3.08	1.27	--	-- / --	--	**YES**
Dieldrin	3.50 - 27.0	0 / 9	--	--	--	3.29	3.83	5.67	10.5	-- / --	2.57	0.54	0.31	--	-- / --	--	NO
Endosulfan I	1.80 - 14.0	0 / 9	--	--	--	1.71	1.99	2.94	6.32	-- / --	2.22	0.47	0.27	--	-- / --	--	NO
Endosulfan II	3.50 - 27.0	2 / 9	4.40	5.70	CAS004-4HA03-00-1199	3.98	3.82	6.35	6.32	0 / 9	0.90	--	0.63	--	-- / --	--	NO
Endosulfan sulfate	3.50 - 27.0	0 / 9	--	--	--	3.29	3.83	5.67	6.32	-- / --	4.27	0.90	0.52	--	-- / --	--	NO
Endrin	3.50 - 5.20	3 / 9	3.50	28.0	CAS004-4HA05-00-1199	5.57	8.53	10.9	1.95	3 / 9	14.4	5.57	2.86	--	-- / --	--	**YES**
Endrin aldehyde	3.70 - 5.20	3 / 9	1.90	77.0	CAS004-4HA05-00-1199	10.4	25.0	25.9	1.95	2 / 9	39.5	13.3	5.33	--	-- / --	--	**YES**
Endrin ketone	3.50 - 5.20	2 / 9	4.50	87.0	CAS004-4HA05-00-1199	11.7	28.2	29.2	1.95	2 / 9	44.6	15.0	6.01	--	-- / --	--	**YES**
gamma-BHC (Lindane)	1.80 - 14.0	0 / 9	--	--	--	1.71	1.99	2.94	7.75	-- / --	1.81	0.38	0.22	--	-- / --	--	NO
gamma-Chlordane	1.80 - 2.70	1 / 9	15.0	15.0	CAS004-4HA05-00-1199	2.59	4.65	5.48	11.0	1 / 9	1.36	0.50	0.24	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
3- and 4-Methylphenol	590 - 700	0 / 4	--	--	--	318	23.3	345	1,000	-- / --	0.70	0.34	0.32	--	-- / --	--	NO
Carbazole	22.0 - 5,500	4 / 9	2.60	250	CAS004-4HA02-00-1199	523	930	1,100	7,000	0 / 9	0.04	--	--	--	-- / --	--	NO
Dibenzofuran	340 - 5,500	0 / 9	--	--	--	692	885	1,240	4,600	-- / --	1.20	0.27	0.15	--	-- / --	--	NO
PAH (HMW)	1,710 - 1,710	8 / 9	96.0	17,250	CAS004-4HA05-00-1199	4,148	6,173	7,974	18,000	0 / 9	0.96	0.44	0.23	--	-- / --	--	NO
PAH (LMW)	1,710 - 1,710	8 / 9	93.1	22,450	CAS004-4HA05-00-1199	5,191	7,845	10,054	29,000	0 / 9	0.77	0.35	0.18	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																	
2-Butanone	11.2 - 31.0	0 / 8	--	--	--	10.4	4.37	13.3	NSV	-- / --	--	--	--	--	-- / --	--	NO
Acetone	5.00 - 78.0	2 / 8	94.0	100	CAS04-SS02-1109	36.3	40.0	63.1	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	4 / 4	5.00	6.00	CAS04-SS02-1109	5.43	0.43	5.94	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	4 / 4	5,600	17,000	CAS04-SS03-1109	13,900	5,553	20,435	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-44

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Surface Soil - East

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance[5]	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	2 / 2	15,600	19,600	CAS04-SS06-1012	17,600	2,828	30,228	pH < 5.5	2 / 2	--	mean pH not in range		12,200	2 / 2	1.61	**YES**
Arsenic	-- - --	2 / 2	5.20	7.20	CAS04-SS06-1012	6.20	1.41	12.5	18.0	0 / 2	0.40	--	0.34	--	-- / --	--	NO
Copper	-- - --	2 / 2	2.90	4.60	CAS04-SS06-1012	3.75	1.20	9.12	70.0	0 / 2	0.07	--	0.05	--	-- / --	--	NO
Iron	-- - --	2 / 2	17,400	20,300	CAS04-SS06-1012	18,850	2,051	28,005	5 < pH > 8	2 / 2	--	mean pH not in range		19,900	1 / 2	1.02	NO
Lead	-- - --	2 / 2	13.5	24.0	CAS04-SS06-1012	18.8	7.42	51.9	120	0 / 2	0.20	--	0.16	--	-- / --	--	NO
Manganese	-- - --	2 / 2	30.2	40.8	CAS04-SS06-1012	35.5	7.50	69.0	220	0 / 2	0.19	--	0.16	--	-- / --	--	NO
Mercury	-- - --	2 / 2	0.050	0.080	CAS04-SS06-1012	0.065	0.021	0.16	0.10	0 / 2	0.80	--	0.65	--	-- / --	--	NO
Nickel	-- - --	2 / 2	4.80	6.00	CAS04-SS06-1012	5.40	0.85	9.19	38.0	0 / 2	0.16	--	0.14	--	-- / --	--	NO
Selenium	0.74 - 0.74	1 / 2	0.59	0.59	CAS04-SS07-1012	0.48	0.16	1.17	0.52	1 / 2	1.13	--	0.92	0.51	1 / 2	1.16	NO
Thallium	0.16 - 0.18	0 / 2	--	--	--	0.085	0.0071	0.12	1.00	-- / --	0.18	--	0.09	--	-- / --	--	NO
Zinc	-- - --	2 / 2	21.3	29.5	CAS04-SS06-1012	25.4	5.80	51.3	120	0 / 2	0.25	--	0.21	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
PAH (HMW)	-- - --	2 / 2	96.2	215	CAS04-SS06-1012	156	84.3	532	18,000	0 / 2	0.012	--	0.009	--	-- / --	--	NO
PAH (LMW)	-- - --	2 / 2	65.1	119	CAS04-SS06-1012	92.2	38.3	263	29,000	0 / 2	0.004	--	0.003	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	2 / 2	3.90	4.00	CAS04-SS06-1012	3.95	0.071	4.27	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	2 / 2	32,000	59,000	CAS04-SS06-1012	45,500	19,092	130,736	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-45

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Youth Pond Surface Soil - Developed Area

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	2 / 2	5,330	11,000	CAYP-SS02-1012	8,165	4,009	26,064	pH < 5.5	0 / 2	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	2 / 2	3.79	4.72	CAYP-SS02-1012	4.26	0.66	7.19	18.0	0 / 2	0.26	--	0.24	--	-- / --	--	NO
Chromium (hexavalent)	-- - --	1 / 1	0.53	0.53	CAYP-SS02-1012	0.53	--	--	0.40	1 / 1	1.33	--	1.33	--	-- / --	--	NO
Copper	-- - --	2 / 2	5.54	19.7	CAYP-SS01-1012	12.6	10.0	57.3	70.0	0 / 2	0.28	--	0.18	--	-- / --	--	NO
Iron	-- - --	2 / 2	11,200	19,400	CAYP-SS02-1012	15,300	5,798	41,186	5 < pH > 8	0 / 2	--	--	--	--	-- / --	--	NO
Lead	-- - --	2 / 2	14.9	39.6	CAYP-SS01-1012	27.3	17.5	105	120	0 / 2	0.33	--	0.23	--	-- / --	--	NO
Manganese	-- - --	2 / 2	52.8	177	CAYP-SS01-1012	115	87.8	507	220	0 / 2	0.80	--	0.52	--	-- / --	--	NO
Mercury	-- - --	2 / 2	0.025	0.066	CAYP-SS02-1012	0.045	0.029	0.17	0.10	0 / 2	0.66	--	0.45	--	-- / --	--	NO
Nickel	-- - --	2 / 2	2.47	4.75	CAYP-SS01-1012	3.61	1.61	10.8	38.0	0 / 2	0.13	--	0.10	--	-- / --	--	NO
Selenium	1.70 - 2.10	0 / 2	--	--	--	0.95	0.14	1.58	0.52	-- / --	4.04	--	1.83	--	-- / --	--	NO
Thallium	1.70 - 2.10	0 / 2	--	--	--	0.95	0.14	1.58	1.00	-- / --	2.10	--	0.95	--	-- / --	--	NO
Zinc	-- - --	2 / 2	50.7	164	CAYP-SS01-1012	107	80.1	465	120	1 / 2	1.37	--	0.89	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDT	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	100	-- / --	0.13	--	0.07	--	-- / --	--	NO
Aldrin	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	3.63	-- / --	3.58	--	1.79	--	-- / --	--	NO
Dieldrin	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	10.5	-- / --	1.24	--	0.62	--	-- / --	--	NO
Endosulfan I	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	6.32	-- / --	2.06	--	1.03	--	-- / --	--	NO
Endosulfan II	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	6.32	-- / --	2.06	--	1.03	--	-- / --	--	NO
Endosulfan sulfate	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	6.32	-- / --	2.06	--	1.03	--	-- / --	--	NO
Endrin	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	1.95	-- / --	6.67	--	3.33	--	-- / --	--	NO
Endrin aldehyde	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	1.95	-- / --	6.67	--	3.33	--	-- / --	--	NO
Endrin ketone	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	1.95	-- / --	6.67	--	3.33	--	-- / --	--	NO
gamma-BHC (Lindane)	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	7.75	-- / --	1.68	--	0.84	--	-- / --	--	NO
gamma-Chlordane	13.0 - 13.0	0 / 2	--	--	--	6.50	0.0	6.50	11.0	-- / --	1.18	--	0.59	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
3- and 4-Methylphenol	250 - 520	0 / 2	--	--	--	193	95.5	619	1,000	-- / --	0.52	--	0.19	--	-- / --	--	NO
Carbazole	130 - 130	1 / 2	420	420	CAYP-SS01-1012	243	251	1,363	7,000	0 / 2	0.06	--	0.03	--	-- / --	--	NO
Dibenzofuran	130 - 130	1 / 2	380	380	CAYP-SS01-1012	223	223	1,217	4,600	0 / 2	0.08	--	0.05	--	-- / --	--	NO
PAH (HMW)	-- - --	2 / 2	721	10,055	CAYP-SS01-1012	5,388	6,600	34,854	18,000	0 / 2	0.56	--	0.30	--	-- / --	--	NO
PAH (LMW)	-- - --	2 / 2	252	7,675	CAYP-SS01-1012	3,964	5,249	27,397	29,000	0 / 2	0.26	--	0.14	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																	
2-Butanone	2.80 - 3.30	0 / 2	--	--	--	1.53	0.18	2.31	NSV	-- / --	--	--	--	--	-- / --	--	NO
Acetone	14.0 - 16.0	0 / 2	--	--	--	7.50	0.71	10.7	NSV	-- / --	--	--	--	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	2 / 2	6.70	6.70	CAYP-SS01-1012	6.70	0.0	6.70	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	2 / 2	3,800	11,000	CAYP-SS01-1012	7,400	5,091	30,130	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-46

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Youth Pond Surface Soil - Northern Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	4 / 4	2,560	6,900	CAYP-SS03-1012	4,908	1,855	7,090	pH < 5.5	0 / 4	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	4 / 4	3.65	7.69	CAYP-SS03-1012	5.57	1.73	7.60	18.0	0 / 4	0.43	0.42	0.31	--	-- / --	--	NO
Chromium (hexavalent)	0.25 - 0.25	1 / 2	0.24	0.24	CAYP-SS06-1012	0.18	0.081	0.55	0.40	0 / 2	0.60	--	0.46	--	-- / --	--	NO
Copper	-- - --	4 / 4	7.08	34.1	CAYP-SS03-1012	21.2	11.7	34.9	70.0	0 / 4	0.49	0.50	0.30	--	-- / --	--	NO
Iron	-- - --	4 / 4	6,870	11,300	CAYP-SS04-1012	8,975	2,251	11,624	5 < pH > 8	0 / 4	--	--	--	--	-- / --	--	NO
Lead	-- - --	4 / 4	9.21	71.9	CAYP-SS05-1012	28.3	29.3	62.7	120	0 / 4	0.60	0.52	0.24	--	-- / --	--	NO
Manganese	-- - --	4 / 4	28.9	217	CAYP-SS03-1012	131	87.6	234	220	0 / 4	0.99	1.06	0.59	--	-- / --	--	NO
Mercury	-- - --	4 / 4	0.0059	0.035	CAYP-SS05-1012	0.017	0.014	0.034	0.10	0 / 4	0.35	0.34	0.17	--	-- / --	--	NO
Nickel	-- - --	4 / 4	2.13	5.60	CAYP-SS03-1012	4.49	1.63	6.41	38.0	0 / 4	0.15	0.17	0.12	--	-- / --	--	NO
Selenium	1.55 - 2.37	1 / 4	0.66	0.66	CAYP-SS05-1012	0.90	0.23	1.18	0.52	1 / 4	1.28	--	--	0.51	1 / 4	1.30	**YES**
Thallium	1.20 - 2.37	0 / 4	--	--	--	0.89	0.25	1.19	1.00	-- / --	2.37	1.19	0.89	--	-- / --	--	NO
Zinc	-- - --	4 / 4	107	272	CAYP-SS04-1012	227	80.3	321	120	3 / 4	2.27	2.68	1.89	26.5	4 / 4	10.3	**YES**
Pesticides (UG/KG)																	
4,4'-DDT	12.0 - 13.0	1 / 4	20.0	20.0	CAYP-SS05-1012	9.63	6.92	17.8	100	0 / 4	0.20	0.18	0.10	--	-- / --	--	NO
Aldrin	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	3.63	-- / --	3.58	1.77	1.69	--	-- / --	--	NO
Dieldrin	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	10.5	-- / --	1.24	0.61	0.58	--	-- / --	--	NO
Endosulfan I	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	6.32	-- / --	2.06	1.02	0.97	--	-- / --	--	NO
Endosulfan II	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	6.32	-- / --	2.06	1.02	0.97	--	-- / --	--	NO
Endosulfan sulfate	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	6.32	-- / --	2.06	1.02	0.97	--	-- / --	--	NO
Endrin	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	1.95	-- / --	6.67	3.29	3.14	--	-- / --	--	NO
Endrin aldehyde	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	1.95	-- / --	6.67	3.29	3.14	--	-- / --	--	NO
Endrin ketone	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	1.95	-- / --	6.67	3.29	3.14	--	-- / --	--	NO
gamma-BHC (Lindane)	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	7.75	-- / --	1.68	0.83	0.79	--	-- / --	--	NO
gamma-Chlordane	12.0 - 13.0	0 / 4	--	--	--	6.13	0.25	6.42	11.0	-- / --	1.18	0.58	0.56	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
3- and 4-Methylphenol	250 - 500	0 / 4	--	--	--	214	59.4	284	1,000	-- / --	0.50	0.28	0.21	--	-- / --	--	NO
Carbazole	130 - 250	0 / 4	--	--	--	108	28.4	141	7,000	-- / --	0.04	0.02	0.02	--	-- / --	--	NO
Dibenzofuran	130 - 250	0 / 4	--	--	--	108	28.4	141	4,600	-- / --	0.05	0.03	0.02	--	-- / --	--	NO
PAH (HMW)	-- - --	4 / 4	425	3,874	CAYP-SS05-1012	1,458	1,620	3,364	18,000	0 / 4	0.22	0.19	0.08	--	-- / --	--	NO
PAH (LMW)	-- - --	4 / 4	312	2,256	CAYP-SS05-1012	937	892	1,986	29,000	0 / 4	0.08	0.07	0.03	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																	
2-Butanone	3.00 - 3.10	1 / 4	3.50	3.50	CAYP-SS03-1012	2.01	0.99	3.18	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	15.0 - 15.0	2 / 4	9.60	45.0	CAYP-SS03-1012	17.4	18.4	39.1	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	4 / 4	6.30	6.90	CAYP-SS04-1012	6.58	0.28	6.90	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	4 / 4	4,100	17,000	CAYP-SS03-1012	9,800	5,570	16,354	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-47

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	-- - --	22 / 22	3,550	31,900	CAS04-SB07-1012	pH < 5.5	9 / 22	--	**YES**
Antimony	0.53 - 1.10	15 / 22	0.040	0.22	CAA03-SB09-1109	78.0	0 / 22	0.003	NO
Arsenic	-- - --	22 / 22	0.62	12.7	CAA03-SB09-1109	18.0	0 / 22	0.71	NO
Barium	-- - --	22 / 22	17.0	247	CAS004-4-HA04-01-1199	330	0 / 22	0.75	NO
Beryllium	0.31 - 0.55	17 / 22	0.31	0.95	CAA03-SB07-1109	40.0	0 / 22	0.02	NO
Cadmium	0.080 - 2.20	6 / 22	0.030	1.20	CAS004-4-HA05-01-1199	32.0	0 / 22	0.04	NO
Calcium [3]	-- - --	22 / 22	107	13,200	CAA03-SB06-1109	NSV	-- / --	NSV	NO
Chromium (hexavalent)	0.22 - 0.22	1 / 2	0.43	0.43	CAS04-SB16-1012	0.40	1 / 2	1.08	**YES**
Chromium	-- - --	24 / 24	6.00	46.2	CAA03-SB09-1109	64.0	0 / 24	0.72	NO
Cobalt	-- - --	22 / 22	1.00	4.30	CAS004-4-HA03-02-1199	13.0	0 / 22	0.33	NO
Copper	1.90 - 4.40	19 / 22	1.40	40.4	CAS004-4-HA03-02-1199	70.0	0 / 22	0.58	NO
Cyanide	0.020 - 0.84	1 / 20	0.44	0.44	CAS004-4-HA04-01-1199	15.8	0 / 20	0.03	NO
Iron	-- - --	22 / 22	3,390	31,800	CAA03-SB09-1109	5 < pH > 8	9 / 22	--	**YES**
Lead	11.0 - 11.0	21 / 22	3.80	45.3	CAS004-4-HA03-02-1199	120	0 / 22	0.38	NO
Magnesium [3]	-- - --	22 / 22	327	2,780	CAA03-SB07-1109	NSV	-- / --	NSV	NO
Manganese	-- - --	22 / 22	20.7	259	CAA03-SB07-1109	220	1 / 22	1.18	**YES**
Mercury	0.030 - 0.036	20 / 22	0.010	0.91	CAS004-4-HA03-02-1199	0.10	4 / 22	9.10	**YES**
Nickel	3.50 - 7.70	20 / 22	2.10	20.4	CAS004-4-HA06-02-1199	38.0	0 / 22	0.54	NO
Potassium [3]	249 - 920	20 / 22	235	3,660	CAA03-SB09-1109	NSV	-- / --	NSV	NO
Selenium	0.60 - 0.94	17 / 22	0.20	0.78	CAS004-4-HA02-02-1199	0.52	1 / 22	1.50	**YES**
Silver	0.50 - 5.80	4 / 22	0.44	8.50	CAS004-4-HA06-02-1199	560	0 / 22	0.02	NO
Sodium [3]	11.6 - 57.1	15 / 22	12.8	101	CAA03-SB06-1109	NSV	-- / --	NSV	NO
Thallium	0.060 - 0.94	1 / 22	0.33	0.33	CAS04-SB01-1109	1.00	0 / 22	0.33	NO
Vanadium	10.1 - 10.1	21 / 22	6.50	64.0	CAS04-SB07-1012	130	0 / 22	0.49	NO
Zinc	28.6 - 28.6	21 / 22	7.80	373	CAS004-4-HA04-01-1199	120	4 / 22	3.11	**YES**
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	9.80 - 67.0	0 / 22	--	--	--	8,000	-- / --	0.01	NO
Aroclor-1221	9.80 - 140	0 / 22	--	--	--	8,000	-- / --	0.02	NO
Aroclor-1232	12.0 - 67.0	0 / 22	--	--	--	8,000	-- / --	0.01	NO
Aroclor-1242	9.80 - 67.0	1 / 22	2,300	2,300	CAS004-4-HA05-01-1199	8,000	0 / 22	0.29	NO
Aroclor-1248	9.80 - 67.0	0 / 22	--	--	--	8,000	-- / --	0.01	NO
Aroclor-1254	9.80 - 67.0	0 / 22	--	--	--	8,000	-- / --	0.01	NO
Aroclor-1260	9.80 - 48.0	3 / 22	51.0	1,600	CAS004-4-HA05-01-1199	8,000	0 / 22	0.20	NO
Pesticides (UG/KG)									
4,4'-DDD	3.30 - 6.70	9 / 20	1.10	20.0	CAA03-SB07-1109	583	0 / 20	0.03	NO
4,4'-DDE	1.60 - 4.60	9 / 20	1.20	24.0	CAA03-SB02-1109A	114	0 / 20	0.21	NO
4,4'-DDT	3.30 - 4.60	9 / 20	1.80	150	CAS004-4-HA05-01-1199	100	1 / 20	1.50	**YES**
Aldrin	1.70 - 3.40	2 / 20	1.10	27.0	CAS004-4-HA05-01-1199	3.63	1 / 20	7.44	**YES**
alpha-BHC	1.70 - 3.40	0 / 20	--	--	--	226	-- / --	0.02	NO
alpha-Chlordane	1.70 - 3.40	2 / 20	0.89	2.40	CAS004-4-HA05-01-1199	11.0	0 / 20	0.22	NO

TABLE L-47

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
beta-BHC	1.70 - 3.40	0 / 20	--	--	--	342	-- / --	0.01	NO
delta-BHC	1.70 - 3.40	1 / 20	1.40	1.40	CAA03-SB06-1109	226	0 / 20	0.01	NO
Dieldrin	3.30 - 6.70	6 / 20	0.65	3.20	CAA03-SB04-1109A	10.5	0 / 20	0.30	NO
Endosulfan I	1.70 - 3.40	0 / 20	--	--	--	6.32	-- / --	0.54	NO
Endosulfan II	3.30 - 6.70	1 / 20	6.50	6.50	CAS004-4-HA03-02-1199	6.32	1 / 20	1.03	**YES**
Endosulfan sulfate	3.30 - 6.70	1 / 20	9.20	9.20	CAA03-SB07-1109	6.32	1 / 20	1.46	**YES**
Endrin	3.30 - 6.70	3 / 20	8.60	96.0	CAA03-SB08-1109	1.95	3 / 20	49.2	**YES**
Endrin aldehyde	3.30 - 6.70	0 / 20	--	--	--	1.95	-- / --	3.44	**YES**
Endrin ketone	3.30 - 4.80	3 / 20	0.88	19.0	CAS004-4-HA05-01-1199	1.95	2 / 20	9.74	**YES**
gamma-BHC (Lindane)	1.70 - 3.40	4 / 20	0.57	6.40	CAA03-SB01-1109	7.75	0 / 20	0.83	NO
gamma-Chlordane	1.70 - 3.40	3 / 20	1.00	23.0	CAA03-SB07-1109	11.0	1 / 20	2.09	**YES**
Heptachlor	1.40 - 3.40	1 / 20	9.90	9.90	CAS004-4-HA05-01-1199	52.9	0 / 20	0.19	NO
Heptachlor epoxide	1.70 - 3.40	0 / 20	--	--	--	52.9	-- / --	0.06	NO
Methoxychlor	17.0 - 34.0	1 / 20	25.0	25.0	CAS004-4-HA05-01-1199	500	0 / 20	0.05	NO
Toxaphene	33.0 - 340	0 / 20	--	--	--	500	-- / --	0.68	NO
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	290 - 390	0 / 15	--	--	--	13,600	-- / --	0.03	NO
1,2,4,5-Tetrachlorobenzene	370 - 490	0 / 15	--	--	--	1,000	-- / --	0.49	NO
2,2'-Oxybis(1-chloropropane)	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
2,4,5-Trichlorophenol	730 - 42,000	0 / 20	--	--	--	1,350	-- / --	31.1	**YES**
2,4,6-Trichlorophenol	430 - 17,000	0 / 20	--	--	--	580	-- / --	29.3	**YES**
2,4-Dichlorophenol	400 - 17,000	0 / 20	--	--	--	500	-- / --	34.0	**YES**
2,4-Dimethylphenol	440 - 17,000	0 / 20	--	--	--	1,000	-- / --	17.0	**YES**
2,4-Dinitrophenol	1,000 - 42,000	0 / 20	--	--	--	20,000	-- / --	2.10	**YES**
2,4-Dinitrotoluene	290 - 480	0 / 20	--	--	--	11,000	-- / --	0.04	NO
2,6-Dinitrotoluene	290 - 480	0 / 20	--	--	--	8,500	-- / --	0.06	NO
2-Chloronaphthalene	18.0 - 17,000	0 / 20	--	--	--	LMW PAH	-- / --	--	--
2-Chlorophenol	440 - 17,000	0 / 20	--	--	--	500	-- / --	34.0	**YES**
2-Methylnaphthalene	12.0 - 17,000	4 / 22	3.60	120	CAA03-SB01-1109	LMW PAH	-- / --	--	--
2-Methylphenol	480 - 17,000	0 / 20	--	--	--	1,000	-- / --	17.0	**YES**
2-Nitroaniline	730 - 42,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
2-Nitrophenol	450 - 17,000	0 / 20	--	--	--	1,000	-- / --	17.0	**YES**
3- and 4-Methylphenol	510 - 670	0 / 15	--	--	--	1,000	-- / --	0.67	NO
3,3'-Dichlorobenzidine	310 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
3-Nitroaniline	730 - 42,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	980 - 42,000	0 / 20	--	--	--	1,000	-- / --	42.0	**YES**
4-Bromophenyl-phenylether	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
4-Chloro-3-methylphenol	440 - 17,000	0 / 20	--	--	--	500	-- / --	34.0	**YES**
4-Chloroaniline	320 - 17,000	0 / 20	--	--	--	500	-- / --	34.0	**YES**
4-Chlorophenyl-phenylether	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
4-Methylphenol	480 - 17,000	0 / 5	--	--	--	1,000	-- / --	17.0	**YES**

TABLE L-47

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
4-Nitroaniline	730 - 42,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
4-Nitrophenol	830 - 42,000	0 / 20	--	--	--	380	-- / --	111	**YES**
Acenaphthene	12.0 - 17,000	5 / 22	5.90	290	CAA03-SB01-1109	LMW PAH	-- / --	--	--
Acenaphthylene	12.0 - 17,000	4 / 22	18.0	100	CAA03-SB02-1109A	LMW PAH	-- / --	--	--
Acetophenone	480 - 630	0 / 15	--	--	--	NSV	-- / --	NSV	NO
Anthracene	12.0 - 17,000	5 / 22	35.0	1,200	CAA03-SB01-1109	LMW PAH	-- / --	--	--
Atrazine	290 - 390	0 / 15	--	--	--	11.9	-- / --	32.8	**YES**
Benzaldehyde	320 - 420	0 / 15	--	--	--	58,400	-- / --	0.01	NO
Benzo(a)anthracene	13.0 - 17,000	15 / 22	2.70	1,900	CAA03-SB01-1109	HMW PAH	-- / --	--	--
Benzo(a)pyrene	12.0 - 17,000	10 / 22	5.30	1,400	CAA03-SB07-1109	HMW PAH	-- / --	--	--
Benzo(b)fluoranthene	9.80 - 17,000	10 / 22	8.90	2,300	CAA03-SB07-1109	HMW PAH	-- / --	--	--
Benzo(g,h,i)perylene	3.00 - 17,000	8 / 20	2.40	560	CAA03-SB07-1109	HMW PAH	-- / --	--	--
Benzo(k)fluoranthene	12.0 - 17,000	8 / 22	64.0	760	CAS004-4-HA06-02-1199	HMW PAH	-- / --	--	--
bis(2-Chloroethoxy)methane	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
bis(2-Ethylhexyl)phthalate	89.0 - 4,300	3 / 20	41.0	63,000	CAS004-4-HA03-02-1199	30,000	1 / 20	2.10	**YES**
Butylbenzylphthalate	290 - 17,000	0 / 20	--	--	--	30,000	-- / --	0.57	NO
Caprolactam	450 - 500	0 / 3	--	--	--	NSV	-- / --	NSV	NO
Carbazole	18.0 - 17,000	5 / 20	17.0	650	CAA03-SB01-1109	7,000	0 / 20	0.09	NO
Chrysene	13.0 - 17,000	9 / 22	2.20	1,800	CAA03-SB01-1109	HMW PAH	-- / --	--	--
Dibenz(a,h)anthracene	13.0 - 17,000	7 / 22	4.20	250	CAA03-SB07-1109	HMW PAH	-- / --	--	--
Dibenzofuran	290 - 17,000	2 / 20	120	350	CAA03-SB01-1109	4,600	0 / 20	0.08	NO
Diethylphthalate	290 - 17,000	0 / 20	--	--	--	26,800	-- / --	0.63	NO
Dimethyl phthalate	290 - 17,000	0 / 20	--	--	--	10,640	-- / --	1.60	**YES**
Di-n-butylphthalate	66.0 - 5,700	1 / 20	90,000	90,000	CAS004-4-HA04-01-1199	40,000	1 / 20	2.25	**YES**
Di-n-octylphthalate	480 - 17,000	0 / 20	--	--	--	30,000	-- / --	0.57	NO
Fluoranthene	7.40 - 17,000	11 / 22	2.70	5,400	CAA03-SB01-1109	LMW PAH	-- / --	--	--
Fluorene	12.0 - 17,000	5 / 22	12.0	660	CAA03-SB01-1109	LMW PAH	-- / --	--	--
Hexachlorobenzene	18.0 - 17,000	1 / 20	7.20	7.20	CAA03-SB08-1109	1,000	0 / 20	0.01	NO
Hexachlorobutadiene	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Hexachlorocyclopentadiene	290 - 17,000	0 / 20	--	--	--	2,000	-- / --	8.50	**YES**
Hexachloroethane	18.0 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Indeno(1,2,3-cd)pyrene	18.0 - 17,000	9 / 22	3.70	1,400	CAA03-SB01-1109	HMW PAH	-- / --	--	--
Isophorone	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Naphthalene	12.0 - 17,000	4 / 22	7.40	240	CAA03-SB01-1109	LMW PAH	-- / --	--	--
n-Nitroso-di-n-propylamine	290 - 17,000	0 / 20	--	--	--	NSV	-- / --	NSV	NO
n-Nitrosodiphenylamine	480 - 17,000	0 / 20	--	--	--	1,090	-- / --	15.6	**YES**
Nitrobenzene	290 - 480	0 / 20	--	--	--	2,260	-- / --	0.21	NO
PAH (HMW)	81.0 - 76,500	17 / 22	49.8	13,910	CAA03-SB07-1109	18,000	0 / 22	0.77	NO
PAH (LMW)	81.0 - 76,500	11 / 22	43.9	18,080	CAS004-4-HA05-01-1199	29,000	0 / 22	0.62	NO
Pentachlorophenol	89.0 - 42,000	0 / 20	--	--	--	5,000	-- / --	8.40	**YES**

TABLE L-47

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Phenanthrene	2.50 - 17,000	8 / 22	3.20	5,000	CAA03-SB01-1109	LMW PAH	-- / --	--	--
Phenol	420 - 17,000	0 / 20	--	--	--	1,880	-- / --	9.04	**YES**
Pyrene	13.0 - 17,000	11 / 22	3.80	4,000	CAA03-SB01-1109	HMW PAH	-- / --	--	--
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	6.00 - 20.4	0 / 20	--	--	--	1,025	-- / --	0.02	NO
1,1,2,2-Tetrachloroethane	5.00 - 20.4	0 / 20	--	--	--	5,000	-- / --	0.004	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	6.00 - 7.00	0 / 15	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	5.00 - 20.4	0 / 20	--	--	--	2,000	-- / --	0.01	NO
1,1-Dichloroethane	6.00 - 20.4	0 / 20	--	--	--	548	-- / --	0.04	NO
1,1-Dichloroethene	5.00 - 20.4	0 / 20	--	--	--	173	-- / --	0.12	NO
1,2,4-Trichlorobenzene	5.00 - 17,000	0 / 20	--	--	--	1,270	-- / --	13.4	**YES**
1,2-Dibromo-3-chloropropane	5.00 - 6.00	0 / 15	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromoethane	5.00 - 6.00	0 / 15	--	--	--	300	-- / --	0.02	NO
1,2-Dichlorobenzene	5.00 - 17,000	0 / 20	--	--	--	1,000	-- / --	17.0	**YES**
1,2-Dichloroethane	5.00 - 20.4	0 / 20	--	--	--	2,190	-- / --	0.01	NO
1,2-Dichloroethene (total)	12.8 - 20.4	0 / 5	--	--	--	447	-- / --	0.05	NO
1,2-Dichloropropane	5.00 - 20.4	0 / 20	--	--	--	38,800	-- / --	0.001	NO
1,3-Dichlorobenzene	5.00 - 17,000	0 / 20	--	--	--	1,000	-- / --	17.0	**YES**
1,4-Dichlorobenzene	5.00 - 17,000	0 / 20	--	--	--	1,280	-- / --	13.3	**YES**
2-Butanone	12.8 - 30.0	1 / 20	8.00	8.00	CAS004-4-HA02-02-1199	NSV	-- / --	NSV	**YES**
2-Hexanone	12.8 - 30.0	0 / 20	--	--	--	NSV	-- / --	NSV	NO
4-Methyl-2-pentanone	12.8 - 30.0	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Acetone	12.8 - 100	3 / 20	98.0	240	CAA03-SB08-1109	NSV	-- / --	NSV	**YES**
Benzene	5.00 - 20.4	0 / 20	--	--	--	1,140	-- / --	0.02	NO
Bromodichloromethane	5.00 - 20.4	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Bromoform	5.00 - 20.4	0 / 20	--	--	--	300	-- / --	0.07	NO
Bromomethane	9.00 - 20.4	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Carbon disulfide	5.00 - 20.4	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Carbon tetrachloride	5.00 - 20.4	0 / 20	--	--	--	3,400	-- / --	0.01	NO
Chlorobenzene	5.00 - 20.4	0 / 20	--	--	--	2,400	-- / --	0.01	NO
Chloroethane	9.00 - 20.4	0 / 20	--	--	--	5,000	-- / --	0.004	NO
Chloroform	6.00 - 20.4	3 / 20	0.80	1.00	CAA03-SB05-1109A	1,844	0 / 20	0.001	NO
Chloromethane	9.00 - 20.4	0 / 20	--	--	--	5,000	-- / --	0.004	NO
cis-1,2-Dichloroethene	6.00 - 7.00	0 / 15	--	--	--	447	-- / --	0.02	NO
cis-1,3-Dichloropropene	5.00 - 20.4	0 / 20	--	--	--	5,000	-- / --	0.004	NO
Cyclohexane	5.00 - 6.00	0 / 15	--	--	--	6,000	-- / --	0.001	NO
Dibromochloromethane	5.00 - 20.4	0 / 20	--	--	--	NSV	-- / --	NSV	NO
Dichlorodifluoromethane (Freon-12)	9.00 - 12.0	0 / 15	--	--	--	NSV	-- / --	NSV	NO
Ethylbenzene	5.00 - 20.4	1 / 20	2.00	2.00	CAS004-4-HA02-02-1199	1,815	0 / 20	0.001	NO
Isopropylbenzene	5.00 - 6.00	0 / 15	--	--	--	NSV	-- / --	NSV	NO
m- and p-Xylene	10.0 - 13.0	0 / 15	--	--	--	1,300	-- / --	0.01	NO

TABLE L-47

Initial Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Methyl acetate	8.00 - 11.0	0 / 15	--	--	--	NSV	-- / --	NSV	NO
Methylcyclohexane	5.00 - 6.00	0 / 15	--	--	--	NSV	-- / --	NSV	NO
Methylene chloride	7.00 - 30.0	4 / 20	12.0	16.0	CAA03-SB03-1109A	1,250	0 / 20	0.01	NO
Methyl-tert-butyl ether (MTBE)	8.00 - 11.0	0 / 15	--	--	--	NSV	-- / --	NSV	NO
o-Xylene	5.00 - 6.00	0 / 15	--	--	--	1,300	-- / --	0.005	NO
Styrene	5.00 - 20.4	1 / 20	2.00	2.00	CAA03-SB08-1109	64,000	0 / 20	0.00003	NO
Tetrachloroethene	5.00 - 20.4	1 / 20	3.00	3.00	CAS004-4-HA03-02-1199	179	0 / 20	0.02	NO
Toluene	5.00 - 20.4	3 / 20	2.00	5.00	CAA03-SB08-1109	40,000	0 / 20	0.0001	NO
trans-1,2-Dichloroethene	6.00 - 8.00	0 / 15	--	--	--	447	-- / --	0.02	NO
trans-1,3-Dichloropropene	6.00 - 20.4	0 / 20	--	--	--	5,000	-- / --	0.004	NO
Trichloroethene	6.00 - 20.4	0 / 20	--	--	--	500	-- / --	0.04	NO
Trichlorofluoromethane (Freon-11)	9.00 - 12.0	0 / 15	--	--	--	NSV	-- / --	NSV	NO
Vinyl chloride	9.00 - 20.4	0 / 20	--	--	--	412	-- / --	0.05	NO
Xylene, total	12.8 - 20.4	0 / 20	--	--	--	1,300	-- / --	0.02	NO
Explosives (UG/KG)									
1,3,5-Trinitrobenzene	450 - 500	0 / 5	--	--	--	NSV	-- / --	NSV	NO
1,3-Dinitrobenzene	450 - 500	0 / 5	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trinitrotoluene	450 - 500	0 / 5	--	--	--	10,000	-- / --	0.05	NO
2-Amino-4,6-dinitrotoluene	450 - 500	0 / 5	--	--	--	80,000	-- / --	0.01	NO
2-Nitrotoluene	450 - 500	0 / 5	--	--	--	NSV	-- / --	NSV	NO
3-Nitrotoluene	450 - 500	0 / 5	--	--	--	NSV	-- / --	NSV	NO
4-Amino-2,6-dinitrotoluene	450 - 500	0 / 5	--	--	--	80,000	-- / --	0.01	NO
4-Nitrotoluene	450 - 500	0 / 5	--	--	--	NSV	-- / --	NSV	NO
HMX	450 - 500	0 / 5	--	--	--	10,000	-- / --	0.05	NO
RDX	450 - 500	0 / 5	--	--	--	10,000	-- / --	0.05	NO
Tetryl	450 - 500	0 / 5	--	--	--	10,000	-- / --	0.05	NO
Other Parameters									
pH	-- - --	17 / 17	3.90	8.40	CAA03-SB06-1109	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	15 / 15	3,400	18,000	CAA03-SB04-1109A	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

Table L-48

Exceedances - Site 4/Youth Pond Subsurface Soil

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Soil ESV	Background UTL	CAA03-SB01	CAA03-SB02	CAA03-SB03	CAA03-SB04	CAA03-SB05	CAA03-SB06	CAA03-SB07	CAA03-SB08		CAA03-SB09	CAA03-SB10	CAS004-4HA06	CAS04-SB05	CAS04-SO15	CAS004-4HA02	CAS004-4HA03	CAS004-4HA04	CAS004-4HA05	CAS04-SB01	CAS04-SB02
			CAA03-SB01-1109	CAA03-SB02-1109A	CAA03-SB03-1109A	CAA03-SB04-1109A	CAA03-SB05-1109A	CAA03-SB06-1109	CAA03-SB07-1109	CAA03-SB08-1109	CAA03-SB08P-1109	CAA03-SB09-1109	CAA03-SB10-1109	CAS004-4-HA06-02-1199	CAS04-SB05-1109	CAS04-SB15-1012	CAS004-4-HA02-02-1199	CAS004-4-HA03-02-1199	CAS004-4-HA04-01-1199	CAS004-4-HA05-01-1199	CAS04-SB01-1109	CAS04-SB02-1109
			Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 NW	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South	Site 4 South
			11/03/09	11/04/09	11/04/09	11/04/09	11/04/09	11/04/09	11/05/09	11/05/09	11/05/09	11/05/09	11/05/09	11/12/99	11/03/09	10/23/12	11/12/99	11/12/99	11/12/99	11/12/99	11/03/09	11/03/09
Inorganics (MG/KG)																						
Aluminum	pH < 5.5	13,000	**8,290**	**15,800**	**12,100**	**10,600**	**10,300**	**11,600**	**10,800**	**23,100**	**24,500**	**22,600**	**4,310**	**3,550 L**	**20,700**	NA	**3,670 L**	**9,660 L**	**7,520 L**	**5,850 L**	**29,400**	**5,310**
Antimony	78.0	--	**0.1 L**	**0.11 L**	**0.11 L**	**0.09 L**	**0.05 L**	**0.08 L**	**0.08**	**0.14**	**0.12**	**0.22**	**0.04 J**	1.1 B	**0.12 L**	NA	0.53 U	0.53 U	0.69 U	1.1 B	**0.15 L**	**0.04 L**
Arsenic	18.0	--	**2.4**	**4**	**2.3**	**2.4**	**1.7**	**2.7**	**2.4**	**5.7**	**5.7**	**12.7**	**0.71**	**4.2 L**	**5.7**	NA	**1.8 L**	**2.9 L**	**3.9 L**	**3.7 L**	**6.9**	**0.62**
Barium	330	--	**33**	**54.8 J**	**50.4 J**	**45.7 J**	**49.5 J**	**31.8 J**	**32.3**	**28.1**	**30.8**	**31.2**	**17**	**33.2 J**	**22 J**	NA	**20.2 J**	**48 J**	**247**	**30.6 J**	**42.8**	**28.6**
Beryllium	40.0	--	**0.45 J**	**0.6**	**0.56**	**0.53**	**0.53**	**0.51**	**0.95**	**0.52 J**	**0.55**	**0.89**	**0.31 J**	0.35 B	**0.57**	NA	0.31 B	0.39 B	0.4 B	0.55 B	**0.49 J**	**0.35 J**
Cadmium	32.0	--	1 U	0.86 U	1 U	0.85 U	0.89 U	**0.03 J**	**0.06 J**	1.1 U	0.98 U	**0.03 J**	0.65 U	0.15 U	**0.07 J**	NA	0.08 U	0.08 U	**0.96 J**	**1.2 J**	2.2 U	0.73 U
Chromium (hexavalent)	0.40	No value	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	NA	NA	NA	NA	NA	NA
Chromium	64.0	--	**12 K**	**18.1**	**14.6**	**13.7**	**11.5**	**16**	**17.6**	**33.6**	**35.6**	**46.2**	**6**	**29.2**	**33.4**	**13.9**	**6.9**	**15.9**	**13.4**	**17.4**	**39.6 K**	**6.1 K**
Cobalt	13.0	--	**2.7**	**3.4**	**2.8**	**3**	**2.7**	**2.6**	**3.5**	**3**	**3.1**	**3.9**	**1**	**3.6 J**	**2.8**	NA	**1.6 J**	**4.3 J**	**3.8 J**	**2.8 J**	**3.9**	**1.8**
Copper	70.0	--	**4.9 K**	**3.6**	**3.6**	**2.9**	**3**	**3.3**	**9.4**	**3.4**	**3.8**	**4**	**1.4 J**	**19.4**	**3.4**	NA	4.4 B	**40.4**	**30**	**30.1**	**2.9 K**	**2.8 K**
Cyanide	15.8	--	0.84 U	0.77 U	0.84 U	0.7 U	0.77 U	0.7 U	0.77 U	0.84 U	0.77 U	0.7 U	0.7 U	0.02 UL	0.77 U	NA	0.03 UL	0.03 UL	**0.44 L**	0.03 UL	0.84 U	0.77 U
Iron	5 < pH > 8	32,000	**8,040**	**16,000 J**	**10,000 J**	**11,100 J**	**7,800 J**	**9,950 J**	**12,300**	**22,400**	**22,900**	**31,800**	**3,390**	**28,000 L**	**21,800 J**	NA	**4,960 L**	**19,300 L**	**12,100 L**	**12,700 L**	**31,600**	**3,830**
Lead	120	--	**10 K**	**12.9**	**14.9**	**10.8**	**9**	**9.6**	**20**	**11.3**	**10.8**	**9.8**	**3.8**	**29.7**	**10.7**	NA	**11.3**	**45.3**	**42.3**	**36.2**	**11 K**	**4.4 K**
Manganese	220	176	**64.1 K**	**161 J**	**86.4 J**	**92.8 J**	**122 J**	**46.8 J**	**259**	**27.3**	**26.8**	**30.5**	**20.7**	**114**	**22.7 J**	NA	**28.3**	**120**	**105**	**40.4**	**32.7 K**	**72.8 K**
Mercury	0.10	0.14	0.036 U	**0.06**	**0.02 J**	**0.03 J**	**0.01 J**	**0.01 J**	**0.02 J**	**0.02 J**	**0.02 J**	**0.01 J**	**0.01 J**	**0.05 J**	**0.01 J**	NA	**0.10 J**	**0.91**	**0.90**	**0.44**	**0.05**	0.03 U
Nickel	38.0	--	**4.1 J**	**5.3**	**5**	**4.5**	**4.4**	**5.3**	**7.4**	**6.5**	**6.8**	**8.9**	**2.1 J**	**20.4**	**5.8**	NA	3.5 B	**17.3**	**13.6**	7.7 B	**8 J**	**2.8 J**
Selenium	0.52	0.64	**0.35 J**	**0.51**	**0.32 J**	**0.34 J**	**0.29 J**	**0.31 J**	**0.43**	**0.4 J**	**0.47 J**	**0.41 J**	**0.23 J**	0.66 U	**0.26 J**	NA	**0.78 J**	0.72 U	0.94 U	0.79 U	**0.51 J**	**0.2 J**
Silver	560	--	1.6 U	1.3 U	1.6 U	1.3 U	1.3 U	1.4 U	1.2 U	**0.44 J**	**0.21 J**	**0.82 J**	0.98 U	**8.5 L**	1.4 U	NA	1.6 B	5.8 B	3.9 B	3.7 B	3.2 U	1.1 U
Thallium	1.00	--	0.11 B	0.18 B	0.13 B	0.13 B	0.11 B	0.11 B	0.12 B	0.2 B	0.2 B	0.22 B	0.06 B	0.53 UL	0.16 B	NA	0.58 UL	0.58 UL	0.75 UL	0.63 UL	**0.33**	0.07 B
Vanadium	130	--	**14.8**	**29.2**	**20.2**	**20.1**	**16.8**	**20.9**	**23.8**	**51.1**	**52.2**	**57**	**6.5**	**20.8**	**51.8**	NA	10.1 B	**12.2**	**17.1**	**20.5**	**57.7**	**7.8**
Zinc	120	28.0	**16.4 K**	**20.2**	**21.1**	**18.1**	**15.1**	**15.5**	**39.6**	**20.9**	**21.3**	**28.1**	**8.1**	**236**	**22.2**	NA	28.6 B	**334**	**373**	**150**	**28.2 K**	**7.8 K**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1242	8,000	--	20 U	19 U	19 U	20 U	19 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U	18 U	NA	48 UL	46 U	67 U	**2,300 L**	20 U	18 U
Aroclor-1260	8,000	--	20 U	19 U	19 U	20 U	19 U	19 U	20 U	21 UJ	21 U	20 UL	19 U	38 U	18 U	NA	48 UL	**51 K**	**330 J**	**1,600 L**	20 U	18 U
Pesticides (UG/KG)																						
4,4'-DDD	583	--	**2.8 J**	**9.2**	**5.1 J**	**13**	**2.6 J**	**2.4 J**	**20 J**	3.8 UJ	**1.1 J**	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA	**4.5 L**	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U
4,4'-DDE	114	--	1.6 B	**24**	**7.4 J**	**20**	**6**	**1.2 J**	**19**	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA	**5.3 P**	4.6 U	**24 J**	**10 J**	3.6 UJ	3.3 U
4,4'-DDT	100	--	3.6 UJ	**23**	3.5 UJ	**3.8**	**1.8 J**	3.5 UJ	**32**	**12 J**	3.8 U	3.6 UJ	3.5 U	**8.4 J**	3.4 UJ	NA	**5.8 P**	4.6 U	**13 J**	**150 L**	3.6 UJ	3.3 U
Aldrin	3.63	--	1.9 UJ	1.8 U	1.8 UJ	1.8 U	1.8 U	1.8 UJ	1.9 U	**1.1 J**	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	**27 J**	1.9 UJ	1.7 U
alpha-Chlordane	11.0	--	1.9 UJ	1.8 U	1.8 UJ	1.8 U	1.8 U	1.8 UJ	**0.89 J**	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	**2.4 J**	1.9 UJ	1.7 U
delta-BHC	226	--	1.9 UJ	1.8 U	1.8 UJ	1.8 U	1.8 U	**1.4 J**	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U
Dieldrin	10.5	--	3.6 UJ	**1.9 J**	**2 J**	**3.2 J**	**1 J**	3.5 UJ	3.6 U	**1.3 J**	3.8 U	**0.65 J**	3.5 U	3.8 U	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U
Endosulfan II	6.32	--	3.6 UJ	3.6 U	3.5 UJ	3.6 U	3.4 U	3.5 UJ	3.6 U	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA	4.8 UL	**6.5 K**	6.7 U	4.3 U	3.6 UJ	3.3 U
Endosulfan sulfate	6.32	--	3.6 UJ	3.6 U	3.5 UJ	3.6 U	3.4 U	3.5 UJ	**9.2 J**	3.8 UJ	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U
Endrin	1.95	--	3.6 UJ	3.6 U	**13 J**	3.6 U	3.4 U	3.5 UJ	3.6 U	**96 J**	**5.5 J**	**8.6 J**	3.5 U	3.8 U	3.4 UJ	NA	4.8 UL	4.6 U	6.7 U	4.3 U	3.6 UJ	3.3 U
Endrin ketone	1.95	--	3.6 UJ	3.6 U	3.5 UJ	3.6 U	3.4 U	3.5 UJ	3.6 U	**0.88 J**	3.8 U	3.6 UJ	3.5 U	3.8 U	3.4 UJ	NA	4.8 UL	4.6 U	**8.9 J**	**19 J**	3.6 UJ	3.3 U
gamma-BHC (Lindane)	7.75	--	**6.4 J**	**1.5 J**	1.8 UJ	**0.57 J**	1.8 U	**4.1 J**	1.9 U	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	2.2 U	1.9 UJ	1.7 U
gamma-Chlordane	11.0	--	1.9 UJ	1.8 U	1.8 UJ	**1 J**	1.8 U	1.8 UJ	**23 J**	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	**4.3 J**	1.9 UJ	1.7 U
Heptachlor	52.9	--	1.9 UJ	1.8 U	1.8 UJ	1.8 U	1.8 U	1.8 UJ	1.4 B	2 UJ	2 U	1.9 UJ	1.8 U	1.9 U	1.8 UJ	NA	2.5 UL	2.4 U	3.4 U	**9.9 J**	1.9 UJ	1.7 U
Methoxychlor	500	--	19 UJ	18 U	18 UJ	18 UJ	18 U	18 UJ	19 U	20 UJ	20 U	19 UJ	18 U	19 U	18 UJ	NA	25 UL	24 U	34 U	**25 J**	19 UJ	17 U
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	LMW PAH	--	**120 J**	**3.6 J**	22 U	22 U	22 U	**9.5 J**	**32 J**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Acenaphthene	LMW PAH	--	**290 J**	**8.5 J**	22 U	**5.9 J**	22 U	**38**	**160**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Acenaphthylene	LMW PAH	--	21 U	**100**	22 U	**23**	22 U	**18 J**	**50 J**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Anthracene	LMW PAH	--	**1,200**	**66**	22 U	**35**	22 U	**120**	**560**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Benzo(a)anthracene	HMW PAH	--	**1,900**	**350**	**11 J**	**180**	**8 J**	**440**	**1,800**	23 U	**11 J**	22 U	18 U	**500 J**	**6.2 J**	NA	**77 J**	11,000 UJ	17,000 UJ	4,300 U	**8.5 J**	**7.3 J**
Benzo(a)pyrene	HMW PAH	--	**1,100**	**330**	**5.3 J**	**260**	22 U	**250**	**1,400**	23 U	**12 J**	22 U	18 U	**600 J**	23 U	NA	**110 J**	11,000 UJ	17,000 UJ	**550 J**	23 U	20 U
Benzo(b)fluoranthene	HMW PAH	--	**1,700**	**470**	22 U	**360**	**8.9 J**	**480**	**2,300**	23 U	**19 J**	22 U	18 U	**490 J**	23 U	NA	**130 J**	11,000 UJ	17,000 UJ	**510 J**	23 U	20 U
Benzo(g,h,i)perylene	HMW PAH	--	**220 L**	**130 L**	22 UL	**66 L**	22 UL	**48 L**	**560 J**	23 R	3 B	22 R	18 R	**440 J**	23 UL	NA	**79 J**	11,000 UJ	17,000 UJ	4,300 U	23 UL	20 UL
Benzo(k)fluoranthene	HMW PAH	--	**710**	**150**	22 U	**84**	22 U	**160**	**600**	23 U	22 U	22 U	18 U	**760 J**	23 U	NA	**64 J**	11,000 UJ	17,000 UJ	**490 J**	23 U	20 U
bis(2-Ethylhexyl)phthalate	30,000	--	110 U	110 U	110 U	110 U	110 U	**41 J**	**160**	120 U	110 U	110 U	89 U	3,800 U	120 U	NA	670 B	**63,000 J**	2,600 B	4,300 U	110 U	100 U
Carbazole	7,000	--	**650 J**	**39**	22 U	**17 J**	22 U	**180 J**	**210 J**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Chrysene	HMW PAH	--	**1,800**	**320**	22 U	**160 J**	22 U	**420**	**1,800**	23 U	**18 J**	22 U	18 U	**620 J**	23 U	NA	**130 J**	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Dibenz(a,h)anthracene	HMW PAH	--	**180 J**	**85 K**	22 U	**70 K**	22 U	**52 K**	**250**	23 U	**4.2 J**	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Dibenzofuran	4,600	--	**350 J**	370 U	360 U	360 U	360 U	370 U	**120 J**	380 U	360 U	360 U	290 U	3,800 U	380 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	370 U	330 U
Di-n-butylphthalate	40,000	--	110 U	110 U	110 U	110 U	110 U	110 U	110 U	120 U	110 U	110 U	89 U	3,800 U	120 U	NA	66 B	5,700 B	**90,000 J**	4,300 U	110 U	100 U
Fluoranthene	LMW PAH	--	**5,400**	**620**	8.4 B	**320**	7.4 B	**1,000**	**4,400**	**4.5 J**	22 U	22 U	18 U	**880 J**	23 U	NA	**160 J**	11,000 UJ	17,000 UJ	**880 J**	23 U	20 U
Fluorene	LMW PAH	--	**660**	**33**	22 U	**12 J**	22 U	**58**	**220**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Hexachlorobenzene	1,000	--	21 U	22 U	22 U	22 U	22 U	22 U	22 U	23 U	**7.2 J**	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Indeno(1,2,3-cd)pyrene	HMW PAH	--	**1,400 K**	**230 J**	**14 J**	**280 J**	22 U	**150 J**	**1,300 J**	5.6 B	21 B	22 U	18 U	3,800 U	23 U	NA	**66 J**	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Naphthalene	LMW PAH	--	**240**	**7.4 J**	22 U	22 U	22 U	**28**	**29**	23 U	22 U	22 U	18 U	3,800 U	23 U	NA	480 U	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
PAH (HMW)	18,000	--	**13,010**	**2,545**	**89.7**	**1,720**	**87.0**	**2,810**	**13,910**	94.8 U	**98.2**	99.0 U	81.0 U	**7,880**	**98.2**	NA	**1,106**	49,500 U	76,500 U	**13,230**	**101**	**87.3**
PAH (LMW)	29,000	--	**12,931**	**1,110**	82.5 U	**559**	82.4 U	**2,083**	**8,362**	**96.5**	99.0 U	99.0 U	81.0 U	**14,580**	104 U	NA	**1,940**	49,500 U	76,500 U	**18,080**	104 U	90.0 U
Phenanthrene	LMW PAH	--	**5,000**	**260**	2.5 B	**130**	3.4 B	**800**	**2,900**	23 U	22 U	22 U	18 U	**400 J**	23 U	NA	**100 J**	11,000 UJ	17,000 UJ	4,300 U	23 U	20 U
Pyrene	HMW PAH	--	**4,000**	**480**	**4.4 J**	**260**	**4.1 J**	**810**	**3,900**	23 U	22 U	22 U	18 U	**670 J**	23 U	NA	**210 J**	11,000 UJ	17,000 UJ	**930 J**	23 U	20 U
Volatile Organic Compounds (UG/KG)																						
2-Butanone	NSV	--	24 UJ	25 UJ	30 UJ	28 UJ	23 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	27 UJ	12.8 U	28 U	NA	**8 J**	14.2 U	20.4 U	13.0 U	28 UJ	27 UJ
Acetone	NSV	--	69 B	29 B	68 B	60 B	65 B	45 B	52 B	**220 J**	**240 J**	74 B	100 B	12.8 U	**98**	NA	43 B	14.2 U	20.4 U	13.0 U	74 B	46 B
Chloroform	1,844	--	6 UJ	6 UJ	7 UJ	7 UJ	**1 J**	6 UJ	6 UJ	**0.8 J**	7 UJ	7 UJ	6 UJ	12.8 U	7 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	7 UJ	6 UJ
Ethylbenzene	1,815	--	5 UJ	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA	**2 J**	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ
Methylene chloride	1,250	--	**13 J**	25 UJ	**16 J**	28 UJ	23 UJ	25 UJ	25 UJ	30 UJ	30 UJ	29 UJ	**12 J**	20 B	28 U	NA	7 B	17 B	13 B	12 B	28 UJ	27 UJ
Styrene	64,000	--	5 UJ	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	5 UJ	**2 J**	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ
Tetrachloroethene	179	--	5 UJ	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	5 UJ	12.8 UL	6 U	NA	13.7 U	**3 J**	20.4 U	13.0 U	6 UJ	5 UJ
Toluene	40,000	--	5 UJ	5 UJ	6 UJ	6 UJ	5 UJ	**2 J**	5 UJ	6 UJ	**5 J**	6 UJ	5 UJ	12.8 UL	6 U	NA	13.7 U	14.2 U	20.4 U	13.0 U	6 UJ	5 UJ
Other Parameters																						
pH	--	--	**8.10**	**7.60**	**8.20**	**8.30**	**7.30**	**8.40**	**7.20**	**5.20**	**5.20**	**4.60**	**5.00**	NA	**4.40**	NA	NA	NA	NA	NA	**5.00**	**5.80**
Total organic carbon (MG/KG)	--	--	**3,900**	**8,400**	**5,400**	**18,000**	**5,300**	**3,600**	**14,000**	**11,000**	**9,200**	**5,700**	**6,700**	NA	**3,400**	NA	NA	NA	NA	NA	**4,800**	**3,400**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

Table L-48

Exceedances - Site 4/Youth Pond Subsurface Soil

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virg

Chemical	Soil ESV	Background UTL	CAS04-SB03	CAS04-SB04	CAS04-SO16	CAS04-SO06		CAS04-SO07
			CAS04-SB03-1109	CAS04-SB04-1109	CAS04-SB16-1012	CAS04-SB06-1012	CAS04-SB06P-1012	CAS04-SB07-1012
			Site 4 South	Site 4 South	Site 4 South	Site 4 East	Site 4 East	Site 4 East
			11/03/09	11/03/09	10/23/12	10/23/12	10/23/12	10/23/12
Inorganics (MG/KG)								
Aluminum	pH < 5.5	13,000	**22,800**	**6,400**	NA	**25,100**	**25,800**	**31,900**
Antimony	78.0	--	**0.12 L**	**0.05 L**	NA	0.85 U	0.62 U	0.94 UL
Arsenic	18.0	--	**4.8**	**0.89**	NA	**8.8**	**8.9**	**8.4**
Barium	330	--	**32 J**	**25.8 J**	NA	**26.1**	**26.8**	**32.8**
Beryllium	40.0	--	**0.48**	**0.53**	NA	**0.47**	**0.48**	**0.5**
Cadmium	32.0	--	0.94 U	0.86 U	NA	0.51 U	0.37 U	0.56 U
Chromium (hexavalent)	0.40	No value	NA	NA	**0.43 J**	NA	NA	NA
Chromium	64.0	--	**32**	**7.3**	**25.8**	**38.8**	**38.7**	**41.3 K**
Cobalt	13.0	--	**3.4**	**2.6**	NA	**3**	**2.9**	**4**
Copper	70.0	--	**2.7**	2 B	NA	**3.6 J**	**3.6**	1.9 B
Cyanide	15.8	--	0.77 U	0.77 U	NA	NA	NA	NA
Iron	5 < pH > 8	32,000	**20,900 J**	**4,300 J**	NA	**28,900**	**26,800**	**27,800**
Lead	120	--	**9.7**	**5.1**	NA	**12**	**12.1**	11 B
Manganese	220	176	**28 J**	**47.2 J**	NA	**31.9**	**30.8**	**35.6 L**
Mercury	0.10	0.14	**0.04**	**0.01 J**	NA	**0.03 J**	**0.03 J**	**0.04 L**
Nickel	38.0	--	**6.7**	**3.6**	NA	**6.8**	**7.1**	**8.5**
Selenium	0.52	0.64	**0.45 J**	**0.3 J**	NA	**0.43 J**	**0.42 J**	0.6 B
Silver	560	--	1.4 U	1.3 U	NA	**0.64 J**	**0.4 J**	0.5 B
Thallium	1.00	--	0.23 B	0.08 B	NA	0.85 U	0.19 B	0.94 U
Vanadium	130	--	**53.7**	**8.4**	NA	**58.7**	**58**	**64**
Zinc	120	28.0	**22.6**	**11.5**	NA	**24.5**	**24.4**	**27.1**
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1242	8,000	--	21 U	18 U	NA	9.3 U	9.8 U	11 U
Aroclor-1260	8,000	--	21 U	18 U	NA	9.3 U	9.8 U	11 U
Pesticides (UG/KG)								
4,4'-DDD	583	--	3.8 U	3.3 UJ	NA	NA	NA	NA
4,4'-DDE	114	--	3.8 UL	3.3 UJ	NA	NA	NA	NA
4,4'-DDT	100	--	3.8 U	3.3 UJ	NA	NA	NA	NA
Aldrin	3.63	--	2 U	1.7 UJ	NA	NA	NA	NA
alpha-Chlordane	11.0	--	2 U	1.7 UJ	NA	NA	NA	NA
delta-BHC	226	--	2 U	1.7 UJ	NA	NA	NA	NA
Dieldrin	10.5	--	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan II	6.32	--	3.8 U	3.3 UJ	NA	NA	NA	NA
Endosulfan sulfate	6.32	--	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin	1.95	--	3.8 U	3.3 UJ	NA	NA	NA	NA
Endrin ketone	1.95	--	3.8 U	3.3 UJ	NA	NA	NA	NA
gamma-BHC (Lindane)	7.75	--	2 U	1.7 UJ	NA	NA	NA	NA
gamma-Chlordane	11.0	--	2 U	1.7 UJ	NA	NA	NA	NA
Heptachlor	52.9	--	2 U	1.7 UJ	NA	NA	NA	NA
Methoxychlor	500	--	20 U	17 UJ	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)								
2-Methylnaphthalene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Acenaphthene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Acenaphthylene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Anthracene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Benzo(a)anthracene	HMW PAH	--	**6.2 J**	21 U	NA	**2.7 J**	12 U	13 U
Benzo(a)pyrene	HMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Benzo(b)fluoranthene	HMW PAH	--	23 U	21 U	NA	12 U	9.9 B	9.8 B
Benzo(g,h,i)perylene	HMW PAH	--	23 UL	21 UL	NA	12 U	**2.4 J**	13 U
Benzo(k)fluoranthene	HMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
bis(2-Ethylhexyl)phthalate	30,000	--	120 U	110 U	NA	NA	NA	NA
Carbazole	7,000	--	23 U	21 U	NA	NA	NA	NA
Chrysene	HMW PAH	--	23 U	21 U	NA	12 U	**2.2 J**	13 U
Dibenz(a,h)anthracene	HMW PAH	--	23 U	21 U	NA	12 U	**8.1 J**	13 U
Dibenzofuran	4,600	--	390 U	350 U	NA	NA	NA	NA
Di-n-butylphthalate	40,000	--	120 U	110 U	NA	NA	NA	NA
Fluoranthene	LMW PAH	--	23 U	21 U	NA	**4.7 J**	**3.8 J**	**2.7 J**
Fluorene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
Hexachlorobenzene	1,000	--	23 U	21 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	HMW PAH	--	23 U	21 U	NA	**7.3 J**	**4.1 J**	**3.7 J**
Naphthalene	LMW PAH	--	23 U	21 U	NA	12 U	12 U	13 U
PAH (HMW)	18,000	--	**98.2**	94.5 U	NA	**49.8**	**43.4**	**54.1**
PAH (LMW)	29,000	--	104 U	94.5 U	NA	**43.9**	**42.5**	**48.2**
Phenanthrene	LMW PAH	--	23 U	21 U	NA	**3.2 J**	**2.7 J**	13 U
Pyrene	HMW PAH	--	23 U	21 U	NA	**3.8 J**	**3.6 J**	13 U
Volatile Organic Compounds (UG/KG)								
2-Butanone	NSV	--	27 UJ	27 UJ	NA	NA	NA	NA
Acetone	NSV	--	76 B	120 J	NA	NA	NA	NA
Chloroform	1,844	--	6 UJ	**1 J**	NA	NA	NA	NA
Ethylbenzene	1,815	--	5 UJ	5 UJ	NA	NA	NA	NA
Methylene chloride	1,250	--	27 UJ	**12 J**	NA	NA	NA	NA
Styrene	64,000	--	5 UJ	5 UJ	NA	NA	NA	NA
Tetrachloroethene	179	--	5 UJ	5 UJ	NA	NA	NA	NA
Toluene	40,000	--	5 UJ	**2 J**	NA	NA	NA	NA
Other Parameters								
pH	--	--	**4.70**	**5.00**	NA	**3.90**	NA	**4.00**
Total organic carbon (MG/KG)	--	--	**6,100**	**5,400**	NA	NA	NA	NA

Notes:

Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-49

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil - NW

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	12 / 12	3,550	24,500	CAA03-SB08-1109	12,929	6,736	16,421	pH < 5.5	4 / 12	--	mean pH in range		13,000	4 / 12	1.88	**YES**
Chromium (hexavalent)	0.22 - 0.22	0 / 1	--	--	--	0.11	--	--	0.40	-- / --	0.55	--	0.28	--	-- / --	--	NO
Iron	-- - --	12 / 12	3,390	31,800	CAA03-SB09-1109	15,257	8,884	19,862	5 < pH > 8	6 / 12	--	mean pH in range		32,000	0 / 12	0.99	NO
Manganese	-- - --	12 / 12	20.7	259	CAA03-SB07-1109	87.3	70.4	124	220	1 / 12	1.18	0.56	0.40	--	-- / --	--	NO
Mercury	0.036 - 0.036	11 / 12	0.010	0.060	CAA03-SB02-1109A	0.022	0.017	0.031	0.10	0 / 12	0.60	0.31	0.22	--	-- / --	--	NO
Selenium	0.66 - 0.66	11 / 12	0.23	0.51	CAA03-SB02-1109A	0.35	0.085	0.40	0.52	0 / 12	0.98	0.77	0.68	--	-- / --	--	NO
Zinc	-- - --	12 / 12	8.10	236	CAS004-4-HA06-02-1199	38.5	62.7	71.0	120	1 / 12	1.97	0.59	0.32	--	-- / --	--	NO
Pesticides (UG/KG)																	
4,4'-DDT	3.40 - 3.60	6 / 12	1.80	32.0	CAA03-SB07-1109	7.63	10.0	12.8	100	0 / 12	0.32	0.13	0.08	--	-- / --	--	NO
Aldrin	1.80 - 1.90	1 / 12	1.10	1.10	CAA03-SB08-1109	0.93	0.058	0.96	3.63	0 / 12	0.30	0.27	0.26	--	-- / --	--	NO
Endosulfan II	3.40 - 3.80	0 / 12	--	--	--	1.79	0.064	1.82	6.32	-- / --	0.60	0.29	0.28	--	-- / --	--	NO
Endosulfan sulfate	3.40 - 3.80	1 / 12	9.20	9.20	CAA03-SB07-1109	2.40	2.14	3.51	6.32	1 / 12	1.46	0.56	0.38	--	-- / --	--	NO
Endrin	3.40 - 3.80	3 / 12	8.60	96.0	CAA03-SB08-1109	11.1	27.0	25.1	1.95	3 / 12	49.2	12.9	5.71	--	-- / --	--	**YES**
Endrin ketone	3.40 - 3.80	1 / 12	0.88	0.88	CAA03-SB08-1109	1.70	0.26	1.84	1.95	0 / 12	0.45	--	--	--	-- / --	--	NO
gamma-Chlordane	1.80 - 2.00	2 / 12	1.00	23.0	CAA03-SB07-1109	2.77	6.37	6.07	11.0	1 / 12	2.09	0.55	0.25	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
bis(2-Ethylhexyl)phthalate	89.0 - 3,800	2 / 12	41.0	160	CAA03-SB07-1109	216	531	492	30,000	0 / 12	0.005	--	--	--	-- / --	--	NO
Di-n-butylphthalate	89.0 - 3,800	0 / 12	--	--	--	209	533	485	40,000	-- / --	0.095	0.012	0.005	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																	
2-Butanone	12.8 - 30.0	0 / 12	--	--	--	12.8	2.33	14.0	NSV	-- / --	--	--	--	--	-- / --	--	NO
Acetone	12.8 - 100	2 / 12	98.0	240	CAA03-SB08-1109	52.1	63.4	85.0	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	11 / 11	4.40	8.40	CAA03-SB06-1109	6.75	1.61	7.63	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	11 / 11	3,400	18,000	CAA03-SB04-1109A	7,764	4,721	10,344	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-50

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil - South

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	8 / 8	3,670	29,400	CAS04-SB01-1109	11,326	9,446	17,654	pH < 5.5	3 / 8	--	mean pH < 5.5		13,000	2 / 8	2.26	**YES**
Chromium (hexavalent)	-- - --	1 / 1	0.43	0.43	CAS04-SB16-1012	0.43	--	--	0.40	1 / 1	1.08	--	1.08	--	-- / --	--	NO
Iron	-- - --	8 / 8	3,830	31,600	CAS04-SB01-1109	13,711	9,779	20,261	5 < pH > 8	1 / 8	--	mean pH in range		32,000	0 / 8	0.99	NO
Manganese	-- - --	8 / 8	28.0	120	CAS004-4-HA03-02-1199	59.3	36.1	83.5	220	0 / 8	0.55	0.38	0.27	--	-- / --	--	NO
Mercury	0.030 - 0.030	7 / 8	0.010	0.91	CAS004-4-HA03-02-1199	0.31	0.39	0.57	0.10	4 / 8	9.10	5.72	3.08	0.14	3 / 8	6.50	**YES**
Selenium	0.72 - 0.94	5 / 8	0.20	0.78	CAS004-4-HA02-02-1199	0.43	0.17	0.55	0.52	1 / 8	1.50	1.05	0.83	0.64	1 / 8	1.22	**YES**
Zinc	28.6 - 28.6	7 / 8	7.80	373	CAS004-4-HA04-01-1199	118	153	220	120	3 / 8	3.11	1.84	0.98	28.0	4 / 8	13.3	**YES**
Pesticides (UG/KG)																	
4,4'-DDT	3.30 - 4.60	3 / 8	5.80	150	CAS004-4-HA05-01-1199	22.3	51.8	56.9	100	1 / 8	1.50	0.57	0.22	--	-- / --	--	NO
Aldrin	1.70 - 3.40	1 / 8	27.0	27.0	CAS004-4-HA05-01-1199	4.35	9.16	10.5	3.63	1 / 8	7.44	2.89	1.20	--	-- / --	--	**YES**
Endosulfan II	3.30 - 6.70	1 / 8	6.50	6.50	CAS004-4-HA03-02-1199	2.68	1.64	3.78	6.32	1 / 8	1.03	0.60	0.42	--	-- / --	--	NO
Endosulfan sulfate	3.30 - 6.70	0 / 8	--	--	--	2.15	0.56	2.53	6.32	-- / --	1.06	0.40	0.34	--	-- / --	--	NO
Endrin	3.30 - 6.70	0 / 8	--	--	--	2.15	0.56	2.53	1.95	-- / --	3.44	1.30	1.10	--	-- / --	--	NO
Endrin ketone	3.30 - 4.80	2 / 8	8.90	19.0	CAS004-4-HA05-01-1199	4.95	6.18	9.09	1.95	2 / 8	9.74	4.66	2.54	--	-- / --	--	**YES**
gamma-Chlordane	1.70 - 3.40	1 / 8	4.30	4.30	CAS004-4-HA05-01-1199	1.51	1.16	2.29	11.0	0 / 8	0.39	0.21	0.14	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																	
bis(2-Ethylhexyl)phthalate	100 - 4,300	1 / 8	63,000	63,000	CAS004-4-HA03-02-1199	8,376	22,085	23,169	30,000	1 / 8	2.10	0.77	0.28	--	-- / --	--	NO
Di-n-butylphthalate	66.0 - 5,700	1 / 8	90,000	90,000	CAS004-4-HA04-01-1199	11,907	31,574	33,056	40,000	1 / 8	2.25	0.83	0.30	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																	
2-Butanone	13.0 - 28.0	1 / 8	8.00	8.00	CAS004-4-HA02-02-1199	10.8	3.22	12.9	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Acetone	13.0 - 76.0	1 / 8	120	120	CAS04-SB04-1109	32.9	37.3	57.9	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	4 / 4	4.70	5.80	CAS04-SB02-1109	5.13	0.47	5.68	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	4 / 4	3,400	6,100	CAS04-SB03-1109	4,925	1,147	6,275	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-51

Area-Specific Screening Statistics for Plants and Soil Invertebrates - Site 4 Subsurface Soil - East

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																	
Aluminum	-- - --	2 / 2	25,800	31,900	CAS04-SB07-1012	28,850	4,313	48,107	pH < 5.5	2 / 2	--	mean pH not in range		13,000	2 / 2	2.45	**YES**
Iron	-- - --	2 / 2	27,800	28,900	CAS04-SB06-1012	28,350	778	31,823	5 < pH > 8	2 / 2	--	mean pH not in range		32,000	0 / 2	0.90	NO
Manganese	-- - --	2 / 2	31.9	35.6	CAS04-SB07-1012	33.8	2.62	45.4	220	0 / 2	0.16	--	0.15	--	-- / --	--	NO
Mercury	-- - --	2 / 2	0.030	0.040	CAS04-SB07-1012	0.035	0.0071	0.067	0.10	0 / 2	0.40	--	0.35	--	-- / --	--	NO
Selenium	0.60 - 0.60	1 / 2	0.43	0.43	CAS04-SB06-1012	0.37	0.092	0.78	0.52	0 / 2	0.83	--	0.70	--	-- / --	--	NO
Zinc	-- - --	2 / 2	24.5	27.1	CAS04-SB07-1012	25.8	1.84	34.0	120	0 / 2	0.23	--	0.22	--	-- / --	--	NO
Other Parameters																	
pH	-- - --	2 / 2	3.90	4.00	CAS04-SB07-1012	3.95	0.071	4.27	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-52

Screening Statistics - Site 4 Surface Soil - Mammal/Bird Eco-SSLs

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	95% UCL (Norm)	Arithmetic Mean	Mammal Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Bird Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Inorganics (MG/KG)															
Arsenic	-- - --	29 / 29	346	35.4	15.3	46.0	1 / 29	7.52	0.77	0.33	43.0	1 / 29	8.05	0.82	0.36
Cadmium	0.020 - 1.20	12 / 29	3.30	0.72	0.49	0.36	4 / 29	9.17	2.00	1.35	0.77	2 / 29	4.29	0.93	0.63
Chromium	-- - --	31 / 31	63.0	23.4	19.1	34.0	4 / 31	1.85	0.69	0.56	26.0	6 / 31	2.42	0.90	0.74
Copper	2.90 - 4.50	26 / 29	150	31.2	20.9	49.0	4 / 29	3.06	0.64	0.43	28.0	8 / 29	5.36	1.12	0.75
Lead	11.6 - 13.6	26 / 29	793	98.2	52.4	56.0	3 / 29	14.2	1.75	0.93	11.0	20 / 29	72.1	8.93	4.76
Nickel	2.20 - 4.10	26 / 29	46.7	12.7	9.01	130	0 / 29	0.36	0.10	0.07	210	0 / 29	0.22	0.06	0.04
Selenium	0.59 - 2.80	20 / 29	1.00	0.53	0.44	0.63	3 / 29	1.59	0.84	0.70	1.20	0 / 29	0.83	0.44	0.37
Silver	0.28 - 5.20	8 / 29	20.6	2.64	1.45	14.0	1 / 29	1.47	0.19	0.10	4.20	1 / 29	4.90	0.63	0.35
Zinc	28.6 - 32.5	27 / 29	324	95.1	68.9	79.0	8 / 29	4.10	1.20	0.87	46.0	13 / 29	7.04	2.07	1.50
Pesticides (UG/KG)															
4,4'-DDD	3.50 - 27.0	8 / 21	280	40.6	17.9	21.0	2 / 21	13.3	1.93	0.85	93.0	1 / 21	3.01	0.44	0.19
4,4'-DDE	0.67 - 27.0	11 / 21	83.0	19.1	11.0	21.0	3 / 21	3.95	0.91	0.52	93.0	0 / 21	0.89	0.21	0.12
4,4'-DDT	1.00 - 4.10	13 / 21	220	41.4	22.1	21.0	3 / 21	10.5	1.97	1.05	93.0	1 / 21	2.37	0.45	0.24
Dieldrin	3.20 - 27.0	2 / 21	650	86.5	33.3	4.90	1 / 21	133	17.7	6.80	22.0	1 / 21	29.5	3.93	1.51
Semivolatile Organic Compounds (UG/KG)															
PAH (HMW)	1,710 - 1,710	28 / 29	1,348,000	130,478	51,642	1,100	14 / 29	1,225	119	46.9	--	-- - --	--	--	--
PAH (LMW)	1,710 - 1,710	28 / 29	1,253,100	120,308	46,995	100,000	1 / 29	12.5	1.20	0.47	--	-- - --	--	--	--
Pentachlorophenol[1]	100 - 240,000	0 / 21	--	16,445	6,644	2,800	-- / 21	85.7	5.87	2.37	2,100	-- / 21	114	7.83	3.16

Shaded cells indicate HQ > 1

1 - HQs based upon reporting limits

TABLE L-53

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (omnivore)			American Robin (invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	**5.01E+00**	**2.24E+00**	**1.00E+00**	**2.90E+01**	**1.30E+01**	**5.80E+00**	**2.70E+00**	**1.21E+00**	5.39E-01	5.20E-01	4.11E-01	3.26E-01	**1.00E+00**	5.78E-01	3.33E-01	7.62E-01	4.40E-01	2.54E-01	**1.85E+00**	8.29E-01	3.71E-01	2.63E-02	1.52E-02	8.76E-03
Cadmium	2.34E-01	7.40E-02	2.34E-02	**4.06E+00**	**1.28E+00**	4.06E-01	8.76E-01	2.77E-01	8.76E-02	1.97E-01	6.23E-02	1.97E-02	9.60E-01	4.29E-01	1.92E-01	**1.38E+00**	6.16E-01	2.75E-01	1.76E-01	7.86E-02	3.52E-02	7.49E-02	3.35E-02	1.50E-02
Chromium	2.94E-01	1.32E-01	5.89E-02	**1.12E+00**	5.01E-01	2.24E-01	2.17E-01	9.70E-02	4.34E-02	1.30E-01	5.81E-02	2.60E-02	4.88E-01	2.18E-01	9.76E-02	4.56E-01	2.04E-01	9.13E-02	6.12E-01	2.74E-01	1.22E-01	7.46E-02	3.33E-02	1.49E-02
Copper	3.33E-01	2.58E-01	2.00E-01	**1.46E+00**	**1.13E+00**	8.75E-01	2.96E-01	2.29E-01	1.77E-01	8.68E-02	7.64E-02	6.72E-02	9.74E-01	5.64E-01	3.26E-01	**1.00E+00**	5.79E-01	3.35E-01	**1.03E+00**	5.94E-01	3.43E-01	1.78E-01	1.03E-01	5.97E-02
Lead	6.59E-01	4.79E-01	3.48E-01	**3.42E+00**	**2.49E+00**	**1.81E+00**	3.02E-01	2.19E-01	1.59E-01	4.61E-01	3.35E-01	2.44E-01	**1.43E+00**	6.40E-01	2.86E-01	**1.00E+00**	4.49E-01	2.01E-01	**6.14E+00**	**4.34E+00**	**3.07E+00**	2.84E-01	1.27E-01	5.69E-02
Mercury	**1.14E+00**	5.11E-01	2.28E-01	**1.08E+00**	4.85E-01	2.17E-01	4.23E-01	1.89E-01	8.45E-02	5.74E-02	4.45E-02	3.44E-02	6.61E-02	4.23E-02	2.70E-02	2.83E-02	1.81E-02	1.16E-02	1.64E-01	1.16E-01	8.22E-02	1.27E-02	8.12E-03	5.19E-03
Selenium	2.99E-01	2.33E-01	1.81E-01	**2.00E+00**	**1.56E+00**	**1.21E+00**	4.72E-01	3.67E-01	2.86E-01	1.71E-01	1.33E-01	1.04E-01	4.54E-01	2.46E-01	1.33E-01	5.74E-01	3.11E-01	1.68E-01	3.66E-01	2.59E-01	1.83E-01	6.21E-02	3.37E-02	1.82E-02
Silver	1.05E-02	4.69E-03	2.10E-03	3.46E-02	1.55E-02	6.92E-03	4.00E-03	1.79E-03	8.00E-04	3.31E-02	1.48E-02	6.62E-03	4.19E-02	1.87E-02	8.38E-03	2.41E-02	1.08E-02	4.82E-03	8.61E-02	3.85E-02	1.72E-02	9.33E-02	4.17E-02	1.87E-02
Zinc	1.73E-01	7.73E-02	3.46E-02	3.98E-01	1.78E-01	7.97E-02	1.11E-01	4.98E-02	2.23E-02	8.67E-02	3.88E-02	1.73E-02	2.87E-01	1.28E-01	5.74E-02	2.50E-01	1.12E-01	5.00E-02	3.91E-01	1.75E-01	7.82E-02	8.39E-02	3.75E-02	1.68E-02
Polychlorinated Biphenyls																								
Aroclor-1016	8.08E-02	3.61E-02	1.62E-02	6.34E-01	2.83E-01	1.27E-01	1.46E-01	6.52E-02	2.92E-02	1.19E-02	7.53E-03	4.76E-03	1.01E-01	4.54E-02	2.03E-02	1.32E-01	5.89E-02	2.64E-02	5.36E-02	2.40E-02	1.07E-02	3.65E-02	1.63E-02	7.30E-03
Aroclor-1221	3.46E-01	1.55E-01	6.91E-02	**1.69E+00**	7.58E-01	3.39E-01	4.24E-01	1.90E-01	8.48E-02	3.48E-01	1.56E-01	6.96E-02	2.98E-01	1.33E-01	5.96E-02	3.54E-01	1.58E-01	7.08E-02	2.36E-01	1.06E-01	4.72E-02	1.07E-01	4.78E-02	2.14E-02
Aroclor-1232	1.18E-01	5.30E-02	2.37E-02	6.36E-01	2.85E-01	1.27E-01	1.56E-01	6.98E-02	3.12E-02	1.28E-01	5.73E-02	2.56E-02	1.09E-01	4.88E-02	2.18E-02	1.32E-01	5.89E-02	2.64E-02	8.08E-02	3.62E-02	1.62E-02	3.92E-02	1.75E-02	7.83E-03
Aroclor-1242	3.17E-01	1.42E-01	6.34E-02	**3.67E+00**	**1.64E+00**	7.33E-01	8.09E-01	3.62E-01	1.62E-01	6.55E-01	2.93E-01	1.31E-01	5.64E-01	2.52E-01	1.13E-01	7.76E-01	3.47E-01	1.55E-01	1.98E-01	8.84E-02	3.95E-02	2.03E-01	9.08E-02	4.06E-02
Aroclor-1248	5.45E-02	2.44E-02	1.09E-02	6.33E-01	2.83E-01	1.27E-01	1.40E-01	6.25E-02	2.80E-02	1.13E-01	5.05E-02	2.26E-02	9.60E-02	4.30E-02	1.92E-02	1.32E-01	5.90E-02	2.64E-02	3.40E-02	1.52E-02	6.81E-03	3.47E-02	1.55E-02	6.93E-03
Aroclor-1254	4.48E-02	2.01E-02	8.97E-03	6.31E-01	2.82E-01	1.26E-01	1.36E-01	6.09E-02	2.72E-02	1.11E-01	4.95E-02	2.21E-02	9.41E-02	4.21E-02	1.88E-02	1.32E-01	5.89E-02	2.64E-02	2.75E-02	1.23E-02	5.51E-03	3.40E-02	1.52E-02	6.80E-03
Aroclor-1260	4.98E-01	2.23E-01	9.96E-02	**1.40E+01**	**6.24E+00**	**2.79E+00**	**2.92E+00**	**1.31E+00**	5.84E-01	**2.33E+00**	**1.04E+00**	4.66E-01	**2.02E+00**	9.05E-01	4.05E-01	**2.99E+00**	**1.34E+00**	5.98E-01	2.24E-01	1.00E-01	4.49E-02	7.29E-01	3.26E-01	1.46E-01
PCB (total)	4.64E-01	2.08E-01	9.29E-02	**1.69E+00**	7.58E-01	3.39E-01	3.76E-01	1.68E-01	7.52E-02	3.79E-01	1.69E-01	7.58E-02	2.91E-01	1.30E-01	5.83E-02	2.88E-01	1.29E-01	5.77E-02	3.73E-01	1.67E-01	7.47E-02	1.08E-01	4.82E-02	2.16E-02
Pesticides																								
4,4'-DDD	4.45E-02	1.99E-02	8.89E-03	**1.08E+00**	4.83E-01	2.16E-01	2.26E-01	1.01E-01	4.53E-02	1.83E-01	8.19E-02	3.66E-02	1.39E-01	4.41E-02	1.39E-02	2.04E-01	6.45E-02	2.04E-02	1.74E-02	5.50E-03	1.74E-03	3.14E-01	1.40E-01	6.27E-02
4,4'-DDE	2.88E-02	1.29E-02	5.77E-03	**1.07E+00**	4.77E-01	2.13E-01	2.24E-01	1.00E-01	4.49E-02	1.77E-01	7.93E-02	3.55E-02	1.37E-01	4.32E-02	1.37E-02	2.05E-01	6.48E-02	2.05E-02	6.41E-03	2.03E-03	6.41E-04	3.07E-01	1.37E-01	6.13E-02
4,4'-DDT	5.31E-02	2.37E-02	1.06E-02	**1.81E+00**	8.10E-01	3.62E-01	3.79E-01	1.70E-01	7.59E-02	3.02E-01	1.35E-01	6.04E-02	2.32E-01	7.34E-02	2.32E-02	3.46E-01	1.10E-01	3.46E-02	1.42E-02	4.50E-03	1.42E-03	5.21E-01	2.33E-01	1.04E-01
Aldrin	3.95E-03	1.77E-03	7.90E-04	6.68E-02	2.99E-02	1.34E-02	1.43E-02	6.39E-03	2.86E-03	1.16E-02	5.19E-03	2.32E-03	8.50E-02	3.80E-02	1.70E-02	1.21E-01	5.42E-02	2.42E-02	1.72E-02	7.71E-03	3.45E-03	3.07E-02	1.37E-02	6.13E-03
alpha-BHC	4.41E-03	3.12E-03	2.21E-03	3.68E-03	2.60E-03	1.84E-03	1.81E-03	1.28E-03	9.06E-04	1.61E-03	1.14E-03	8.03E-04	1.15E-02	5.72E-03	2.85E-03	5.77E-03	2.88E-03	1.44E-03	2.42E-02	1.21E-02	6.02E-03	4.05E-03	2.02E-03	1.01E-03
alpha-Chlordane	1.23E-05	8.72E-06	6.17E-06	1.10E-04	7.80E-05	5.51E-05	3.18E-05	2.25E-05	1.59E-05	2.01E-05	1.42E-05	1.00E-05	1.07E-04	4.77E-05	2.13E-05	1.50E-04	6.71E-05	3.00E-05	4.36E-05	1.95E-05	8.72E-06	3.84E-05	1.72E-05	7.68E-06
beta-BHC	4.37E-03	3.09E-03	2.19E-03	3.68E-03	2.60E-03	1.84E-03	1.80E-03	1.27E-03	9.00E-04	1.60E-03	1.13E-03	7.99E-04	1.14E-02	5.68E-03	2.84E-03	5.77E-03	2.88E-03	1.44E-03	2.40E-02	1.19E-02	5.96E-03	4.03E-03	2.01E-03	1.00E-03
delta-BHC	1.17E-02	8.30E-03	5.87E-03	1.26E-02	8.91E-03	6.30E-03	5.29E-03	3.74E-03	2.64E-03	4.73E-03	3.34E-03	2.36E-03	3.37E-02	1.68E-02	8.38E-03	2.01E-02	1.00E-02	5.01E-03	6.45E-02	3.22E-02	1.61E-02	1.20E-02	5.96E-03	2.97E-03
Dieldrin	**1.12E+01**	**7.91E+00**	**5.59E+00**	**2.65E+02**	**1.87E+02**	**1.32E+02**	**5.68E+01**	**4.02E+01**	**2.84E+01**	**4.49E+01**	**3.17E+01**	**2.24E+01**	**2.50E+01**	**3.42E+00**	4.68E-01	**3.67E+01**	**5.03E+00**	6.88E-01	**2.69E+00**	3.69E-01	5.05E-02	**8.95E+00**	**1.23E+00**	1.68E-01
Endosulfan I	**2.51E+00**	**1.12E+00**	5.02E-01	**2.15E+00**	9.60E-01	4.29E-01	**1.03E+00**	4.60E-01	2.06E-01	9.23E-01	4.13E-01	1.85E-01	3.46E-02	1.55E-02	6.92E-03	1.77E-02	7.92E-03	3.54E-03	7.24E-02	3.24E-02	1.45E-02	1.22E-02	5.47E-03	2.45E-03
Endosulfan II	3.88E-03	1.73E-03	7.76E-04	5.67E-03	2.53E-03	1.13E-03	2.42E-03	1.08E-03	4.84E-04	1.78E-03	7.95E-04	3.56E-04	6.48E-05	2.90E-05	1.30E-05	4.85E-05	2.17E-05	9.70E-06	1.03E-04	4.62E-05	2.07E-05	2.31E-05	1.03E-05	4.62E-06
Endrin	4.46E-02	1.99E-02	8.92E-03	3.12E-01	1.40E-01	6.25E-02	7.32E-02	3.28E-02	1.46E-02	6.03E-02	2.70E-02	1.21E-02	**1.37E+00**	6.13E-01	2.74E-01	**1.75E+00**	7.83E-01	3.50E-01	4.82E-02	2.16E-02	9.64E-03	4.92E-01	2.20E-01	9.84E-02
gamma-BHC (Lindane)	2.58E-02	1.15E-02	5.16E-03	3.37E-01	1.51E-01	6.74E-02	7.51E-02	3.36E-02	1.50E-02	5.98E-02	2.67E-02	1.20E-02	3.13E-01	1.40E-01	6.27E-02	4.40E-01	1.97E-01	8.79E-02	7.75E-02	3.46E-02	1.55E-02	1.12E-01	5.02E-02	2.24E-02
gamma-Chlordane	9.49E-05	6.71E-05	4.74E-05	1.60E-03	1.13E-03	7.99E-04	3.47E-04	2.45E-04	1.73E-04	2.77E-04	1.96E-04	1.39E-04	1.53E-03	6.83E-04	3.05E-04	2.18E-03	9.77E-04	4.37E-04	5.28E-04	2.36E-04	1.06E-04	5.50E-04	2.46E-04	1.10E-04
Heptachlor	5.32E-03	2.38E-03	1.06E-03	7.40E-02	3.31E-02	1.48E-02	1.60E-02	7.15E-03	3.20E-03	1.31E-02	5.85E-03	2.62E-03	2.43E-02	1.09E-02	4.86E-03	3.40E-02	1.52E-02	6.81E-03	6.28E-03	2.81E-03	1.26E-03	8.77E-03	3.92E-03	1.75E-03
Heptachlor epoxide	1.59E-02	7.12E-03	3.19E-03	2.38E-01	1.06E-01	4.76E-02	5.22E-02	2.33E-02	1.04E-02	4.17E-02	1.86E-02	8.34E-03	7.90E-02	3.53E-02	1.58E-02	1.12E-01	5.01E-02	2.24E-02	1.70E-02	7.61E-03	3.41E-03	2.84E-02	1.27E-02	5.67E-03
Methoxychlor	5.71E-03	4.03E-03	2.85E-03	1.39E-02	9.84E-03	6.96E-03	4.04E-03	2.86E-03	2.02E-03	3.55E-03	2.51E-03	1.77E-03	9.88E-05	4.42E-05	1.98E-05	9.10E-05	4.07E-05	1.82E-05	1.23E-04	5.52E-05	2.47E-05	3.55E-05	1.59E-05	7.10E-06
Toxaphene	6.99E-03	3.12E-03	1.40E-03	2.41E-02	1.08E-02	4.82E-03	6.20E-03	2.77E-03	1.24E-03	5.48E-03	2.45E-03	1.10E-03	1.08E-01	4.84E-02	2.16E-02	1.13E-01	5.05E-02	2.26E-02	1.08E-01	4.83E-02	2.16E-02	3.91E-02	1.75E-02	7.82E-03
Volatile/Semivolatile Organics																								
1,1,2,2-Tetrachloroethane	3.18E-05	1.42E-05	6.36E-06	3.70E-05	1.65E-05	7.40E-06	2.72E-05	1.22E-05	5.44E-06	1.25E-05	5.58E-06	2.50E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.50E-02	1.06E-02	7.50E-03	9.69E-03	6.85E-03	4.84E-03	5.47E-03	3.87E-03	2.73E-03	5.02E-03	3.55E-03	2.51E-03	8.17E-03	3.65E-03	1.63E-03	3.20E-03	1.43E-03	6.40E-04	1.91E-02	8.56E-03	3.83E-03	2.89E-03	1.29E-03	5.78E-04
1,2-Dichlorobenzene	1.58E-02	7.07E-03	3.16E-03	9.72E-03	4.35E-03	1.94E-03	5.80E-03	2.60E-03	1.16E-03	5.21E-03	2.33E-03	1.04E-03	1.39E-02	6.22E-03	2.78E-03	5.51E-03	2.46E-03	1.10E-03	3.24E-02	1.45E-02	6.48E-03	4.89E-03	2.19E-03	9.79E-04
1,3-Dichlorobenzene	1.48E-02	6.63E-03	2.97E-03	9.65E-03	4.32E-03	1.93E-03	5.54E-03	2.48E-03	1.11E-03	4.97E-03	2.22E-03	9.94E-04	1.33E-02	5.93E-03	2.65E-03	5.51E-03	2.46E-03	1.10E-03	3.04E-02	1.36E-02	6.08E-03	4.67E-03	2.09E-03	9.35E-04
1,4-Dichlorobenzene	4.56E-02	2.63E-02	1.52E-02	2.78E-02	1.60E-02	9.27E-03	1.67E-02	9.64E-03	5.56E-03	1.50E-02	8.64E-03	4.99E-03	1.40E-02	6.26E-03	2.80E-03	5.51E-03	2.46E-03	1.10E-03	3.27E-02	1.46E-02	6.54E-03	4.93E-03	2.20E-03	9.85E-04
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	1.13E-03	5.07E-04	2.27E-04	1.95E-02	8.74E-03	3.91E-03	3.06E-03	1.37E-03	6.12E-04	6.20E-04	2.77E-04	1.24E-04	6.92E-02	3.09E-02	1.38E-02	9.03E-02	4.04E-02	1.81E-02	3.37E-02	1.50E-02	6.73E-03	6.90E-07	3.09E-07	1.38E-07
Acenaphthylene	1.65E-03	7.37E-04	3.29E-04	2.86E-03	1.28E-03	5.71E-04	7.95E-04	3.55E-04	1.59E-04	1.48E-04	6.62E-05	2.96E-05	1.77E-02	7.93E-03	3.55E-03	1.19E-02	5.32E-03	2.38E-03	3.17E-02	1.42E-02	6.33E-03	2.00E-06	8.95E-07	4.00E-07
Anthracene	3.29E-02	1.47E-02	6.58E-03	1.21E-01	5.40E-02	2.42E-02	2.59E-02	1.16E-02	5.18E-03	4.54E-03	2.03E-03	9.08E-04	5.71E-01	2.55E-01	1.14E-01	5.57E-01	2.49E-01	1.11E-01	6.60E-01	2.95E-01	1.32E-01	2.00E-06	8.95E-07	4.00E-07
Benzo(a)anthracene	**1.12E+00**	5.02E-01	2.25E-01	**1.46E+01**	**6.55E+00**	**2.93E+00**	**2.29E+00**	**1.03E+00**	4.60E-01	4.92E-01	2.20E-01	9.87E-02	4.93E-01	2.20E-01	9.85E-02	6.19E-01	2.77E-01	1.24E-01	2.91E-01	1.30E-01	5.82E-02	3.40E-06	1.52E-06	6.80E-07
Benzo(a)pyrene	**3.02E+00**	**1.35E+00**	6.05E-01	**1.24E+01**	**5.57E+00**	**2.49E+00**	**2.60E+00**	**1.17E+00**	5.22E-01	4.47E-01	2.00E-01	8.95E-02	5.36E-01	2.40E-01	1.07E-01	5.46E-01	2.44E-01	1.09E-01	5.72E-01	2.56E-01	1.14E-01	2.40E-06	1.07E-06	4.80E-07
Benzo(b)fluoranthene	**1.63E+01**	**7.32E+00**	**3.27E+00**	**1.50E+01**	**6.71E+00**	**3.00E+00**	**6.14E+00**	**2.75E+00**	**1.23E+00**	**1.02E+00**	4.57E-01	2.05E-01	**1.26E+00**	5.64E-01	2.52E-01	5.58E-01	2.50E-01	1.12E-01	**2.84E+00**	**1.27E+00**	5.67E-01	5.80E-06	2.59E-06	1.16E-06
Benzo(g,h,i)perylene	**9.28E+00**	**4.15E+00**	**1.86E+00**	**4.46E+00**	**2.00E+00**	8.94E-01	**2.91E+00**	**1.30E+00**	5.83E-01	4.58E-01	2.05E-01	9.17E-02	5.94E-01	2.66E-01	1.19E-01	1.41E-01	6.32E-02	2.83E-02	**1.58E+00**	7.08E-01	3.17E-01	1.60E-06	7.16E-07	3.20E-07
Benzo(k)fluoranthene	**1.19E+00**	5.34E-01	2.39E-01	**5.71E+00**	**2.55E+00**	**1.14E+00**	**1.03E+00**	4.60E-01	2.06E-01	2.35E-01	1.05E-01	4.70E-02	2.24E-01	1.00E-01	4.49E-02	2.26E-01	1.01E-01	4.52E-02	2.48E-01	1.11E-01	4.96E-02	1.50E-06	6.71E-07	3.00E-07
Chrysene	**1.41E+00**	6.32E-01	2.83E-01	**2.38E+01**	**1.07E+01**	**4.77E+00**	**4.09E+00**	**1.83E+00**	8.19E-01	6.50E-01	2.91E-01	1.30E-01	8.27E-01	3.70E-01	1.65E-01	**1.11E+00**	4.96E-01	2.22E-01	3.37E-01	1.51E-01	6.74E-02	8.00E-07	3.58E-07	1.60E-07
Dibenz(a,h)anthracene	9.37E-01	4.19E-01	1.88E-01	**2.76E+00**	**1.23E+00**	5.53E-01	6.83E-01	3.06E-01	1.37E-01	9.64E-02	4.31E-02	1.93E-02	1.36E-01	6.08E-02	2.72E-02	1.28E-01	5.72E-02	2.56E-02	1.66E-01	7.41E-02	3.31E-02	2.00E-06	8.95E-07	4.00E-07
Fluoranthene	**3.56E+00**	**1.59E+00**	7.12E-01	7.08E-01	3.17E-01	1.42E-01	**1.02E+00**	4.58E-01	2.05E-01	1.30E-01	5.83E-02	2.61E-02	**2.16E+01**	**9.66E+00**	**4.32E+00**	**2.26E+00**	**1.01E+00**	4.52E-01	**6.33E+01**	**2.83E+01**	**1.27E+01**	3.20E-06	1.43E-06	6.40E-07
Fluorene	1.76E-03	7.89E-04	3.53E-04	2.55E-02	1.14E-02	5.09E-03	3.61E-03	1.61E-03	7.22E-04	9.54E-04	4.27E-04	1.91E-04	8.69E-02	3.88E-02	1.74E-02	1.07E-01	4.80E-02	2.15E-02	5.61E-02	2.51E-02	1.12E-02	2.00E-06	8.95E-07	4.00E-07
Hexachlorobenzene	7.41E-01	5.24E-01	3.71E-01	**5.32E+00**	**3.76E+00**	**2.66E+00**	**1.20E+00**	8.45E-01	5.98E-01	**1.02E+00**	7.25E-01	5.12E-01	**4.57E+01**	**2.04E+01**	**9.14E+00**	**5.79E+01**	**2.59E+01**	**1.16E+01**	**2.45E+01**	**1.10E+01**	**4.90E+00**	**1.65E+01**	**7.38E+00**	**3.30E+00**
Hexachlorobutadiene	1.98E-01	6.26E-02	1.98E-02	3.86E-01	1.22E-01	3.86E-02	1.22E-01	3.87E-02	1.22E-02	1.07E-01	3.40E-02	1.07E-02	1.57E-01	7.02E-02	3.14E-02	1.31E-01	5.86E-02	2.62E-02	2.24E-01	1.00E-01	4.48E-02	5.62E-02	2.52E-02	1.12E-02

TABLE L-53

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (omnivore)			American Robin (invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Hexachlorocyclopentadiene	3.23E-03	1.45E-03	6.47E-04	1.01E-02	4.54E-03	2.03E-03	2.71E-03	1.21E-03	5.43E-04	2.37E-03	1.06E-03	4.75E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	7.18E-02	3.21E-02	1.44E-02	7.09E-02	3.17E-02	1.42E-02	3.11E-02	1.39E-02	6.23E-03	2.79E-02	1.25E-02	5.59E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	**2.03E+00**	9.10E-01	4.07E-01	**7.54E+00**	**3.38E+00**	**1.51E+00**	**1.68E+00**	7.54E-01	3.37E-01	2.61E-01	1.17E-01	5.23E-02	3.40E-01	1.52E-01	6.81E-02	3.42E-01	1.53E-01	6.84E-02	3.72E-01	1.67E-01	7.45E-02	2.40E-06	1.07E-06	4.80E-07
Pentachlorophenol	**8.56E+01**	**3.83E+01**	**1.71E+01**	**5.49E+01**	**2.45E+01**	**1.10E+01**	**3.29E+01**	**1.47E+01**	**6.58E+00**	**2.85E+01**	**1.27E+01**	**5.70E+00**	**9.11E+01**	**2.88E+01**	**9.11E+00**	**4.02E+01**	**1.27E+01**	**4.02E+00**	**2.03E+02**	**6.43E+01**	**2.03E+01**	**3.19E+01**	**1.01E+01**	**3.19E+00**
Phenanthrene	7.97E-02	3.57E-02	1.59E-02	3.70E-01	1.65E-01	7.40E-02	7.19E-02	3.22E-02	1.44E-02	1.39E-02	6.20E-03	2.77E-03	**1.61E+00**	7.22E-01	3.23E-01	**1.67E+00**	7.46E-01	3.34E-01	**1.68E+00**	7.53E-01	3.37E-01	8.80E-07	3.94E-07	1.76E-07
Pyrene	**1.52E+02**	**6.81E+01**	**3.05E+01**	**5.07E+01**	**2.27E+01**	**1.02E+01**	**4.70E+01**	**2.10E+01**	**9.41E+00**	**6.11E+00**	**2.73E+00**	**1.22E+00**	**9.30E+00**	**4.16E+00**	**1.86E+00**	**1.85E+00**	8.26E-01	3.70E-01	**2.55E+01**	**1.14E+01**	**5.10E+00**	2.90E-06	1.30E-06	5.80E-07
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	--	--	--	**6.44E+00**	**2.04E+00**	6.44E-01	**1.35E+00**	4.26E-01	1.35E-01	--	--	--	3.86E-01	1.22E-01	3.86E-02	5.87E-01	1.86E-01	5.87E-02	--	--	--	--	--	--

Shaded cells indicate HQ ≥ 1

TABLE L-54

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (omnivore)			American Robin (invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.95E-01	1.77E-01	7.90E-02	**3.84E+00**	**1.72E+00**	7.68E-01	4.74E-01	2.12E-01	9.48E-02	4.26E-02	3.37E-02	2.67E-02	1.59E-01	9.20E-02	5.31E-02	1.80E-01	1.04E-01	5.99E-02	1.71E-01	7.63E-02	3.41E-02	2.46E-03	1.42E-03	8.20E-04
Cadmium	6.59E-02	2.08E-02	6.59E-03	**2.49E+00**	7.88E-01	2.49E-01	3.93E-01	1.24E-01	3.93E-02	5.48E-02	1.73E-02	5.48E-03	5.69E-01	2.54E-01	1.14E-01	8.45E-01	3.78E-01	1.69E-01	5.00E-02	2.24E-02	1.00E-02	1.49E-02	6.66E-03	2.98E-03
Chromium	3.54E-02	1.58E-02	7.07E-03	5.01E-01	2.24E-01	1.00E-01	6.97E-02	3.12E-02	1.39E-02	3.92E-02	1.75E-02	7.85E-03	1.91E-01	8.56E-02	3.83E-02	2.47E-01	1.10E-01	4.94E-02	1.09E-01	4.86E-02	2.17E-02	2.79E-02	1.25E-02	5.58E-03
Copper	7.79E-02	6.04E-02	4.67E-02	6.62E-01	5.13E-01	3.97E-01	1.11E-01	8.62E-02	6.68E-02	3.62E-02	3.18E-02	2.80E-02	4.44E-01	2.57E-01	1.49E-01	5.50E-01	3.18E-01	1.84E-01	3.01E-01	1.74E-01	1.01E-01	1.02E-01	5.89E-02	3.41E-02
Lead	6.16E-02	4.48E-02	3.25E-02	4.31E-01	3.13E-01	2.27E-01	4.82E-02	3.50E-02	2.54E-02	7.63E-02	5.54E-02	4.03E-02	2.15E-01	9.61E-02	4.30E-02	2.07E-01	9.24E-02	4.13E-02	7.00E-01	4.95E-01	3.50E-01	8.07E-02	3.61E-02	1.61E-02
Mercury	2.19E-01	9.80E-02	4.38E-02	3.96E-01	1.77E-01	7.91E-02	1.07E-01	4.77E-02	2.13E-02	5.76E-03	4.47E-03	3.46E-03	2.07E-02	1.32E-02	8.46E-03	1.42E-02	9.05E-03	5.78E-03	4.45E-02	3.15E-02	2.22E-02	7.24E-04	4.62E-04	2.95E-04
Selenium	7.92E-02	6.16E-02	4.80E-02	**1.22E+00**	9.48E-01	7.38E-01	2.01E-01	1.57E-01	1.22E-01	8.81E-02	6.86E-02	5.34E-02	2.55E-01	1.38E-01	7.47E-02	3.52E-01	1.91E-01	1.03E-01	1.28E-01	9.06E-02	6.41E-02	3.80E-02	2.06E-02	1.11E-02
Polychlorinated Biphenyls																								
Aroclor-1221	1.34E-02	5.99E-03	2.68E-03	3.93E-02	1.76E-02	7.86E-03	9.38E-03	4.20E-03	1.88E-03	1.07E-02	4.79E-03	2.14E-03	8.42E-03	3.76E-03	1.68E-03	7.65E-03	3.42E-03	1.53E-03	1.38E-02	6.16E-03	2.75E-03	3.78E-03	1.69E-03	7.56E-04
Aroclor-1242	1.41E-02	6.32E-03	2.83E-03	1.10E-01	4.90E-02	2.19E-02	1.95E-02	8.71E-03	3.90E-03	2.26E-02	1.01E-02	4.52E-03	1.80E-02	8.05E-03	3.60E-03	2.21E-02	9.88E-03	4.42E-03	1.43E-02	6.38E-03	2.85E-03	8.15E-03	3.65E-03	1.63E-03
Aroclor-1260	1.92E-02	8.58E-03	3.84E-03	4.39E-01	1.97E-01	8.79E-02	6.85E-02	3.06E-02	1.37E-02	7.89E-02	3.53E-02	1.58E-02	6.37E-02	2.85E-02	1.27E-02	9.08E-02	4.06E-02	1.82E-02	1.71E-02	7.64E-03	3.42E-03	2.89E-02	1.29E-02	5.79E-03
PCB (total)	2.84E-02	1.27E-02	5.68E-03	7.57E-01	3.39E-01	1.51E-01	1.19E-01	5.31E-02	2.37E-02	1.34E-01	6.01E-02	2.69E-02	1.10E-01	4.91E-02	2.20E-02	1.59E-01	7.10E-02	3.18E-02	2.27E-02	1.01E-02	4.54E-03	4.97E-02	2.22E-02	9.95E-03
Pesticides																								
4,4'-DDD	4.98E-03	2.23E-03	9.96E-04	1.73E-01	7.73E-02	3.46E-02	2.71E-02	1.21E-02	5.41E-03	3.04E-02	1.36E-02	6.08E-03	2.21E-02	6.98E-03	2.21E-03	3.25E-02	1.03E-02	3.25E-03	2.50E-03	7.90E-04	2.50E-04	6.23E-02	2.79E-02	1.25E-02
4,4'-DDE	3.96E-03	1.77E-03	7.92E-04	1.82E-01	8.16E-02	3.65E-02	2.85E-02	1.27E-02	5.70E-03	3.16E-02	1.42E-02	6.33E-03	2.31E-02	7.31E-03	2.31E-03	3.46E-02	1.09E-02	3.46E-03	1.37E-03	4.32E-04	1.37E-04	6.52E-02	2.92E-02	1.30E-02
4,4'-DDT	6.25E-03	2.80E-03	1.25E-03	2.64E-01	1.18E-01	5.29E-02	4.12E-02	1.84E-02	8.25E-03	4.60E-02	2.06E-02	9.21E-03	3.36E-02	1.06E-02	3.36E-03	5.00E-02	1.58E-02	5.00E-03	2.54E-03	8.03E-04	2.54E-04	9.47E-02	4.24E-02	1.89E-02
Dieldrin	2.01E-01	1.42E-01	1.00E-01	**6.25E+00**	**4.42E+00**	**3.13E+00**	9.89E-01	6.99E-01	4.94E-01	**1.11E+00**	7.82E-01	5.53E-01	5.80E-01	7.94E-02	1.09E-02	8.51E-01	1.17E-01	1.60E-02	7.46E-02	1.02E-02	1.40E-03	2.62E-01	3.58E-02	4.91E-03
Endosulfan I	1.55E-01	6.91E-02	3.09E-02	1.75E-01	7.81E-02	3.49E-02	6.20E-02	2.77E-02	1.24E-02	7.83E-02	3.50E-02	1.57E-02	2.78E-03	1.24E-03	5.56E-04	1.42E-03	6.36E-04	2.84E-04	6.58E-03	2.94E-03	1.32E-03	1.23E-03	5.52E-04	2.47E-04
Endrin	4.09E-03	1.83E-03	8.18E-04	3.75E-02	1.68E-02	7.51E-03	6.56E-03	2.93E-03	1.31E-03	7.56E-03	3.38E-03	1.51E-03	1.63E-01	7.27E-02	3.25E-02	2.08E-01	9.29E-02	4.16E-02	6.48E-03	2.90E-03	1.30E-03	7.34E-02	3.28E-02	1.47E-02
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	6.84E-02	3.06E-02	1.37E-02	8.86E-01	3.97E-01	1.77E-01	1.07E-01	4.80E-02	2.15E-02	3.18E-02	1.42E-02	6.38E-03	3.06E-02	1.37E-02	6.12E-03	3.70E-02	1.65E-02	7.39E-03	2.38E-02	1.07E-02	4.77E-03	8.70E-07	3.89E-07	1.74E-07
Benzo(a)pyrene	1.46E-01	6.54E-02	2.93E-02	7.59E-01	3.40E-01	1.52E-01	1.19E-01	5.34E-02	2.39E-02	2.87E-02	1.29E-02	5.76E-03	3.27E-02	1.46E-02	6.54E-03	3.29E-02	1.47E-02	6.57E-03	4.06E-02	1.82E-02	8.12E-03	1.00E-06	4.47E-07	2.00E-07
Benzo(b)fluoranthene	4.97E-01	2.22E-01	9.95E-02	8.80E-01	3.94E-01	1.76E-01	2.08E-01	9.32E-02	4.17E-02	5.28E-02	2.36E-02	1.06E-02	5.79E-02	2.59E-02	1.16E-02	3.32E-02	1.48E-02	6.63E-03	1.30E-01	5.81E-02	2.60E-02	1.10E-06	4.91E-07	2.20E-07
Benzo(g,h,i)perylene	2.97E-01	1.33E-01	5.95E-02	2.69E-01	1.20E-01	5.39E-02	9.78E-02	4.38E-02	1.96E-02	2.35E-02	1.05E-02	4.70E-03	2.70E-02	1.21E-02	5.39E-03	8.83E-03	3.95E-03	1.77E-03	7.58E-02	3.39E-02	1.52E-02	8.73E-07	3.90E-07	1.75E-07
Benzo(k)fluoranthene	7.02E-02	3.14E-02	1.41E-02	3.52E-01	1.58E-01	7.06E-02	5.07E-02	2.27E-02	1.02E-02	1.57E-02	7.04E-03	3.15E-03	1.46E-02	6.54E-03	2.93E-03	1.37E-02	6.14E-03	2.75E-03	2.06E-02	9.22E-03	4.12E-03	8.49E-07	3.80E-07	1.70E-07
Chrysene	8.29E-02	3.71E-02	1.66E-02	**1.44E+00**	6.43E-01	2.88E-01	1.87E-01	8.37E-02	3.75E-02	4.16E-02	1.86E-02	8.33E-03	5.04E-02	2.26E-02	1.01E-02	6.58E-02	2.94E-02	1.32E-02	2.72E-02	1.22E-02	5.44E-03	6.39E-07	2.86E-07	1.28E-07
Dibenz(a,h)anthracene	2.92E-02	1.31E-02	5.85E-03	1.81E-01	8.08E-02	3.62E-02	2.88E-02	1.29E-02	5.76E-03	5.84E-03	2.61E-03	1.17E-03	7.65E-03	3.42E-03	1.53E-03	8.35E-03	3.73E-03	1.67E-03	7.90E-03	3.53E-03	1.58E-03	7.68E-07	3.43E-07	1.54E-07
Fluoranthene	1.81E-02	8.09E-03	3.62E-03	2.95E-02	1.32E-02	5.90E-03	7.84E-03	3.50E-03	1.57E-03	1.62E-03	7.24E-04	3.24E-04	2.24E-01	1.00E-01	4.48E-02	1.33E-01	5.95E-02	2.66E-02	4.90E-01	2.19E-01	9.80E-02	1.24E-06	5.53E-07	2.47E-07
Hexachlorobenzene	2.53E-02	1.79E-02	1.26E-02	2.39E-01	1.69E-01	1.20E-01	3.98E-02	2.82E-02	1.99E-02	4.81E-02	3.40E-02	2.40E-02	**2.03E+00**	9.07E-01	4.06E-01	**2.57E+00**	**1.15E+00**	5.14E-01	**1.23E+00**	5.51E-01	2.46E-01	9.22E-01	4.12E-01	1.84E-01
Indeno(1,2,3-cd)pyrene	7.43E-02	3.33E-02	1.49E-02	4.63E-01	2.07E-01	9.28E-02	7.15E-02	3.20E-02	1.43E-02	1.59E-02	7.10E-03	3.18E-03	1.93E-02	8.63E-03	3.86E-03	2.08E-02	9.30E-03	4.16E-03	2.06E-02	9.21E-03	4.12E-03	1.01E-06	4.52E-07	2.02E-07
Pentachlorophenol	5.71E-01	2.55E-01	1.14E-01	**2.15E+00**	9.62E-01	4.30E-01	4.65E-01	2.08E-01	9.30E-02	5.40E-01	2.41E-01	1.08E-01	**1.66E+00**	5.24E-01	1.66E-01	**1.70E+00**	5.37E-01	1.70E-01	**1.93E+00**	6.10E-01	1.93E-01	7.39E-01	2.34E-01	7.39E-02
Phenanthrene	7.32E-03	3.27E-03	1.46E-03	2.22E-02	9.92E-03	4.44E-03	4.13E-03	1.85E-03	8.26E-04	1.02E-03	4.58E-04	2.05E-04	1.22E-01	5.44E-02	2.43E-02	9.73E-02	4.35E-02	1.95E-02	2.09E-01	9.35E-02	4.18E-02	7.03E-07	3.14E-07	1.41E-07
Pyrene	**2.13E+00**	9.55E-01	4.27E-01	**2.60E+00**	**1.17E+00**	5.22E-01	8.31E-01	3.72E-01	1.66E-01	1.64E-01	7.36E-02	3.29E-02	2.21E-01	9.90E-02	4.43E-02	1.09E-01	4.87E-02	2.18E-02	5.36E-01	2.40E-01	1.07E-01	1.38E-06	6.19E-07	2.77E-07
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	--	--	--	**4.02E+00**	**1.27E+00**	4.02E-01	6.23E-01	1.97E-01	6.23E-02	--	--	--	2.38E-01	7.52E-02	2.38E-02	3.62E-01	1.14E-01	3.62E-02	--	--	--	--	--	--

Shaded cells indicate HQ ≥ 1

TABLE L-55

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Meadow Vole			Short-tailed Shrew			White-footed Mouse			Red Fox			American Robin (omnivore)			American Robin (invertivore)			Mourning Dove			Red-tailed Hawk		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.24E-01	1.00E-01	4.48E-02	**2.91E+00**	**1.30E+00**	5.82E-01	4.08E-01	1.82E-01	8.16E-02	2.25E-02	1.78E-02	1.41E-02	1.26E-01	7.29E-02	4.21E-02	1.61E-01	9.27E-02	5.35E-02	8.54E-02	3.82E-02	1.71E-02	1.15E-03	6.63E-04	3.83E-04
Cadmium	5.94E-02	1.88E-02	5.94E-03	**2.49E+00**	7.87E-01	2.49E-01	3.91E-01	1.24E-01	3.91E-02	4.75E-02	1.50E-02	4.75E-03	5.66E-01	2.53E-01	1.13E-01	8.44E-01	3.78E-01	1.69E-01	3.99E-02	1.78E-02	7.98E-03	1.06E-02	4.74E-03	2.12E-03
Chromium	2.99E-02	1.34E-02	5.97E-03	4.80E-01	2.15E-01	9.61E-02	6.79E-02	3.04E-02	1.36E-02	3.41E-02	1.52E-02	6.82E-03	1.84E-01	8.22E-02	3.67E-02	2.43E-01	1.09E-01	4.87E-02	8.88E-02	3.97E-02	1.78E-02	2.41E-02	1.08E-02	4.81E-03
Copper	6.65E-02	5.15E-02	3.98E-02	6.40E-01	4.96E-01	3.84E-01	1.08E-01	8.36E-02	6.47E-02	3.30E-02	2.91E-02	2.56E-02	4.26E-01	2.46E-01	1.43E-01	5.44E-01	3.15E-01	1.82E-01	2.47E-01	1.43E-01	8.26E-02	9.41E-02	5.45E-02	3.15E-02
Lead	3.99E-02	2.90E-02	2.10E-02	3.17E-01	2.31E-01	1.68E-01	4.07E-02	2.96E-02	2.15E-02	5.33E-02	3.87E-02	2.81E-02	1.66E-01	7.41E-02	3.31E-02	1.79E-01	8.02E-02	3.59E-02	4.21E-01	2.98E-01	2.10E-01	5.97E-02	2.67E-02	1.19E-02
Mercury	1.69E-01	7.57E-02	3.38E-02	3.68E-01	1.64E-01	7.35E-02	9.32E-02	4.17E-02	1.86E-02	4.20E-03	3.25E-03	2.52E-03	1.78E-02	1.14E-02	7.28E-03	1.38E-02	8.85E-03	5.66E-03	3.39E-02	2.40E-02	1.70E-02	4.54E-04	2.90E-04	1.85E-04
Selenium	6.78E-02	5.28E-02	4.11E-02	**1.21E+00**	9.43E-01	7.34E-01	1.98E-01	1.54E-01	1.20E-01	8.26E-02	6.43E-02	5.01E-02	2.50E-01	1.35E-01	7.33E-02	3.51E-01	1.90E-01	1.03E-01	1.05E-01	7.42E-02	5.25E-02	3.54E-02	1.92E-02	1.04E-02
Polychlorinated Biphenyls																								
Aroclor-1221	9.00E-03	4.03E-03	1.80E-03	2.31E-02	1.03E-02	4.63E-03	5.98E-03	2.67E-03	1.20E-03	6.63E-03	2.97E-03	1.33E-03	5.18E-03	2.31E-03	1.04E-03	4.44E-03	1.98E-03	8.87E-04	9.16E-03	4.10E-03	1.83E-03	2.32E-03	1.04E-03	4.65E-04
Aroclor-1242	6.27E-03	2.81E-03	1.25E-03	3.68E-02	1.65E-02	7.36E-03	7.13E-03	3.19E-03	1.43E-03	8.05E-03	3.60E-03	1.61E-03	6.31E-03	2.82E-03	1.26E-03	7.26E-03	3.25E-03	1.45E-03	6.27E-03	2.80E-03	1.25E-03	2.86E-03	1.28E-03	5.72E-04
Aroclor-1260	8.36E-03	3.74E-03	1.67E-03	1.54E-01	6.88E-02	3.08E-02	2.44E-02	1.09E-02	4.87E-03	2.81E-02	1.26E-02	5.63E-03	2.25E-02	1.01E-02	4.50E-03	3.14E-02	1.40E-02	6.27E-03	7.83E-03	3.50E-03	1.57E-03	1.02E-02	4.58E-03	2.05E-03
PCB (total)	1.82E-02	8.16E-03	3.65E-03	7.41E-01	3.32E-01	1.48E-01	1.16E-01	5.17E-02	2.31E-02	1.28E-01	5.74E-02	2.57E-02	1.06E-01	4.75E-02	2.12E-02	1.58E-01	7.06E-02	3.16E-02	1.01E-02	4.50E-03	2.01E-03	4.79E-02	2.14E-02	9.59E-03
Pesticides																								
4,4'-DDD	2.74E-03	1.23E-03	5.49E-04	9.72E-02	4.35E-02	1.94E-02	1.53E-02	6.84E-03	3.06E-03	1.71E-02	7.63E-03	3.41E-03	1.24E-02	3.93E-03	1.24E-03	1.84E-02	5.80E-03	1.84E-03	1.30E-03	4.10E-04	1.30E-04	3.50E-02	1.57E-02	7.01E-03
4,4'-DDE	2.51E-03	1.12E-03	5.02E-04	1.12E-01	5.01E-02	2.24E-02	1.75E-02	7.85E-03	3.51E-03	1.95E-02	8.70E-03	3.89E-03	1.42E-02	4.49E-03	1.42E-03	2.13E-02	6.72E-03	2.13E-03	8.82E-04	2.79E-04	8.82E-05	4.01E-02	1.79E-02	8.01E-03
4,4'-DDT	3.74E-03	1.67E-03	7.48E-04	1.53E-01	6.85E-02	3.06E-02	2.40E-02	1.07E-02	4.79E-03	2.67E-02	1.19E-02	5.34E-03	1.95E-02	6.15E-03	1.95E-03	2.90E-02	9.16E-03	2.90E-03	1.54E-03	4.85E-04	1.54E-04	5.49E-02	2.46E-02	1.10E-02
Dieldrin	7.77E-02	5.49E-02	3.88E-02	**2.41E+00**	**1.70E+00**	**1.20E+00**	3.81E-01	2.70E-01	1.91E-01	4.26E-01	3.01E-01	2.13E-01	2.23E-01	3.06E-02	4.19E-03	3.28E-01	4.49E-02	6.15E-03	2.88E-02	3.94E-03	5.39E-04	1.01E-01	1.38E-02	1.89E-03
Endosulfan I	5.72E-02	2.56E-02	1.14E-02	6.46E-02	2.89E-02	1.29E-02	2.29E-02	1.03E-02	4.59E-03	2.90E-02	1.29E-02	5.79E-03	1.03E-03	4.60E-04	2.06E-04	5.26E-04	2.35E-04	1.05E-04	2.43E-03	1.09E-03	4.87E-04	4.57E-04	2.04E-04	9.14E-05
Endrin	2.30E-03	1.03E-03	4.60E-04	2.09E-02	9.35E-03	4.18E-03	3.68E-03	1.65E-03	7.36E-04	4.21E-03	1.88E-03	8.43E-04	9.06E-02	4.05E-02	1.81E-02	1.16E-01	5.17E-02	2.31E-02	3.61E-03	1.61E-03	7.22E-04	4.09E-02	1.83E-02	8.17E-03
Volatile/Semivolatile Organics																								
Benzo(a)anthracene	3.21E-02	1.44E-02	6.43E-03	3.51E-01	1.57E-01	7.04E-02	4.38E-02	1.96E-02	8.77E-03	1.28E-02	5.75E-03	2.57E-03	1.25E-02	5.57E-03	2.49E-03	1.46E-02	6.55E-03	2.93E-03	1.07E-02	4.77E-03	2.13E-03	7.78E-07	3.48E-07	1.56E-07
Benzo(a)pyrene	5.98E-02	2.68E-02	1.20E-02	3.05E-01	1.36E-01	6.11E-02	4.82E-02	2.16E-02	9.66E-03	1.16E-02	5.19E-03	2.32E-03	1.32E-02	5.91E-03	2.64E-03	1.32E-02	5.90E-03	2.64E-03	1.66E-02	7.41E-03	3.31E-03	8.38E-07	3.75E-07	1.68E-07
Benzo(b)fluoranthene	1.95E-01	8.74E-02	3.91E-02	3.46E-01	1.55E-01	6.93E-02	8.19E-02	3.66E-02	1.64E-02	2.08E-02	9.30E-03	4.16E-03	2.27E-02	1.02E-02	4.55E-03	1.30E-02	5.83E-03	2.61E-03	5.10E-02	2.28E-02	1.02E-02	8.85E-07	3.96E-07	1.77E-07
Benzo(g,h,i)perylene	1.02E-01	4.56E-02	2.04E-02	1.06E-01	4.76E-02	2.13E-02	3.47E-02	1.55E-02	6.95E-03	8.64E-03	3.87E-03	1.73E-03	9.62E-03	4.30E-03	1.92E-03	3.54E-03	1.59E-03	7.09E-04	2.61E-02	1.17E-02	5.23E-03	8.02E-07	3.59E-07	1.60E-07
Benzo(k)fluoranthene	3.14E-02	1.40E-02	6.28E-03	1.43E-01	6.42E-02	2.87E-02	2.14E-02	9.56E-03	4.28E-03	6.52E-03	2.92E-03	1.31E-03	6.14E-03	2.74E-03	1.23E-03	5.58E-03	2.49E-03	1.12E-03	9.07E-03	4.06E-03	1.81E-03	7.80E-07	3.49E-07	1.56E-07
Chrysene	3.81E-02	1.70E-02	7.63E-03	5.64E-01	2.53E-01	1.13E-01	7.49E-02	3.35E-02	1.50E-02	1.66E-02	7.43E-03	3.32E-03	2.02E-02	9.03E-03	4.04E-03	2.59E-02	1.16E-02	5.17E-03	1.20E-02	5.38E-03	2.40E-03	6.39E-07	2.86E-07	1.28E-07
Dibenz(a,h)anthracene	1.31E-02	5.85E-03	2.62E-03	8.06E-02	3.61E-02	1.62E-02	1.29E-02	5.76E-03	2.58E-03	2.61E-03	1.17E-03	5.24E-04	3.41E-03	1.53E-03	6.83E-04	3.73E-03	1.67E-03	7.45E-04	3.53E-03	1.58E-03	7.05E-04	7.62E-07	3.41E-07	1.52E-07
Fluoranthene	7.00E-03	3.13E-03	1.40E-03	1.14E-02	5.10E-03	2.28E-03	3.03E-03	1.36E-03	6.06E-04	6.26E-04	2.80E-04	1.25E-04	8.66E-02	3.88E-02	1.73E-02	5.14E-02	2.30E-02	1.03E-02	1.90E-01	8.48E-02	3.79E-02	9.83E-07	4.40E-07	1.97E-07
Hexachlorobenzene	1.10E-02	7.74E-03	5.48E-03	1.04E-01	7.33E-02	5.18E-02	1.72E-02	1.22E-02	8.62E-03	2.08E-02	1.47E-02	1.04E-02	8.79E-01	3.93E-01	1.76E-01	**1.11E+00**	4.98E-01	2.23E-01	5.34E-01	2.39E-01	1.07E-01	3.99E-01	1.79E-01	7.98E-02
Indeno(1,2,3-cd)pyrene	3.04E-02	1.36E-02	6.08E-03	1.89E-01	8.47E-02	3.79E-02	2.92E-02	1.31E-02	5.86E-03	6.49E-03	2.90E-03	1.30E-03	7.88E-03	3.53E-03	1.58E-03	8.50E-03	3.80E-03	1.70E-03	8.41E-03	3.76E-03	1.68E-03	8.51E-07	3.81E-07	1.70E-07
Pentachlorophenol	2.31E-01	1.03E-01	4.61E-02	8.69E-01	3.89E-01	1.74E-01	1.88E-01	8.40E-02	3.76E-02	2.18E-01	9.75E-02	4.36E-02	6.69E-01	2.12E-01	6.69E-02	6.86E-01	2.17E-01	6.86E-02	7.79E-01	2.46E-01	7.79E-02	2.99E-01	9.45E-02	2.99E-02
Phenanthrene	3.86E-03	1.73E-03	7.72E-04	8.55E-03	3.82E-03	1.71E-03	1.85E-03	8.29E-04	3.71E-04	4.39E-04	1.96E-04	8.78E-05	5.42E-02	2.42E-02	1.08E-02	3.71E-02	1.66E-02	7.41E-03	1.08E-01	4.81E-02	2.15E-02	7.03E-07	3.14E-07	1.41E-07
Pyrene	8.29E-01	3.71E-01	1.66E-01	**1.01E+00**	4.53E-01	2.03E-01	3.23E-01	1.44E-01	6.47E-02	6.39E-02	2.86E-02	1.28E-02	8.60E-02	3.85E-02	1.72E-02	4.23E-02	1.89E-02	8.47E-03	2.08E-01	9.31E-02	4.16E-02	1.07E-06	4.78E-07	2.14E-07
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	--	--	--	**4.02E+00**	**1.27E+00**	4.02E-01	6.23E-01	1.97E-01	6.23E-02	--	--	--	2.38E-01	7.52E-02	2.38E-02	3.62E-01	1.14E-01	3.62E-02	--	--	--	--	--	--

Shaded cells indicate HQ ≥ 1

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (UG/L)									
Aluminum	25.0 - 300	14 / 19	9.35	2,730	CAS04-SW03-1209	87.0	8 / 19	31.4	**YES**
Antimony	0.44 - 8.00	3 / 19	0.12	0.21	CAYP-SW05-1112	30.0	0 / 19	0.01	NO
Arsenic	1.60 - 5.70	8 / 19	1.15	58.0	CAS04-SW09-1209	150	0 / 19	0.39	NO
Barium	-- - --	19 / 19	9.50	44.4	CAS04-SW03-1209	4.00	19 / 19	11.1	**YES**
Beryllium	0.37 - 1.00	3 / 19	0.060	0.12	CAS04-SW03-1209	0.66	0 / 19	0.18	NO
Cadmium	1.00 - 4.00	12 / 19	0.11	0.82	CAS04-SW03-1209	0.45	1 / 19	1.81	**YES**
Calcium [3]	-- - --	19 / 19	24,400	132,000	CAS04-SW05-1209	NSV	-- / --	NSV	NO
Chromium	1.50 - 6.30	0 / 19	--	--	--	11.4	-- / --	0.55	NO
Cobalt	0.84 - 0.84	14 / 19	0.28	1.50	CAS04-SW03-1209	23.0	0 / 19	0.07	NO
Copper	-- - --	19 / 19	0.24	25.9	CAS04-SW03-1209	16.9	1 / 19	1.53	**YES**
Cyanide	11.0 - 12.0	0 / 19	--	--	--	5.20	-- / --	2.31	**YES**
Iron	-- - --	19 / 19	339	30,300	CAS04-SW09-1209	1,000	12 / 19	30.3	**YES**
Lead	0.18 - 0.60	10 / 19	0.56	5.90	CAS04-SW03-1209	7.74	0 / 19	0.76	NO
Magnesium [3]	-- - --	19 / 19	895	3,040	CAS04-SW03-1209	NSV	-- / --	NSV	NO
Manganese	-- - --	19 / 19	11.8	250	CAS04-SW09-1209	120	2 / 19	2.08	**YES**
Mercury	0.069 - 0.20	0 / 19	--	--	--	0.91	-- / --	0.22	NO
Nickel	0.60 - 1.70	8 / 19	0.53	3.50	CAS04-SW03-1209	94.2	0 / 19	0.04	NO
Potassium [3]	1,380 - 1,440	17 / 19	1,460	2,430	CAYP-SW01-1012	NSV	-- / --	NSV	NO
Selenium	2.60 - 5.00	5 / 19	0.82	1.30	CAS04-SW06-1209	5.00	0 / 19	0.26	NO
Silver	0.12 - 1.00	5 / 19	0.042	0.070	CAA03-SW04-1209	0.36	0 / 19	0.19	NO
Sodium [3]	-- - --	19 / 19	1,910	8,260	CAS04-SW07-1209	NSV	-- / --	NSV	NO
Thallium	0.13 - 2.00	0 / 19	--	--	--	12.0	-- / --	0.17	NO
Vanadium	0.72 - 2.10	2 / 19	4.60	8.30	CAS04-SW03-1209	20.0	0 / 19	0.42	NO
Zinc	3.20 - 6.00	16 / 19	3.90	65.4	CAS04-SW03-1209	216	0 / 19	0.30	NO
Dissolved Metals (UG/L)									
Aluminum	25.0 - 300	0 / 19	--	--	--	87.0	-- / --	3.45	**YES**
Antimony	0.44 - 8.00	3 / 19	0.12	0.22	CAYP-SW05-1112	30.0	0 / 19	0.01	NO
Arsenic	2.20 - 5.00	7 / 19	0.87	16.6	CAS04-SW09-1209	150	0 / 19	0.11	NO
Barium	-- - --	19 / 19	8.21	28.6	CAYP-SW06-1112	4.00	19 / 19	7.15	**YES**
Beryllium	0.37 - 1.00	1 / 19	0.060	0.060	CAS04-SW01-1209	0.66	0 / 19	0.09	NO
Cadmium	1.00 - 4.00	8 / 19	0.050	0.19	CAS04-SW08-1209	0.40	0 / 19	0.48	NO
Calcium [3]	-- - --	19 / 19	23,400	128,000	CAS04-SW05-1209	NSV	-- / --	NSV	NO
Chromium	0.56 - 3.00	0 / 19	--	--	--	11.0	-- / --	0.27	NO
Cobalt	0.84 - 0.84	14 / 19	0.13	0.67	CAS04-SW09-1209	23.0	0 / 19	0.03	NO
Copper	0.88 - 4.30	2 / 19	0.43	0.76	CAYP-SW05-1112	16.3	0 / 19	0.05	NO
Iron	5.20 - 100	15 / 19	17.5	5,680	CAS04-SW09-1209	1,000	1 / 19	5.68	**YES**
Lead	0.080 - 0.66	0 / 19	--	--	--	5.33	-- / --	0.12	NO
Magnesium [3]	-- - --	19 / 19	858	3,110	CAS04-SW09-1209	NSV	-- / --	NSV	NO
Manganese	-- - --	19 / 19	3.58	268	CAS04-SW09-1209	120	1 / 19	2.23	**YES**
Mercury	0.069 - 0.20	0 / 19	--	--	--	0.77	-- / --	0.26	NO

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Nickel	0.54 - 1.20	14 / 19	0.48	1.97	CAYP-SW06-1112	93.9	0 / 19	0.02	NO
Potassium [3]	1,320 - 1,380	17 / 19	1,380	2,300	CAYP-SW01-1012	NSV	-- / --	NSV	NO
Selenium	2.60 - 5.00	2 / 19	0.84	1.60	CAS04-SW08-1209	4.61	0 / 19	0.35	NO
Silver	0.12 - 1.00	1 / 19	0.10	0.10	CAS04-SW01-1209	0.36	0 / 19	0.28	NO
Sodium [3]	-- - --	19 / 19	1,870	8,030	CAS04-SW07-1209	NSV	-- / --	NSV	NO
Thallium	0.11 - 2.00	0 / 19	--	--	--	12.0	-- / --	0.17	NO
Vanadium	0.80 - 5.00	3 / 19	0.72	1.20	CAS04-SW07-1209	20.0	0 / 19	0.06	NO
Zinc	5.20 - 16.0	3 / 19	2.97	19.8	CAS04-SW09-1209	213	0 / 19	0.09	NO
Polychlorinated Biphenyls (UG/L)									
Aroclor-1016	0.47 - 0.67	0 / 19	--	--	--	0.14	-- / --	4.79	**YES**
Aroclor-1221	0.50 - 0.93	0 / 19	--	--	--	0.28	-- / --	3.32	**YES**
Aroclor-1232	0.47 - 0.67	0 / 19	--	--	--	0.58	-- / --	1.16	**YES**
Aroclor-1242	0.50 - 0.80	0 / 19	--	--	--	0.053	-- / --	15.1	**YES**
Aroclor-1248	0.50 - 0.93	0 / 19	--	--	--	0.081	-- / --	11.5	**YES**
Aroclor-1254	0.47 - 0.67	0 / 19	--	--	--	0.033	-- / --	20.3	**YES**
Aroclor-1260	0.50 - 0.80	0 / 19	--	--	--	0.14	-- / --	5.71	**YES**
Pesticides (UG/L)									
4,4'-DDD	0.050 - 0.13	0 / 19	--	--	--	0.011	-- / --	11.8	**YES**
4,4'-DDE	0.050 - 0.13	0 / 19	--	--	--	0.013	-- / --	10.0	**YES**
4,4'-DDT	0.050 - 0.13	0 / 19	--	--	--	0.013	-- / --	10.0	**YES**
Aldrin	0.047 - 0.067	0 / 19	--	--	--	0.30	-- / --	0.22	NO
alpha-BHC	0.047 - 0.067	0 / 19	--	--	--	2.20	-- / --	0.03	NO
alpha-Chlordane	0.047 - 0.067	0 / 19	--	--	--	0.17	-- / --	0.39	NO
beta-BHC	0.047 - 0.067	0 / 19	--	--	--	2.20	-- / --	0.03	NO
delta-BHC	0.047 - 0.067	0 / 19	--	--	--	2.20	-- / --	0.03	NO
Dieldrin	0.050 - 0.13	0 / 19	--	--	--	0.056	-- / --	2.32	**YES**
Endosulfan I	0.047 - 0.067	0 / 19	--	--	--	0.056	-- / --	1.20	**YES**
Endosulfan II	0.050 - 0.13	0 / 19	--	--	--	0.056	-- / --	2.32	**YES**
Endosulfan sulfate	0.050 - 0.13	0 / 19	--	--	--	0.056	-- / --	2.32	**YES**
Endrin	0.050 - 0.13	0 / 19	--	--	--	0.036	-- / --	3.61	**YES**
Endrin aldehyde	0.050 - 0.13	0 / 19	--	--	--	0.15	-- / --	0.87	NO
Endrin ketone	0.050 - 0.13	0 / 19	--	--	--	0.15	-- / --	0.87	NO
gamma-BHC (Lindane)	0.047 - 0.067	0 / 19	--	--	--	0.080	-- / --	0.84	NO
gamma-Chlordane	0.047 - 0.067	0 / 19	--	--	--	0.17	-- / --	0.39	NO
Heptachlor	0.047 - 0.067	0 / 19	--	--	--	0.0069	-- / --	9.71	**YES**
Heptachlor epoxide	0.047 - 0.067	0 / 19	--	--	--	0.0069	-- / --	9.71	**YES**
Methoxychlor	0.050 - 0.67	0 / 19	--	--	--	0.030	-- / --	22.3	**YES**
Toxaphene	0.64 - 1.30	0 / 19	--	--	--	0.011	-- / --	118	**YES**
Semivolatile Organic Compounds (UG/L)									
1,1-Biphenyl	9.00 - 10.0	0 / 19	--	--	--	14.0	-- / --	0.71	NO
1,2,4,5-Tetrachlorobenzene	6.00 - 10.0	0 / 19	--	--	--	3.00	-- / --	3.33	**YES**

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
2,2'-Oxybis(1-chloropropane)	6.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
2,3,4,6-Tetrachlorophenol	6.00 - 6.00	0 / 6	--	--	--	1.20	-- / --	5.00	**YES**
2,4,5-Trichlorophenol	6.00 - 24.0	0 / 19	--	--	--	63.0	-- / --	0.38	NO
2,4,6-Trichlorophenol	6.00 - 10.0	0 / 19	--	--	--	4.90	-- / --	2.04	**YES**
2,4-Dichlorophenol	6.00 - 10.0	0 / 19	--	--	--	11.0	-- / --	0.91	NO
2,4-Dimethylphenol	6.00 - 14.0	0 / 19	--	--	--	100	-- / --	0.14	NO
2,4-Dinitrophenol	6.00 - 24.0	0 / 19	--	--	--	19.0	-- / --	1.26	**YES**
2,4-Dinitrotoluene	0.16 - 10.0	0 / 19	--	--	--	44.0	-- / --	0.23	NO
2,6-Dinitrotoluene	0.16 - 10.0	0 / 19	--	--	--	81.0	-- / --	0.12	NO
2-Chloronaphthalene	0.19 - 3.00	0 / 19	--	--	--	0.40	-- / --	7.50	**YES**
2-Chlorophenol	6.00 - 10.0	0 / 19	--	--	--	24.0	-- / --	0.42	NO
2-Methylnaphthalene	0.080 - 0.20	0 / 19	--	--	--	330	-- / --	0.001	NO
2-Methylphenol	3.00 - 12.0	0 / 19	--	--	--	13.0	-- / --	0.92	NO
2-Nitroaniline	3.00 - 24.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
2-Nitrophenol	6.00 - 10.0	0 / 19	--	--	--	1,920	-- / --	0.01	NO
3- and 4-Methylphenol	6.00 - 17.0	0 / 19	--	--	--	543	-- / --	0.03	NO
3,3'-Dichlorobenzidine	6.00 - 10.0	0 / 19	--	--	--	4.50	-- / --	2.22	**YES**
3-Nitroaniline	3.00 - 24.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	6.00 - 24.0	0 / 19	--	--	--	2.30	-- / --	10.4	**YES**
4-Bromophenyl-phenylether	6.00 - 10.0	0 / 19	--	--	--	1.50	-- / --	6.67	**YES**
4-Chloro-3-methylphenol	6.00 - 11.0	0 / 19	--	--	--	0.30	-- / --	36.7	**YES**
4-Chloroaniline	6.00 - 10.0	0 / 19	--	--	--	232	-- / --	0.04	NO
4-Chlorophenyl-phenylether	6.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
4-Nitroaniline	3.00 - 24.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
4-Nitrophenol	3.00 - 24.0	0 / 19	--	--	--	300	-- / --	0.08	NO
Acenaphthene	0.080 - 0.20	1 / 19	0.069	0.069	CAA03-SW02-1209	23.0	0 / 19	0.003	NO
Acenaphthylene	0.080 - 0.20	0 / 19	--	--	--	4,840	-- / --	0.00004	NO
Acetophenone	3.00 - 12.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Anthracene	0.080 - 0.20	0 / 19	--	--	--	0.73	-- / --	0.27	NO
Atrazine	3.00 - 10.0	0 / 19	--	--	--	1.80	-- / --	5.56	**YES**
Benzaldehyde	1.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Benzo(a)anthracene	0.080 - 0.34	0 / 19	--	--	--	0.027	-- / --	12.6	**YES**
Benzo(a)pyrene	0.080 - 0.20	2 / 19	0.073	0.24	CAS04-SW04-1209	0.014	2 / 19	17.1	**YES**
Benzo(b)fluoranthene	0.080 - 0.58	0 / 19	--	--	--	9.07	-- / --	0.06	NO
Benzo(g,h,i)perylene	0.080 - 0.20	1 / 19	0.16	0.16	CAS04-SW04-1209	7.64	0 / 19	0.02	NO
Benzo(k)fluoranthene	0.080 - 0.20	2 / 19	0.069	0.15	CAS04-SW04-1209	9.07	0 / 19	0.02	NO
bis(2-Chloroethoxy)methane	6.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	6.00 - 10.0	0 / 19	--	--	--	1,900	-- / --	0.01	NO
bis(2-Ethylhexyl)phthalate	0.94 - 6.00	8 / 19	0.48	1.50	CAS04-SW07-1209	32.0	0 / 19	0.05	NO
Butylbenzylphthalate	3.00 - 10.0	0 / 19	--	--	--	19.0	-- / --	0.53	NO
Caprolactam	3.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Carbazole	0.19 - 3.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Chrysene	0.080 - 0.20	1 / 19	0.080	0.080	CAS04-SW04-1209	NSV	-- / --	NSV	**YES**
Dibenz(a,h)anthracene	0.080 - 0.20	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Dibenzofuran	3.00 - 10.0	0 / 19	--	--	--	3.70	-- / --	2.70	**YES**
Diethylphthalate	3.00 - 10.0	0 / 19	--	--	--	270	-- / --	0.04	NO
Dimethyl phthalate	3.00 - 10.0	0 / 19	--	--	--	330	-- / --	0.03	NO
Di-n-butylphthalate	0.94 - 3.00	0 / 19	--	--	--	35.0	-- / --	0.09	NO
Di-n-octylphthalate	6.00 - 10.0	0 / 19	--	--	--	22.0	-- / --	0.45	NO
Fluoranthene	0.080 - 0.20	4 / 19	0.11	0.32	CAS04-SW04-1209	8.10	0 / 19	0.04	NO
Fluorene	0.063 - 0.20	0 / 19	--	--	--	3.90	-- / --	0.05	NO
Hexachlorobenzene	0.19 - 3.00	0 / 19	--	--	--	3.68	-- / --	0.82	NO
Hexachlorobutadiene	6.00 - 10.0	0 / 19	--	--	--	1.30	-- / --	7.69	**YES**
Hexachlorocyclopentadiene	6.00 - 10.0	0 / 19	--	--	--	1.04	-- / --	9.62	**YES**
Hexachloroethane	0.19 - 3.00	0 / 19	--	--	--	12.0	-- / --	0.25	NO
Indeno(1,2,3-cd)pyrene	0.080 - 0.20	1 / 19	0.24	0.24	CAS04-SW04-1209	4.31	0 / 19	0.06	NO
Isophorone	3.00 - 10.0	0 / 19	--	--	--	1,170	-- / --	0.01	NO
Naphthalene	0.080 - 0.20	1 / 19	0.066	0.066	CAA03-SW02-1209	12.0	0 / 19	0.01	NO
n-Nitroso-di-n-propylamine	6.00 - 10.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
n-Nitrosodiphenylamine	6.00 - 12.0	0 / 19	--	--	--	210	-- / --	0.06	NO
Nitrobenzene	0.16 - 10.0	0 / 19	--	--	--	270	-- / --	0.04	NO
Pentachlorophenol	0.94 - 9.00	0 / 19	--	--	--	15.0	-- / --	0.60	NO
Phenanthrene	0.080 - 0.20	4 / 19	0.068	0.088	CAS04-SW05-1209	6.30	0 / 19	0.01	NO
Phenol	3.00 - 10.0	0 / 19	--	--	--	110	-- / --	0.09	NO
Pyrene	0.080 - 0.20	5 / 19	0.065	0.29	CAS04-SW04-1209	0.025	5 / 19	11.6	**YES**
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	1.00 - 1.00	0 / 19	--	--	--	11.0	-- / --	0.09	NO
1,1,2,2-Tetrachloroethane	1.00 - 2.00	0 / 19	--	--	--	610	-- / --	0.003	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	1.00 - 1.00	0 / 19	--	--	--	1,200	-- / --	0.001	NO
1,1-Dichloroethane	1.00 - 1.00	0 / 19	--	--	--	47.0	-- / --	0.02	NO
1,1-Dichloroethene	1.00 - 2.00	0 / 19	--	--	--	25.0	-- / --	0.08	NO
1,2,3-Trichlorobenzene	1.00 - 1.00	0 / 6	--	--	--	8.00	-- / --	0.13	NO
1,2,4-Trichlorobenzene	1.00 - 2.00	0 / 19	--	--	--	110	-- / --	0.02	NO
1,2-Dibromo-3-chloropropane	2.00 - 5.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromoethane	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichlorobenzene	1.00 - 1.00	0 / 19	--	--	--	14.0	-- / --	0.07	NO
1,2-Dichloroethane	1.00 - 1.00	0 / 19	--	--	--	910	-- / --	0.001	NO
1,2-Dichloropropane	1.00 - 1.00	0 / 19	--	--	--	525	-- / --	0.002	NO
1,3-Dichlorobenzene	1.00 - 1.00	0 / 19	--	--	--	71.0	-- / --	0.01	NO
1,4-Dichlorobenzene	1.00 - 1.00	0 / 19	--	--	--	15.0	-- / --	0.07	NO
2-Butanone	5.00 - 12.0	0 / 19	--	--	--	14,000	-- / --	0.001	NO

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
2-Hexanone	2.50 - 6.00	0 / 19	--	--	--	99.0	-- / --	0.06	NO
4-Methyl-2-pentanone	2.50 - 5.00	0 / 19	--	--	--	170	-- / --	0.03	NO
Acetone	3.00 - 12.0	0 / 19	--	--	--	1,500	-- / --	0.01	NO
Benzene	1.00 - 1.00	0 / 19	--	--	--	130	-- / --	0.01	NO
Bromochloromethane	1.00 - 1.00	0 / 6	--	--	--	NSV	-- / --	NSV	NO
Bromodichloromethane	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Bromoform	1.00 - 1.00	0 / 19	--	--	--	320	-- / --	0.003	NO
Bromomethane	1.00 - 2.00	0 / 19	--	--	--	110	-- / --	0.02	NO
Carbon disulfide	1.00 - 5.00	0 / 19	--	--	--	0.92	-- / --	5.43	**YES**
Carbon tetrachloride	1.00 - 1.00	0 / 19	--	--	--	240	-- / --	0.004	NO
Chlorobenzene	1.00 - 1.00	0 / 19	--	--	--	64.0	-- / --	0.02	NO
Chloroethane	1.00 - 2.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Chloroform	1.00 - 1.00	0 / 19	--	--	--	28.0	-- / --	0.04	NO
Chloromethane	1.00 - 2.00	0 / 19	--	--	--	5,500	-- / --	0.0004	NO
cis-1,2-Dichloroethene	1.00 - 1.00	0 / 19	--	--	--	590	-- / --	0.002	NO
cis-1,3-Dichloropropene	1.00 - 1.00	0 / 19	--	--	--	24.4	-- / --	0.04	NO
Cyclohexane	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Dibromochloromethane	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Dichlorodifluoromethane (Freon-12)	1.00 - 2.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Ethylbenzene	1.00 - 1.00	0 / 19	--	--	--	290	-- / --	0.003	NO
Isopropylbenzene	1.00 - 1.00	0 / 19	--	--	--	2.60	-- / --	0.38	NO
m- and p-Xylene	2.00 - 2.00	0 / 19	--	--	--	13.0	-- / --	0.15	NO
Methyl acetate	1.00 - 2.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Methylcyclohexane	1.00 - 1.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Methylene chloride	5.00 - 5.00	0 / 19	--	--	--	2,200	-- / --	0.002	NO
Methyl-tert-butyl ether (MTBE)	1.00 - 2.00	0 / 19	--	--	--	11,070	-- / --	0.0002	NO
o-Xylene	1.00 - 1.00	0 / 19	--	--	--	13.0	-- / --	0.08	NO
Styrene	1.00 - 1.00	0 / 19	--	--	--	72.0	-- / --	0.01	NO
Tetrachloroethene	1.00 - 3.00	0 / 19	--	--	--	98.0	-- / --	0.03	NO
Toluene	1.00 - 1.00	0 / 19	--	--	--	9.80	-- / --	0.10	NO
trans-1,2-Dichloroethene	1.00 - 1.00	0 / 19	--	--	--	590	-- / --	0.002	NO
trans-1,3-Dichloropropene	1.00 - 1.00	0 / 19	--	--	--	24.4	-- / --	0.04	NO
Trichloroethene	1.00 - 1.00	0 / 19	--	--	--	47.0	-- / --	0.02	NO
Trichlorofluoromethane (Freon-11)	1.00 - 2.00	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Vinyl chloride	1.00 - 2.00	0 / 19	--	--	--	930	-- / --	0.002	NO
Xylene, total	3.00 - 3.00	0 / 13	--	--	--	13.0	-- / --	0.23	NO
Explosives (UG/L)									
1,3,5-Trinitrobenzene	0.16 - 0.17	0 / 6	--	--	--	11.0	-- / --	0.02	NO
1,3-Dinitrobenzene	0.16 - 0.17	0 / 6	--	--	--	17.0	-- / --	0.01	NO
2,4,6-Trinitrotoluene	0.16 - 0.17	0 / 6	--	--	--	93.0	-- / --	0.002	NO
2-Amino-4,6-dinitrotoluene	0.16 - 0.17	0 / 6	--	--	--	19.0	-- / --	0.01	NO

TABLE L-56

Initial Screening Statistics - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
2-Nitrotoluene	0.17 - 0.18	0 / 6	--	--	--	3,400	-- / --	0.0001	NO
3-Nitrotoluene	0.16 - 0.17	0 / 6	--	--	--	750	-- / --	0.0002	NO
4-Amino-2,6-dinitrotoluene	0.16 - 0.17	0 / 6	--	--	--	19.0	-- / --	0.01	NO
4-Nitrotoluene	0.31 - 0.33	0 / 6	--	--	--	1,900	-- / --	0.0002	NO
HMX	0.16 - 0.17	0 / 6	--	--	--	330	-- / --	0.001	NO
RDX	0.16 - 0.17	0 / 6	--	--	--	186	-- / --	0.001	NO
Tetryl	0.16 - 0.17	0 / 6	--	--	--	NSV	-- / --	NSV	NO
Other Parameters									
Hardness (MG/L)	-- - --	19 / 19	62.0	338	CAS04-SW05-1209	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-57

Exceedances - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Water ESV	Background UTL	CAA03-SW01		CAA03-SW02	CAA03-SW03	CAA03-SW04	CAS04-SW01	CAS04-SW02	CAS04-SW03	CAS04-SW04	CAS04-SW05	CAS04-SW06	CAS04-SW07	
			CAA03-SW01-1209	CAA03-SW01P-1209	CAA03-SW02-1209	CAA03-SW03-1209	CAA03-SW04-1209	CAS04-SW01-1209	CAS04-SW02-1209	CAS04-SW03-1209	CAS04-SW04-1209	CAS04-SW05-1209	CAS04-SW06-1209	CAS04-SW07-1209	CAS04-SW07P-1209
			Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams
			12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/07/09	12/08/09	12/08/09	12/08/09	12/08/09
Inorganics (UG/L)															
Aluminum	87.0	228	300 U	44.3 B	26.7 B	**212 J**	**306**	**178 J**	108 B	**2,730**	**445**	**83.1 J**	300 U	**248 J**	**1,120**
Antimony	30.0	--	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic	150	--	2.9 B	3.3 B	3.3 B	5.7 B	4.4 B	3.5 B	1.7 B	**10.3**	3.8 B	1.6 B	5 U	5 U	5 U
Barium	4.00	26.6	**23.1**	**23.8**	**26.8**	**28.4**	**23**	**24.4**	**24.2**	**44.4**	**25.2**	**25.6**	**26.2**	**26.5**	**30.3**
Beryllium	0.66	--	1 U	1 U	1 U	1 U	**0.06 J**	1 U	1 U	**0.12 J**	1 U	1 U	1 U	1 U	**0.06 J**
Cadmium	0.45	0.080	**0.06 J**	**0.11 J**	1 U	**0.15 J**	**0.23 J**	**0.13 J**	**0.16 J**	**0.82 J**	**0.22 J**	1 U	**0.16 J**	**0.3 J**	**0.45 J**
Cobalt	23.0	--	**0.3 J**	**0.34 J**	**0.28 J**	**0.44 J**	**0.5 J**	**0.34 J**	**0.45 J**	**1.5**	**0.45 J**	**0.29 J**	**0.4 J**	**0.66 J**	**1.1**
Copper	16.9	No value	**3.0**	**3.0**	**3.0**	**6.4**	**6.1**	**7.8**	**3.9**	**25.9**	**7.6**	**1.3**	**1.4**	**2.3**	**7.0**
Iron	1,000	2,620	**1,070**	**1,010**	**1,970**	**2,410**	**1,550**	**1,310**	**1,480**	**19,000**	**2,200**	**682**	**339**	**353**	**1,800**
Lead	7.74	--	0.32 B	0.26 B	0.28 B	**1.3**	**0.98 J**	**0.93 J**	**0.56 J**	**5.9**	**1.4**	0.36 B	0.18 B	**0.67 J**	**2.6**
Manganese	120	161	**49**	**46.9**	**66.2**	**55.5**	**66.2**	**42.6**	**53.4**	**142**	**74.2**	**72.8**	**19.8**	**6.6**	**12.5**
Nickel	94.2	--	1.1 B	0.92 B	0.73 B	1.5 B	1.3 B	1 B	1.1 B	**3.5 J**	1.7 B	0.65 B	1.1 B	1.4 B	**2 J**
Selenium	5.00	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**0.86 J**	**0.82 J**	**1.3 J**	**1.3 J**	**1.1 J**
Silver	0.36	--	1 U	1 U	1 U	**0.06 J**	**0.07 J**	1 U	**0.05 J**	**0.06 J**	1 U	1 U	1 U	1 U	1 U
Vanadium	20.0	--	1.7 B	0.9 B	1 B	1.4 B	1.3 B	2 B	1.4 B	**8.3**	1.7 B	0.72 B	1 B	1.3 B	**4.6 J**
Zinc	216	--	**17.9 J**	**15.4 J**	**9.3 J**	**20.1 J**	**16.3 J**	**12.9 J**	**13.3 J**	**65.4**	**24.4 J**	3.2 B	**12.6 J**	**16.8 J**	**31.4**
Dissolved Metals (UG/L)															
Antimony	30.0	--	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Arsenic	150	--	5 U	5 U	5 U	2.2 B	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Barium	4.00	27.7	**24.4**	**23.3**	**25.5**	**21.4**	**21.6**	**19.8**	**20.8**	**24.2**	**22**	**23.8**	**24.3**	**24.4**	**25.4**
Beryllium	0.66	--	1 U	1 U	1 U	1 U	1 U	**0.06 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	0.40	--	1 U	1 U	**0.05 J**	1 U	**0.05 J**	**0.18 J**	**0.06 J**	1 U	1 U	1 U	**0.14 J**	**0.18 J**	**0.18 J**
Cobalt	23.0	--	**0.29 J**	**0.27 J**	**0.28 J**	**0.13 J**	**0.26 J**	**0.45 J**	**0.26 J**	**0.41 J**	**0.27 J**	**0.2 J**	**0.53 J**	**0.43 J**	**0.49 J**
Copper	16.3	--	4.2 B	2.4 B	3 B	3.6 B	3.5 B	4.3 B	2.5 B	1.9 B	3.2 B	2.2 B	1.6 B	2.6 B	3 B
Iron	1,000	2,410	**30.4 J**	**29.8 J**	**30.1 J**	**54.3 J**	**55.8 J**	**96.6 J**	**50.9 J**	**17.5 J**	**119**	8.7 B	5.2 B	13.3 B	100 U
Manganese	120	165	**41.5**	**38.9**	**55.9**	**11.4**	**45.6**	**40.3**	**43.9**	**91.5**	**91.9**	**49.6**	**18.8**	**4.4 J**	**5.3**
Nickel	93.9	--	**0.83 J**	**1.1 J**	**0.97 J**	**0.73 J**	**0.88 J**	**1 J**	**1 J**	**1.1 J**	**1.3 J**	0.54 B	0.89 B	1.2 B	0.95 B
Selenium	4.61	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**0.84 J**
Silver	0.36	--	1 U	1 U	1 U	1 U	1 U	**0.1 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vanadium	20.0	--	0.92 B	0.91 B	5 U	**0.72 J**	5 U	0.86 B	0.92 B	5 U	5 U	5 U	5 U	**1.2 J**	**1.2 J**
Zinc	213	--	10.6 B	8.4 B	7.8 B	9 B	10.1 B	10.5 B	7.5 B	6.5 B	10 B	5.2 B	11.9 B	14.8 B	16 B
Semivolatile Organic Compounds (UG/L)															
Acenaphthene	23.0	--	0.19 U	0.19 U	**0.069 J**	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(a)pyrene	0.014	No value	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	**0.073 J**	**0.24 J**	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(g,h,i)perylene	7.64	--	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.16 J**	0.19 U	0.19 U	0.19 U	0.19 U
Benzo(k)fluoranthene	9.07	--	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.15 J**	**0.069 J**	0.19 U	0.19 U	0.19 U
bis(2-Ethylhexyl)phthalate	32.0	--	0.94 U	0.94 U	0.94 U	**1.1**	0.94 U	**0.86 J**	**0.85 L**	**1.3**	**0.75 J**	0.94 U	0.96 U	0.96 U	**1.5**
Chrysene	NSV	No value	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.08 J**	0.19 U	0.19 U	0.19 U	0.19 U
Fluoranthene	8.10	--	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	**0.13 J**	**0.32**	**0.18 J**	0.19 U	0.19 U	0.19 U
Indeno(1,2,3-cd)pyrene	4.31	--	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	**0.24**	0.19 U	0.19 U	0.19 U	0.19 U
Naphthalene	12.0	--	0.19 U	0.19 U	**0.066 J**	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Phenanthrene	6.30	--	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	**0.068 J**	**0.074 J**	**0.088 J**	0.19 U	0.19 U	0.19 U
Pyrene	0.025	0.059	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	**0.10 J**	**0.29**	**0.29 J**	0.19 U	0.19 U	**0.065 J**
Other Parameters															
Hardness (MG/L)	--	--	**196**	NA	**179**	**170**	**169**	**166**	**209**	**276**	**181**	**338**	**330**	**335**	NA

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-57

Exceedances - Site 4/Youth Pond Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Surface Water ESV	Background UTL	CAS04-SW08	CAS04-SW09	CAYP-SWSD01		CAYP-SWSD02	CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06
			CAS04-SW08-1209	CAS04-SW09-1209	CAYP-SW01-1012	CAYP-SW01P-1012	CAYP-SW02-1012	CAYP-SW03-1012	CAYP-SW04-1012	CAYP-SW05-1112	CAYP-SW06-1112
			Site 4 Streams	Site 4 Streams	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond
			12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/11/12	10/11/12	11/09/12	11/09/12
Inorganics (UG/L)											
Aluminum	87.0	228	**215 J**	**518**	**58.8**	**38.1 J**	25 U	**9.35 J**	**21.5 J**	**15.7 J**	**29.5 J**
Antimony	30.0	--	8 U	8 U	**0.116 J**	0.44 U	0.44 U	0.44 U	0.44 U	**0.206 J**	**0.155 J**
Arsenic	150	--	5 U	**58**	**1.5 J**	**1.62 J**	**1.55 J**	**1.55 J**	**1.4 J**	**1.45 J**	**1.15 J**
Barium	4.00	26.6	**26.3**	**42.5**	**17.1**	**16.3**	**14.5**	**17**	**16.5**	**9.5 J**	**30**
Beryllium	0.66	--	1 U	1 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium	0.45	0.080	**0.28 J**	1 U	**0.177 J**	**0.115 J**	4 U	4 U	**0.292 J**	4 U	4 U
Cobalt	23.0	--	**0.63 J**	**0.61 J**	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	**0.294 J**
Copper	16.9	No value	**3.4**	**1.6**	**1.0**	**0.838 J**	**0.627 J**	**0.286 J**	**0.236 J**	**1.2**	**0.663 J**
Iron	1,000	2,620	**424**	**30,300**	**928**	**868**	**1,200**	**1,040**	**891**	**349**	**716**
Lead	7.74	--	**1.2**	**1.5**	**0.886 J**	**0.582 J**	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Manganese	120	161	**11.8**	**250**	**63.2**	**64**	**64.1**	**78.6**	**59.9**	**12.9**	**48.7**
Nickel	94.2	--	1.5 B	0.6 B	**0.944 J**	**0.859 J**	**1.14 J**	**0.903 J**	**0.864 J**	**0.527 J**	**2.15 J**
Selenium	5.00	--	**1.2 J**	5 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.36	--	1 U	1 U	0.12 U	0.12 U	0.12 U	0.12 U	**0.0418 J**	0.12 U	0.12 U
Vanadium	20.0	--	1.8 B	2.1 B	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc	216	--	**18.2 J**	**16.5 J**	**10.9 J**	**7.98 J**	**12.9 L**	6 U	6 U	**6.94 J**	**3.9 J**
Dissolved Metals (UG/L)											
Antimony	30.0	--	8 U	8 U	**0.12 J**	**0.111 J**	0.44 U	0.44 U	0.44 U	**0.218 J**	**0.163 J**
Arsenic	150	--	5 U	**16.6**	**0.873 J**	**0.84 J**	**0.936 J**	**0.87 J**	**0.896 J**	**0.92 J**	**1.07 J**
Barium	4.00	27.7	**23.9**	**23.8**	**14.1**	**14.6**	**12.8**	**16**	**15.7**	**8.21 J**	**28.6**
Beryllium	0.66	--	1 U	1 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Cadmium	0.40	--	**0.19 J**	1 U	4 U	**0.11 J**	4 U	4 U	4 U	4 U	4 U
Cobalt	23.0	--	**0.56 J**	**0.67 J**	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	**0.255 J**
Copper	16.3	--	2.2 B	3 B	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	**0.758 J**	**0.431 J**
Iron	1,000	2,410	7.9 B	**5,680**	**119**	**153**	**68**	**62.1**	**72.7**	**48.6**	**406**
Manganese	120	165	**6.2**	**268**	**48.3**	**49.7**	**57.7**	**72.7**	**53.1**	**3.58**	**45.6**
Nickel	93.9	--	0.95 B	0.98 B	**0.812 J**	**0.816 J**	**0.77 J**	**0.826 J**	**0.844 J**	**0.484 J**	**1.97 J**
Selenium	4.61	--	**1.6 J**	5 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.36	--	1 U	1 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Vanadium	20.0	--	**1.1 J**	5 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Zinc	213	--	12.8 B	**19.8 J**	6 U	6 U	6 U	6 U	6 U	**4.48 J**	**2.97 J**
Semivolatile Organic Compounds (UG/L)											
Acenaphthene	23.0	--	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(a)pyrene	0.014	No value	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(g,h,i)perylene	7.64	--	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Benzo(k)fluoranthene	9.07	--	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
bis(2-Ethylhexyl)phthalate	32.0	--	**1.5**	**0.48 J**	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chrysene	NSV	No value	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Fluoranthene	8.10	--	0.19 U	**0.11 J**	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Indeno(1,2,3-cd)pyrene	4.31	--	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Naphthalene	12.0	--	0.19 U	0.19 U	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Phenanthrene	6.30	--	0.19 U	**0.069 J**	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Pyrene	0.025	0.059	0.19 U	**0.23 J**	0.08 U	0.08 U	0.08 U	0.08 UL	0.08 UL	0.08 U	0.08 U
Other Parameters											
Hardness (MG/L)	--	--	**321**	**297**	**80**	NA	**84**	**88**	**90**	**62**	**240**

Notes:

Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-58

Area-Specific Screening Statistics - Surface Water - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (UG/L)																	
Aluminum	26.7 - 300	5 / 8	178	2,730	CAS04-SW03-1209	511	907	1,119	87.0	5 / 8	31.4	12.9	5.87	228	3 / 8	12.0	**YES**
Barium	-- - --	8 / 8	23.0	44.4	CAS04-SW03-1209	27.5	7.04	32.2	4.00	8 / 8	11.1	8.06	6.88	26.6	3 / 8	1.67	**YES**
Cadmium	1.00 - 1.00	7 / 8	0.11	0.82	CAS04-SW03-1209	0.29	0.25	0.46	0.44	1 / 8	1.86	1.03	0.66	0.08	7 / 8	10.3	**YES**
Copper	-- - --	8 / 8	3.00	25.9	CAS04-SW03-1209	7.96	7.50	13.0	16.4	1 / 8	1.58	0.79	0.49	--	-- / --	--	NO
Iron	-- - --	8 / 8	1,070	19,000	CAS04-SW03-1209	3,874	6,129	7,979	1,000	8 / 8	19.0	7.98	3.87	2,620	1 / 8	7.25	**YES**
Manganese	-- - --	8 / 8	42.6	142	CAS04-SW03-1209	68.6	31.4	89.7	120	1 / 8	1.18	0.75	0.57	161	0 / 8	0.88	NO
Dissolved Metals (UG/L)																	
Barium	-- - --	8 / 8	19.8	25.5	CAA03-SW02-1209	22.5	2.00	23.8	4.00	8 / 8	6.38	5.95	5.62	27.7	0 / 8	0.92	NO
Iron	-- - --	8 / 8	17.5	119	CAS04-SW04-1209	56.8	34.7	80.1	1,000	0 / 8	0.12	0.08	0.06	2,410	0 / 8	0.05	NO
Manganese	-- - --	8 / 8	11.4	91.9	CAS04-SW04-1209	52.8	27.2	70.9	120	0 / 8	0.77	0.59	0.44	165	0 / 8	0.56	NO
Semivolatile Organic Compounds (UG/L)																	
Benzo(a)pyrene	0.19 - 0.20	2 / 8	0.073	0.24	CAS04-SW04-1209	0.11	0.053	0.15	0.014	2 / 8	17.1	10.5	7.93	--	-- / --	--	**YES**
Chrysene	0.19 - 0.20	1 / 8	0.080	0.080	CAS04-SW04-1209	0.094	0.0058	0.098	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Pyrene	0.19 - 0.20	2 / 8	0.10	0.29	CAS04-SW04-1209	0.12	0.068	0.17	0.025	2 / 8	11.6	6.66	4.83	0.059	2 / 8	4.91	**YES**
Other Parameters																	
Hardness (MG/L)	-- - --	8 / 8	166	276	CAS04-SW03-1209	193	36.5	218	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-59

Area-Specific Screening Statistics - Surface Water - Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (UG/L)																	
Aluminum	300 - 300	4 / 5	83.1	1,120	CAS04-SW07-1209	417	427	824	87.0	3 / 5	12.9	9.47	4.80	228	2 / 5	4.91	**YES**
Barium	-- - --	5 / 5	25.6	42.5	CAS04-SW09-1209	30.2	7.14	37.0	4.00	5 / 5	10.6	9.25	7.55	26.6	2 / 5	1.60	**YES**
Cadmium	1.00 - 1.00	3 / 5	0.16	0.45	CAS04-SW07-1209	0.38	0.15	0.52	0.65	0 / 5	0.70	--	0.58	--	-- / --	--	NO
Copper	-- - --	5 / 5	1.30	7.00	CAS04-SW07-1209	2.94	2.43	5.25	25.5	0 / 5	0.27	0.21	0.12	--	-- / --	--	NO
Iron	-- - --	5 / 5	339	30,300	CAS04-SW09-1209	6,709	13,201	19,294	1,000	2 / 5	30.3	19.3	6.71	2,620	1 / 5	11.6	**YES**
Manganese	-- - --	5 / 5	11.8	250	CAS04-SW09-1209	73.4	102	171	120	1 / 5	2.08	1.42	0.61	161	1 / 5	1.55	**YES**
Dissolved Metals (UG/L)																	
Barium	-- - --	5 / 5	23.8	25.4	CAS04-SW07-1209	24.2	0.68	24.9	4.00	5 / 5	6.35	6.22	6.06	27.7	0 / 5	0.92	NO
Iron	5.20 - 100	1 / 5	5,680	5,680	CAS04-SW09-1209	1,148	2,533	3,564	1,000	1 / 5	5.68	3.56	1.15	2,410	1 / 5	2.36	**YES**
Manganese	-- - --	5 / 5	5.30	268	CAS04-SW09-1209	69.6	112	177	120	1 / 5	2.23	1.47	0.58	165	1 / 5	1.62	**YES**
Semivolatile Organic Compounds (UG/L)																	
Benzo(a)pyrene	0.19 - 0.19	0 / 5	--	--	--	0.095	0.0	0.095	0.014	-- / --	13.6	6.79	6.79	--	-- / --	--	NO
Chrysene	0.19 - 0.19	0 / 5	--	--	--	0.095	0.0	0.095	NSV	-- / --	--	--	--	--	-- / --	--	NO
Pyrene	0.19 - 0.19	3 / 5	0.065	0.29	CAS04-SW05-1209	0.16	0.099	0.25	0.025	3 / 5	11.6	10.0	6.20	0.059	3 / 5	4.91	**YES**
Other Parameters																	
Hardness (MG/L)	-- - --	5 / 5	297	338	CAS04-SW05-1209	324	16.5	340	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-60

Area-Specific Screening Statistics - Surface Water - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (UG/L)																	
Aluminum	25.0 - 25.0	5 / 6	9.35	58.8	CAYP-SW01-1012	24.6	18.2	39.6	87.0	0 / 6	0.68	0.45	0.28	--	-- / --	--	NO
Barium	-- - --	6 / 6	9.50	30.0	CAYP-SW06-1112	17.4	6.79	23.0	4.00	6 / 6	7.50	5.76	4.36	26.6	1 / 6	1.13	**YES**
Cadmium	4.00 - 4.00	2 / 6	0.18	0.29	CAYP-SW04-1012	1.41	0.91	2.16	0.28	1 / 6	1.03	--	--	0.08	1 / 6	3.65	NO
Copper	-- - --	6 / 6	0.24	1.20	CAYP-SW05-1112	0.67	0.38	0.98	9.88	0 / 6	0.12	0.10	0.07	--	-- / --	--	NO
Iron	-- - --	6 / 6	349	1,200	CAYP-SW02-1012	854	295	1,097	1,000	2 / 6	1.20	1.10	0.85	2,620	0 / 6	0.46	NO
Manganese	-- - --	6 / 6	12.9	78.6	CAYP-SW03-1012	54.7	22.6	73.3	120	0 / 6	0.66	0.61	0.46	--	-- / --	--	NO
Dissolved Metals (UG/L)																	
Barium	-- - --	6 / 6	8.21	28.6	CAYP-SW06-1112	16.0	6.81	21.6	4.00	6 / 6	7.15	5.40	4.00	27.7	1 / 6	1.03	NO
Iron	-- - --	6 / 6	48.6	406	CAYP-SW06-1112	135	138	248	1,000	0 / 6	0.41	0.25	0.14	--	-- / --	--	NO
Manganese	-- - --	6 / 6	3.58	72.7	CAYP-SW03-1012	47.1	23.3	66.2	120	0 / 6	0.61	0.55	0.39	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/L)																	
Benzo(a)pyrene	0.08 - 0.08	0 / 6	--	--	--	0.040	0.0	0.040	0.014	-- / --	5.71	2.86	2.86	--	-- / --	--	NO
Chrysene	0.08 - 0.08	0 / 6	--	--	--	0.040	0.0	0.040	NSV	-- / --	--	--	--	--	-- / --	--	NO
Pyrene	0.08 - 0.08	0 / 6	--	--	--	0.040	0.0	0.040	0.025	-- / --	3.20	1.60	1.60	--	-- / --	--	NO
Other Parameters																	
Hardness (MG/L)	-- - --	6 / 6	62.0	240	CAYP-SW06-1112	107	65.8	161	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-61

Initial Screening Statistics - Site 4/Youth Pond Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	-- - --	50 / 50	1,570	30,900	CAS04-SD10-1012	25,500	1 / 50	1.21	**YES**
Antimony	0.18 - 6.40	19 / 50	0.34	3.72	CAYP-SD12-1012	3.00	1 / 50	1.24	**YES**
Arsenic	-- - --	50 / 50	1.40	265	CAYP-SD05-1112	9.79	22 / 50	27.1	**YES**
Barium	21.2 - 35.0	47 / 50	8.40	166	CAS04-SD04-1209A	20.0	38 / 50	8.30	**YES**
Beryllium	0.73 - 0.73	49 / 50	0.14	1.60	CAS04-SD10-1012	NSV	-- / --	NSV	**YES**
Cadmium	-- - --	50 / 50	0.10	9.60	CAS04-SD10-1012	0.99	21 / 50	9.70	**YES**
Calcium [3]	1,890 - 18,200	47 / 50	232	34,200	CAYP-SD13-1012	NSV	-- / --	NSV	NO
Chromium	-- - --	50 / 50	3.77	57.0	CAS04-SD10-1012	43.4	2 / 50	1.31	**YES**
Cobalt	0.67 - 1.80	48 / 50	0.56	9.60	CAS04-SD10-1012	50.0	0 / 50	0.19	NO
Copper	-- - --	50 / 50	3.30	197	CAS04-SD10-1012	31.6	17 / 50	6.23	**YES**
Cyanide	0.030 - 2.70	2 / 36	0.25	0.33	CAYP-SD02-1012	NSV	-- / --	NSV	**YES**
Iron	-- - --	50 / 50	2,940	44,200	CAYP-SD13-1012	20,000	14 / 50	2.21	**YES**
Lead	-- - --	50 / 50	4.50	417	CAS04-SD03-1209A	35.8	20 / 50	11.6	**YES**
Magnesium [3]	522 - 2,100	48 / 50	197	5,980	CAS04-SD10-1012	NSV	-- / --	NSV	NO
Manganese	65.8 - 105	47 / 50	12.0	338	CAYP-SD13-1012	460	0 / 50	0.73	NO
Mercury	0.0070 - 0.040	44 / 50	0.0054	0.79	CAYP-SD05-1112	0.18	3 / 50	4.37	**YES**
Nickel	1.40 - 1.40	49 / 50	1.19	27.2	CAS04-SD10-1012	22.7	3 / 50	1.20	**YES**
Potassium [3]	368 - 1,880	47 / 50	176	3,520	CAS04-SD10-1012	NSV	-- / --	NSV	NO
Selenium	0.24 - 6.40	16 / 50	0.22	6.48	CAYP-SD12-1012	2.00	3 / 50	3.24	**YES**
Silver	0.18 - 5.60	21 / 50	0.050	6.10	CAS04-SD03-1209A	1.00	1 / 50	6.10	**YES**
Sodium [3]	5.79 - 191	25 / 50	9.47	235	CAA03-SD02-1209A	NSV	-- / --	NSV	NO
Thallium	0.40 - 10.1	7 / 50	0.15	1.86	CAYP-SD05-1112	NSV	-- / --	NSV	**YES**
Vanadium	-- - --	50 / 50	4.62	73.4	CAS04-SD10-1012	57.0	1 / 50	1.29	**YES**
Zinc	-- - --	50 / 50	11.8	626	CAS04-SD10-1012	121	26 / 50	5.17	**YES**
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	10.0 - 280	0 / 49	--	--	--	59.8	-- / --	4.68	**YES**
Aroclor-1221	10.0 - 660	0 / 49	--	--	--	59.8	-- / --	11.0	**YES**
Aroclor-1232	12.0 - 440	0 / 49	--	--	--	59.8	-- / --	7.36	**YES**
Aroclor-1242	10.0 - 280	2 / 49	20.0	52.0	CAS04-SD06-1209A	59.8	0 / 49	0.87	NO
Aroclor-1248	10.0 - 300	1 / 49	19.0	19.0	CAS004-4-SD04-00-1199	59.8	0 / 49	0.32	NO
Aroclor-1254	10.0 - 240	7 / 49	240	21,000	CAS04-SD03-1209A	59.8	7 / 49	351	**YES**
Aroclor-1260	24.0 - 280	34 / 49	23.0	2,400	CAS04-SD10-1012	59.8	27 / 49	40.1	**YES**
Pesticides (UG/KG)									
4,4'-DDD	3.60 - 66.0	13 / 35	1.60	380	CAS04-SD03-1209A	4.88	11 / 35	77.9	**YES**
4,4'-DDE	1.00 - 66.0	12 / 35	0.92	600	CAS04-SD03-1209A	3.16	9 / 35	190	**YES**
4,4'-DDT	4.80 - 66.0	13 / 35	0.83	3,300	CAYP-SD05-1112	4.16	11 / 35	793	**YES**
Aldrin	2.20 - 66.0	2 / 35	0.85	1.00	CAS04-SD08-1209A	2.00	0 / 35	0.50	NO
alpha-BHC	2.20 - 66.0	0 / 35	--	--	--	6.00	-- / --	11.0	**YES**
alpha-Chlordane	2.20 - 66.0	2 / 35	1.70	17.0	CAS04-SD03-1209A	3.24	1 / 35	5.25	**YES**
beta-BHC	2.20 - 66.0	0 / 35	--	--	--	5.00	-- / --	13.2	**YES**

TABLE L-61

Initial Screening Statistics - Site 4/Youth Pond Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
delta-BHC	2.20 - 66.0	0 / 35	--	--	--	3.00	-- / --	22.0	**YES**
Dieldrin	2.40 - 66.0	4 / 35	1.70	1,400	CAS04-SD03-1209A	1.90	2 / 35	737	**YES**
Endosulfan I	2.20 - 66.0	5 / 35	1.30	58.0	CAS04-SD03-1209A	NSV	-- / --	NSV	**YES**
Endosulfan II	4.30 - 66.0	8 / 35	0.64	830	CAS04-SD03-1209A	NSV	-- / --	NSV	**YES**
Endosulfan sulfate	4.30 - 66.0	4 / 35	3.40	35.0	CAA03-SD03-1209A	NSV	-- / --	NSV	**YES**
Endrin	4.30 - 66.0	3 / 35	9.60	1,200	CAS04-SD03-1209A	2.22	3 / 35	541	**YES**
Endrin aldehyde	4.30 - 66.0	4 / 35	3.30	290	CAS04-SD03-1209A	2.22	4 / 35	131	**YES**
Endrin ketone	4.30 - 66.0	0 / 35	--	--	--	2.22	-- / --	29.7	**YES**
gamma-BHC (Lindane)	2.20 - 66.0	1 / 35	0.78	0.78	CAS04-SD06-1209A	2.37	0 / 35	0.33	NO
gamma-Chlordane	2.20 - 66.0	10 / 35	1.10	780	CAS04-SD03-1209A	3.24	4 / 35	241	**YES**
Heptachlor	2.20 - 66.0	2 / 35	0.69	1.70	CAS04-SD05-1209A	NSV	-- / --	NSV	**YES**
Heptachlor epoxide	2.20 - 66.0	1 / 35	540	540	CAS04-SD03-1209A	2.47	1 / 35	219	**YES**
Methoxychlor	12.0 - 71.0	1 / 35	520	520	CAS04-SD03-1209A	NSV	-- / --	NSV	**YES**
Toxaphene	43.0 - 1,300	0 / 35	--	--	--	NSV	-- / --	NSV	NO
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	130 - 1,400	0 / 32	--	--	--	NSV	-- / --	NSV	NO
1,2,4,5-Tetrachlorobenzene	130 - 1,800	0 / 32	--	--	--	NSV	-- / --	NSV	NO
2,2'-Oxybis(1-chloropropane)	130 - 1,400	0 / 32	--	--	--	NSV	-- / --	NSV	NO
2,3,4,6-Tetrachlorophenol	250 - 2,300	0 / 19	--	--	--	NSV	-- / --	NSV	NO
2,4,5-Trichlorophenol	130 - 4,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trichlorophenol	130 - 2,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,4-Dichlorophenol	130 - 1,900	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,4-Dimethylphenol	130 - 2,100	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,4-Dinitrophenol	380 - 4,800	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,4-Dinitrotoluene	130 - 1,400	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2,6-Dinitrotoluene	130 - 1,400	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Chloronaphthalene	25.0 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Chlorophenol	130 - 2,100	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Methylnaphthalene	0.014 - 1,600	9 / 50	4.00	29.0	CAS04-SD18-1012	70.0	0 / 50	0.41	NO
2-Methylphenol	130 - 2,500	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Nitroaniline	130 - 4,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Nitrophenol	130 - 2,200	0 / 36	--	--	--	NSV	-- / --	NSV	NO
3- and 4-Methylphenol	250 - 2,400	0 / 32	--	--	--	NSV	-- / --	NSV	NO
3,3'-Dichlorobenzidine	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
3-Nitroaniline	130 - 4,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	380 - 4,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Bromophenyl-phenylether	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Chloro-3-methylphenol	130 - 2,100	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Chloroaniline	130 - 1,600	0 / 35	--	--	--	NSV	-- / --	NSV	NO
4-Chlorophenyl-phenylether	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Methylphenol	530 - 1,600	0 / 4	--	--	--	NSV	-- / --	NSV	NO

TABLE L-61

Initial Screening Statistics - Site 4/Youth Pond Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
4-Nitroaniline	130 - 4,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Nitrophenol	130 - 4,000	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Acenaphthene	23.0 - 1,600	23 / 50	0.014	300	CAA03-SD02-1209A	290	1 / 50	1.03	**YES**
Acenaphthylene	23.0 - 1,600	24 / 50	0.0032	320	CAYP-SD11-1012	160	1 / 50	2.00	**YES**
Acetophenone	130 - 2,300	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Anthracene	26.0 - 1,600	29 / 50	0.031	600	CAYP-SD11-1012	57.2	8 / 50	10.5	**YES**
Atrazine	130 - 1,400	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Benzaldehyde	130 - 1,500	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Benzo(a)anthracene	7.40 - 150	41 / 50	0.11	2,400	CAYP-SD11-1012	108	26 / 50	22.2	**YES**
Benzo(a)pyrene	13.0 - 150	44 / 50	0.12	2,700	CAYP-SD11-1012	150	18 / 50	18.0	**YES**
Benzo(b)fluoranthene	26.0 - 150	42 / 50	0.21	3,900	CAS04-SD03-1209A	240	21 / 50	16.3	**YES**
Benzo(g,h,i)perylene	7.10 - 150	37 / 50	0.056	1,900	CAS04-SD03-1209A	170	11 / 50	11.2	**YES**
Benzo(k)fluoranthene	8.50 - 150	37 / 50	0.066	1,600	CAS04-SD03-1209A	240	9 / 50	6.67	**YES**
bis(2-Chloroethoxy)methane	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroisopropyl)ether	530 - 1,600	0 / 4	--	--	--	NSV	-- / --	NSV	NO
bis(2-Ethylhexyl)phthalate	120 - 1,200	9 / 36	100	3,500	CAYP-SS05-1012	750	1 / 36	4.67	**YES**
Butylbenzylphthalate	130 - 1,600	1 / 36	7,400	7,400	CAYP-SD15-1012	NSV	-- / --	NSV	**YES**
Caprolactam	250 - 2,300	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Carbazole	6.70 - 1,600	8 / 36	6.00	49.0	CAS04-SD04-1209A	140	0 / 36	0.35	NO
Chrysene	27.0 - 150	46 / 50	0.16	2,700	CAS04-SD03-1209A	166	23 / 50	16.3	**YES**
Dibenz(a,h)anthracene	6.80 - 1,600	22 / 50	0.020	660	CAS04-SD03-1209A	33.0	13 / 50	20.0	**YES**
Dibenzofuran	130 - 1,600	0 / 36	--	--	--	5,100	-- / --	0.31	NO
Diethylphthalate	130 - 1,600	0 / 36	--	--	--	630	-- / --	2.54	**YES**
Dimethyl phthalate	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Di-n-butylphthalate	120 - 1,600	3 / 36	64.0	81.0	CAS004-4-SD03-00-1199	110	0 / 36	0.74	NO
Di-n-octylphthalate	130 - 2,700	1 / 36	440	440	CAYP-SD08-1012	NSV	-- / --	NSV	**YES**
Fluoranthene	27.0 - 150	46 / 50	0.24	4,700	CAYP-SD11-1012	423	13 / 50	11.1	**YES**
Fluorene	5.70 - 1,600	17 / 50	0.016	420	CAA03-SD02-1209A	77.4	2 / 50	5.43	**YES**
Hexachlorobenzene	25.0 - 1,600	0 / 36	--	--	--	20.0	-- / --	80.0	**YES**
Hexachlorobutadiene	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Hexachlorocyclopentadiene	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Hexachloroethane	25.0 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Indeno(1,2,3-cd)pyrene	9.90 - 550	34 / 50	0.084	2,800	CAS04-SD03-1209A	200	12 / 50	14.0	**YES**
Isophorone	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Naphthalene	12.0 - 1,600	14 / 50	0.0056	360	CAS04-SD18-1012	176	2 / 50	2.05	**YES**
n-Nitroso-di-n-propylamine	130 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
n-Nitrosodiphenylamine	250 - 2,800	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Nitrobenzene	130 - 1,400	0 / 36	--	--	--	NSV	-- / --	NSV	NO
PAH (HMW)	112 - 675	47 / 50	1.07	20,400	CAYP-SD11-1012	2,900	12 / 50	7.03	**YES**
PAH (LMW)	122 - 1,200	46 / 50	0.48	8,188	CAYP-SD11-1012	786	21 / 50	10.4	**YES**

TABLE L-61

Initial Screening Statistics - Site 4/Youth Pond Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
PAH (total)	233 - 1,875	47 / 50	1.54	28,588	CAYP-SD11-1012	3,553	16 / 50	8.05	**YES**
Pentachlorophenol	120 - 4,000	2 / 36	24.0	110	CAA03-SD02-1209A	NSV	-- / --	NSV	**YES**
Phenanthrene	27.0 - 150	42 / 50	0.16	2,200	CAYP-SD11-1012	204	15 / 50	10.8	**YES**
Phenol	130 - 2,000	0 / 36	--	--	--	48.0	-- / --	41.7	**YES**
Pyrene	27.0 - 150	46 / 50	0.24	4,500	CAYP-SD11-1012	195	25 / 50	23.1	**YES**
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,1,2,2-Tetrachloroethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.90 - 26.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,1-Dichloroethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,1-Dichloroethene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,2,3-Trichlorobenzene	0.90 - 11.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
1,2,4-Trichlorobenzene	0.90 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromo-3-chloropropane	0.90 - 21.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromoethane	0.90 - 21.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichlorobenzene	0.90 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichloroethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichloroethene (total)	15.8 - 26.4	0 / 4	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichloropropane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,3-Dichlorobenzene	0.90 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
1,4-Dichlorobenzene	0.90 - 1,600	0 / 36	--	--	--	NSV	-- / --	NSV	NO
2-Butanone	2.90 - 42.0	22 / 36	3.50	330	CAYP-SD12-1012	NSV	-- / --	NSV	**YES**
2-Hexanone	2.40 - 110	0 / 36	--	--	--	NSV	-- / --	NSV	NO
4-Methyl-2-pentanone	2.40 - 110	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Acetone	13.0 - 44.0	26 / 36	5.40	1,200	CAYP-SD12-1012	NSV	-- / --	NSV	**YES**
Benzene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Bromochloromethane	0.90 - 11.0	0 / 19	--	--	--	NSV	-- / --	NSV	NO
Bromodichloromethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Bromoform	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Bromomethane	0.90 - 43.0	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Carbon disulfide	4.70 - 56.0	3 / 36	2.00	3.00	CAA03-SD04-1209A	NSV	-- / --	NSV	**YES**
Carbon tetrachloride	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Chlorobenzene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Chloroethane	0.90 - 43.0	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Chloroform	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Chloromethane	0.90 - 43.0	0 / 36	--	--	--	NSV	-- / --	NSV	NO
cis-1,2-Dichloroethene	0.90 - 26.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
cis-1,3-Dichloropropene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Cyclohexane	0.90 - 21.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Dibromochloromethane	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO

TABLE L-61

Initial Screening Statistics - Site 4/Youth Pond Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Dichlorodifluoromethane (Freon-12)	0.90 - 43.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Ethylbenzene	0.90 - 21.0	2 / 36	2.00	3.00	CAS004-4-SD04-00-1199	NSV	-- / --	NSV	**YES**
Isopropylbenzene	0.90 - 21.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
m- and p-Xylene	1.90 - 47.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Methyl acetate	4.70 - 56.0	1 / 31	5.00	5.00	CAA03-SD04-1209A	NSV	-- / --	NSV	**YES**
Methylcyclohexane	0.90 - 11.0	1 / 32	4.00	4.00	CAA03-SD02-1209A	NSV	-- / --	NSV	**YES**
Methylene chloride	4.70 - 110	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Methyl-tert-butyl ether (MTBE)	0.90 - 38.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
o-Xylene	0.90 - 21.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Styrene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Tetrachloroethene	0.90 - 26.4	13 / 36	4.00	50.0	CAA03-SD01-1209A	NSV	-- / --	NSV	**YES**
Toluene	1.10 - 26.4	2 / 36	0.40	3.00	CAS004-4-SD02-00-1199	NSV	-- / --	NSV	**YES**
trans-1,2-Dichloroethene	0.90 - 30.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
trans-1,3-Dichloropropene	0.90 - 30.0	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Trichloroethene	0.90 - 26.4	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Trichlorofluoromethane (Freon-11)	0.90 - 43.0	0 / 32	--	--	--	NSV	-- / --	NSV	NO
Vinyl chloride	0.90 - 43.0	0 / 36	--	--	--	NSV	-- / --	NSV	NO
Xylene, total	15.8 - 64.0	1 / 17	10.0	10.0	CAS004-4-SD04-00-1199	NSV	-- / --	NSV	**YES**
Explosives (UG/KG)									
1,3,5-Trinitrobenzene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
1,3-Dinitrobenzene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trinitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
2-Amino-4,6-dinitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
2-Nitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
3-Nitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
4-Amino-2,6-dinitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
4-Nitrotoluene	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
HMX	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
RDX	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
Tetryl	300 - 500	0 / 23	--	--	--	NSV	-- / --	NSV	NO
Other Parameters									
Ammonia (MG/KG)	-- - --	6 / 6	74.0	230	CAS04-SD22-1012	--	-- / --	--	--
pH	-- - --	46 / 46	6.10	8.20	CAS04-SD07-1209A	--	-- / --	--	--
Sulfide (MG/KG)	120 - 170	0 / 6	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	46 / 46	2,300	250,000	CAA03-SD02-1209A	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-62

Exceedances - Site 4/Youth Pond Surface Sediment

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment ESV - SLC	Background UTL	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04		CAS04-SD01		CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD10		CAS04-SD11	CAS04-SD12	CAS04-SD13	CAS04-SD14
			CAA03-SD01-1209A	CAA03-SD02-1209A	CAA03-SD03-1209A	CAA03-SD04-1209A	CAS004-4-SED01-00-1199	CAS004-4-SD02-00-1199	CAS004-4-SD03-00-1199	CAS004-4-SD04-00-1199	CAS004-4-SD04-00D-1199	CAS04-SD01-1209A	CAS04-SD01P-1209A	CAS04-SD02-1209A	CAS04-SD03-1209A	CAS04-SD04-1209A	CAS04-SD10-1012	CAS04-SD10P-1012	CAS04-SD11-1012	CAS04-SD12-1012	CAS04-SD13-1012	CAS04-SD14
			Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream
			12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09	12/09/09	10/23/12	10/23/12	10/02/12	10/02/12	10/03/12	10/03/
Inorganics (MG/KG)																						
Aluminum	25,500	23,200	**17,800**	**15,000**	**6,490**	**5,090**	**8,340 L**	**6,070 L**	**5,950 L**	**4,210 L**	**4,070 L**	**5,440**	**5,150**	**5,560**	**20,400**	**11,800**	27,100	30,900	**15,000**	**9,440**	**1,570**	**13,800**
Antimony	3.00	1.70	**0.5 L**	**2.2 L**	0.79 UL	0.86 UL	1.7 B	0.67 U	0.62 U	0.65 U	0.65 U	0.83 UL	0.72 UL	1.3 UL	**2 L**	0.83 UL	**1.1 J**	**0.94 J**	**1.1 L**	**0.34 J**	0.4 U	**0.86**
Arsenic	9.79	108	**17.9 K**	**43.6 L**	**6.8 K**	**7.4 K**	**12.2 L**	**4.5**	**3.2**	**8.8**	**7.2**	**3.5 K**	**2.7 K**	**3.5 K**	**8.6 K**	**4.5 K**	**38**	**42.2**	**19**	**26.6**	**1.4**	**14.3**
Barium	20.0	75.0	**56**	**118**	**21.6**	**80.1**	**71.7 J**	**27.1 J**	**24.9 J**	**27.5 J**	**23.6 J**	**11.7**	**9.9**	**25.3**	**80.8**	**166**	**90**	**103**	**51.8**	**37.8**	**8.4**	**46**
Beryllium	NSV	1.39	**0.98**	**0.87 J**	**0.4 J**	**0.3 J**	0.73 B	**0.56 J**	**0.6 J**	**0.36 J**	**0.22 J**	**0.25 J**	**0.22 J**	**0.28 J**	**0.78**	**0.49 J**	**1.4 J**	**1.6**	**0.97**	**0.49 J**	**0.14 J**	**0.87**
Cadmium	0.99	0.571	**0.45**	**2.9**	**0.6**	**0.46**	**5.7**	**3.2**	**2.9**	**0.79 J**	**0.52 J**	**0.11**	**0.07 J**	**0.39**	**4.7**	**0.24**	**8.4**	**9.6**	**7.2**	**1.2**	**0.3 J**	**5.3**
Chromium	43.4	52.0	**43.1 K**	**29.2 L**	**12.7 K**	**8.9 K**	**35.8**	**17.9**	**17.2**	**9.5**	**7.7**	**11.1 K**	**9.8 K**	**9.6 K**	**49.7 K**	**17 K**	**50.2**	**57**	**28.8**	**14.5**	**5.5**	**24.9**
Cobalt	50.0	--	**3.6 J**	**3.2 J**	**1.8 J**	**1.3 J**	**4.6 J**	**3.9 J**	**2.9 J**	1.8 U	1.8 U	**0.97 J**	**0.83 J**	**1.2 J**	**5.1 J**	**2.5 J**	**8**	**9.6**	**4.7**	**2.5**	0.67 B	**4.1**
Copper	31.6	25.6	**4.1**	**85.3 J**	**26.3**	**7.6**	**30.7**	**62.7 J**	**65.3 J**	**33.5 J**	**21.2 J**	**3.3**	**2.6**	**11.1**	**142**	**6.9**	**172**	**197**	**106 K**	**24.2**	**7.5**	**63.4**
Cyanide	NSV	No value	0.91 U	2.7 U	0.98 U	0.98 U	0.04 UL	0.04 UL	0.03 UL	0.04 UL	0.04 UL	0.91 U	0.84 U	1.3 U	0.98 U	0.91 U	NA	NA	NA	NA	NA	NA
Iron	20,000	45,600	**24,700 J**	**23,900**	**9,860 J**	**6,910 J**	**15,400**	**14,300 L**	**14,100**	**9,410 L**	**8,490 L**	**7,430 J**	**6,370 J**	**7,030 J**	**25,900 J**	**12,600 J**	**38,200**	**44,000**	**27,300**	**13,900**	**4,010**	**25,200**
Lead	35.8	41.6	**13.5**	**41.8**	**15.9**	**230**	**52.3**	**24.6**	**20.3**	**20.6**	**16**	**9.2**	**6.8**	**17.2**	**41.7**	**200**	**76.4**	**55**	**49.1 L**	**27.2**	**4.5**	**41.2**
Manganese	460	--	**37.3 J**	**119**	**59.1 J**	**17.3 J**	**62**	**93.4**	**74.9**	**72.7**	**60**	**14.8 J**	**14.2 J**	**43.2 J**	**140 J**	**101 J**	**251**	**290**	**126**	**71.3**	**13.5**	**106**
Mercury	0.18	0.255	**0.03 J**	**0.14**	**0.02 J**	**0.02 J**	**0.07 J**	0.04 UL	0.03 UL	0.04 UL	**0.04 L**	**0.02 J**	**0.02 J**	**0.05 J**	**0.62**	**0.01 J**	**0.19**	**0.17**	**0.14 K**	**0.09 J**	0.01 B	**0.09**
Nickel	22.7	17.1	**10.7**	**13.4**	**4**	**3.3 J**	**23.6**	**7.9 J**	**7.3 J**	**5 J**	**4.5 J**	**2.2 J**	**2.1 J**	**3.5 J**	**16.6**	**4.4**	**23.2**	**27.2**	**14.6**	**7.9**	1.4 B	**10.8**
Selenium	2.00	2.69	0.43 B	**1.4 J**	0.36 B	0.24 B	1.1 U	0.91 U	0.84 U	0.89 U	0.88 U	0.44 B	0.36 B	0.67 B	0.57 B	0.31 B	**0.8 J**	**1.1 J**	0.96 U	1.2 U	0.56 U	0.9
Silver	1.00	No value	**0.15 J**	4.1 U	**0.2 J**	**0.15 J**	5.6 B	5.1 B	3.9 B	2.8 B	2 B	**0.16 J**	**0.16 J**	**0.18 J**	**6.1**	**0.14 J**	**0.79 J**	**0.96 J**	0.55 U	**0.1 J**	**0.05 J**	**0.63**
Thallium	NSV	6.50	**0.53 J**	4.1 U	1.5 U	1.6 U	0.91 UL	0.73 UL	0.67 UL	0.71 UL	0.71 UL	1.6 U	1.3 U	2.5 U	1.7 U	**0.15 J**	1.6 U	1.6 U	0.68 U	0.88 U	0.4 U	0.64
Vanadium	57.0	62.5	**53.8 K**	**38.1**	**17.2 K**	**12.3 K**	**36.6**	**21.9**	**21.1**	**15.1**	**13.2 J**	**14.6 K**	**12.8 K**	**14.7 K**	**37.6 K**	**24.2 K**	**64.5**	**73.4**	**40.2**	**23.4**	**5.3**	**32.8**
Zinc	121	110	**29.6 K**	**207**	**89.7 K**	**60 K**	**147**	**145**	**130**	**228**	**180**	**11.8 K**	**9.7 K**	**32.1 K**	**475 K**	**56.2 K**	**544**	**626**	**405**	**424**	**29**	**240**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1242	59.8	--	26 U	75 UL	26 U	25 U	55 U	60 UL	52 U	60 UL	78 UL	25 UJ	22 U	31 U	280 U	24 U	33 UL	24 UL	19 U	22 UL	11 U	16
Aroclor-1248	59.8	--	27 U	79 UL	27 U	26 U	55 U	60 UL	52 U	**19 L**	78 UL	27 UJ	24 U	32 U	300 U	25 U	33 UL	24 UL	19 U	22 UL	11 U	16
Aroclor-1254	59.8	--	24 U	71 UL	24 U	24 U	55 U	60 UL	52 U	60 UL	78 UL	24 UJ	21 U	29 U	21,000	22 U	560 L	420 L	620	270 J	11 U	240
Aroclor-1260	59.8	--	160 J	1,200 L	160	100	270 K	91 L	52 U	240 L	**25 JP**	**30 J**	**25**	200	280 U	**50 K**	2,400 L	1,500 L	2,400	1,300 J	90	980
Pesticides (UG/KG)																						
4,4'-DDD	4.88	10.1	3.6 B	**97 J**	**6.6 J**	**48 J**	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.6 B	4.1 U	5.6 U	**380 J**	**310**	NA	NA	NA	NA	NA	NA
4,4'-DDE	3.16	44.1	1 B	**11 J**	2.1 B	**12 J**	5.5 U	6 UL	5.2 U	**9 L**	7.8 UL	1.9 B	**0.92 J**	**1.8 J**	**600 J**	**160 L**	NA	NA	NA	NA	NA	NA
4,4'-DDT	4.16	1.45	4.8 UJ	**97 J**	**6.3 J**	**8.7 J**	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	2.7 B	**2.1 J**	5.6 U	**1,600 J**	**55 J**	NA	NA	NA	NA	NA	NA
Aldrin	2.00	--	2.5 UJ	7.1 UJ	2.4 UL	**0.85 J**	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA
alpha-Chlordane	3.24	No value	2.5 UJ	7.1 UJ	2.4 UL	**1.7 J**	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	**47 J**	2.2 UJ	NA	NA	NA	NA	NA	NA
Dieldrin	1.90	0.948	**1.7 J**	14 UJ	2.4 B	4.4 UJ	5.5 U	6 UL	NA	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	**1.8 J**	**1,400 J**	**47 K**	NA	NA	NA	NA	NA
Endosulfan I	NSV	No value	2.5 UJ	7.1 UJ	2.4 UL	**1.6 J**	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	**1.7 J**	**58 L**	2.2 UJ	NA	NA	NA	NA	NA	NA
Endosulfan II	NSV	No value	4.8 UJ	**110 J**	4.7 UL	**1.3 J**	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	**830 J**	4.3 UJ	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NSV	No value	4.8 UJ	14 UJ	**35 J**	**14 J**	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	5.2 UL	4.3 UJ	NA	NA	NA	NA	NA	NA
Endrin	2.22	8.64	**17 J**	14 UJ	4.7 UL	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	**9.6**	**1,200**	4.3 UJ	NA	NA	NA	NA	NA	NA
Endrin aldehyde	2.22	No value	**3.3 J**	14 UJ	**4.2 J**	4.4 UJ	5.5 U	6 UL	5.2 U	6 UL	7.8 UL	4.6 UJ	4.1 U	5.6 U	**290 J**	4.3 UJ	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	2.37	--	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA
gamma-Chlordane	3.24	1.10	2.5 UJ	**11 J**	**1.1 L**	**2.1 J**	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	**2 J**	**780 J**	**14 L**	NA	NA	NA	NA	NA	NA
Heptachlor	NSV	No value	2.5 UJ	7.1 UJ	2.4 UL	**0.69 J**	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	2.7 UL	2.2 UJ	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	2.47	No value	2.5 UJ	7.1 UJ	2.4 UL	2.3 UJ	2.8 U	3.1 UL	2.7 U	3.1 UL	4 UL	2.4 UJ	2.1 U	2.9 U	**540 J**	2.2 UJ	NA	NA	NA	NA	NA	NA
Methoxychlor	NSV	No value	25 UJ	71 UJ	24 UL	23 UJ	28 U	31 UL	27 U	31 UL	40 UL	24 UJ	21 U	29 U	**520 J**	22 UJ	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)																						
2-Methylnaphthalene	70.0	--	29 UL	**19 J**	29 UL	**6.1 L**	550 U	1,200 U	530 U	1,200 U	1,600 U	25 UL	24 UL	34 UL	**4 L**	25 UL	**11 J**	31 U	**16 J**	**8 J**	13 U	18
Acenaphthene	290	No value	29 U	**300**	**4.9 J**	**3.2 J**	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	**2.9 J**	**4.3 J**	**7.9 J**	**29 J**	**21 J**	**32 J**	**32 J**	**4 J**	**13**
Acenaphthylene	160	No value	**1.8 J**	**34 J**	**5 J**	**2.6 J**	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	**2.3 J**	**120**	**83 K**	**36 J**	**26 J**	**17 J**	**19 J**	**2 J**	**9.9**
Anthracene	57.2	No value	**4.6 J**	**66 J**	**16 J**	**4.1 J**	550 U	1,200 U	530 U	1,200 U	1,600 U	**2.8 J**	24 U	**5.6 J**	**260**	**75 K**	**66 J**	**53 J**	**86**	**54**	**5.3 J**	**32**
Benzo(a)anthracene	108	18.2	33 B	**260**	**110**	16 B	**140 J**	**260 J**	**170 J**	**290 J**	**270 J**	19 B	9 B	35 B	**1,300**	**1,500**	**590**	**510**	**440**	**310**	**26 J**	**230**
Benzo(a)pyrene	150	No value	**31 J**	**250**	**120**	13 B	**160 J**	**260 J**	**170 J**	**330 J**	**340 J**	17 B	9 B	**36**	**2,100**	**1,500**	**520**	**460**	**440 L**	**330**	**33**	**220**
Benzo(b)fluoranthene	240	30.3	**62 J**	**420**	**280**	31 B	**220 J**	**370 J**	**330 J**	**450 J**	**550 J**	34 B	16 B	**76**	**3,900**	**3,300**	**910**	**820**	**880 L**	**540**	**75**	**390**
Benzo(g,h,i)perylene	170	25.0	8.3 B	**83 J**	**65 L**	27 UL	**56 J**	**130 J**	**84 J**	1,200 U	**180 J**	25 UL	24 UL	7.1 B	**1,900 L**	**490 J**	**310**	**270**	**250 L**	**170**	**27 L**	**130**
Benzo(k)fluoranthene	240	No value	19 B	**130**	**82**	8.5 B	**120 J**	**290 J**	**170 J**	**420 J**	**440 J**	12 B	6.3 B	**24 J**	**1,600**	**1,100**	**280**	**240**	**290 L**	**220**	**24 J**	**140**
bis(2-Ethylhexyl)phthalate	750	No value	140 U	420 U	150 U	130 U	**110 J**	**170 J**	**160 J**	**140 J**	**280 J**	120 U	120 U	170 U	**120 J**	130 U	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NSV	No value	480 U	1,400 U	480 U	440 U	550 U	1,200 U	530 U	1,200 U	1,600 U	410 U	400 U	550 U	490 U	420 U	NA	NA	NA	NA	NA	NA
Carbazole	140	--	6.7 B	**34 J**	**19 J**	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	5 B	24 U	8.6 B	**31**	**49 K**	NA	NA	NA	NA	NA	NA
Chrysene	166	21.7	**30 J**	**280**	**150**	**19 J**	**190 J**	**400 J**	**240 J**	**460 J**	**490 J**	**18 J**	**9.2 J**	**35**	**2,700**	**1,900**	**650**	**560**	**790 L**	**510**	**65**	**360**
Dibenz(a,h)anthracene	33.0	No value	6.8 B	**110 J**	27 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	**660**	**320 K**	**130**	**110**	**97 L**	**66**	**9.1 J**	**48**
Di-n-butylphthalate	110	--	140 U	420 U	150 U	130 U	**64 J**	1,200 U	**81 J**	1,200 U	1,600 U	120 U	120 U	170 U	**72 J**	130 U	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NSV	No value	920 U	2,700 U	930 U	850 U	550 U	1,200 U	530 U	1,200 U	1,600 U	800 U	780 U	1,100 U	950 U	820 U	NA	NA	NA	NA	NA	NA
Fluoranthene	423	26.0	**75**	**510**	**260**	**37**	**260 J**	**640 J**	**410 J**	**600 J**	**580 J**	**42**	**22 J**	**72**	**320**	**1,800**	**920**	**790**	**890 L**	**530**	**40**	**420**
Fluorene	77.4	No value	29 U	**420**	6.1 B	27 U	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	14 B	12 B	**52 J**	**46 J**	**60**	**48 J**	**5.3 J**	**23**
Indeno(1,2,3-cd)pyrene	200	No value	19 B	**230**	**81**	27 U	550 U	**160 J**	**95 J**	1,200 U	**210 J**	9.9 B	4.9 B	23 B	**2,800**	**1,500**	**680 J**	**570 J**	**380 L**	**260 K**	**34**	**180**
Naphthalene	176	No value	29 U	**280**	29 U	**5.7 J**	550 U	1,200 U	530 U	1,200 U	1,600 U	25 U	24 U	34 U	**6.6 J**	25 U	**14 J**	31 U	**9 J**	**9.5 J**	**4 J**	18
PAH (HMW)	2,900	381	**223**	**2,143**	**1,122**	**130**	**1,666**	**5,040**	**1,874**	**4,350**	**3,870**	**127**	**75.8**	**285**	**18,060**	**15,410**	**5,070**	**4,460**	**4,447**	**3,176**	**342**	**2,218**
PAH (LMW)	786	1,670	**192**	**2,091**	**432**	**105**	**2,305**	**5,170**	**2,475**	**5,140**	**6,510**	**140**	**118**	**190**	**835**	**2,209**	**1,648**	**1,417**	**1,570**	**1,041**	**87.1**	**766**
PAH (total)	3,553	2,110	**415**	**4,234**	**1,554**	**234**	**3,971**	**8,210**	**4,349**	**9,500**	**10,380**	**267**	**194**	**474**	**18,895**	**17,619**	**6,718**	**5,877**	**6,017**	**4,217**	**429**	**2,984**
Pentachlorophenol	NSV	No value	140 UL	**110 J**	150 UL	130 UL	1,400 U	3,100 U	1,300 U	3,000 U	4,000 U	120 UL	120 UL	170 UL	150 UL	**24 L**	NA	NA	NA	NA	NA	NA
Phenanthrene	204	30.2	**38**	**420**	**100**	**19 J**	**120 J**	**330 J**	**210 J**	**340 J**	**330 J**	**20 J**	**12 J**	**39**	**98**	**200 K**	**520**	**450**	**460**	**340**	**20 J**	**250**
Pyrene	195	35.3	**57**	**380**	**220**	**36**	**230 J**	**570 J**	**350 J**	**610 J**	**590 J**	**38**	**20 J**	**64**	**1,100**	**3,800**	**1,000**	**920**	**880 L**	**770**	**49**	**520**
Volatile Organic Compounds (UG/KG)																						
2-Butanone	NSV	591	40 UJ	**39 J**	36 UJ	**56 J**	**12 J**	15 B	17.5 U	10 B	12 B	26 UJ	31 UJ	42 UJ	37 UJ	**21 J**	NA	NA	NA	NA	NA	NA
Acetone	NSV	2,500	**140 J**	**270 J**	**74 J**	**250 J**	37 B	44 B	17 B	23 B	36 B	**210 J**	33 B	34 B	13 B	**100 J**	NA	NA	NA	NA	NA	NA
Carbon disulfide	NSV	25.8	8 UJ	21 UJ	**2 J**	**3 J**	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA
Ethylbenzene	NSV	No value	8 UJ	21 UJ	7 UJ	7 UJ	**3 J**	20.5 UL	17.5 U	**2 J**	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA
Methyl acetate	NSV	No value	15 UJ	38 UJ	13 UJ	**5 J**	NA	NA	NA	NA	NA	9 UJ	11 UJ	15 UJ	13 UJ	10 R	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NSV	No value	8 UJ	**4 J**	7 UJ	7 UJ	NA	NA	NA	NA	NA	5 UJ	6 UJ	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NSV	No value	**50 J**	**49 J**	**5 J**	**11 J**	15.8 U	20.5 UL	17.5 U	19.9 U	26.4 U	5 UJ	**11 J**	**8 J**	**28 J**	**42 J**	NA	NA	NA	NA	NA	NA
Toluene	NSV	No value	8 UJ	21 UJ	7 UJ	7 UJ	15.8 U	**3 L**	17.5 U	19.9 U	26.4 U	5 UJ	6 UJ	8 UJ	7 UJ	6 UJ	NA	NA	NA	NA	NA	NA
Xylene, total	NSV	No value	24 UJ	64 UJ	22 UJ	21 UJ	15.8 U	20.5 UL	17.5 U	**10 J**	26.4 U	16 UJ	19 UJ	26 UJ	22 UJ	16 UJ	NA	NA	NA	NA	NA	NA
Other Parameters																						
pH (PH)	--	--	**7.6**	**6.2**	**6.9**	**6.8**	NA	NA	NA	NA	NA	**6.3**	**6.9**	**7.7**	**7.6**	**7.1**	**6.5**	NA	**6.7**	**6.2**	**6.8**	**6.8**
Total organic carbon (MG/KG)	--	--	**43,000**	**250,000**	**60,000**	**38,000**	NA	NA	NA	NA	NA	**25,000**	**17,000**	**62,000**	**40,000**	**16,000**	**88,000**	NA	**58,000**	**100,000**	**12,000**	**33,000**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-62

Exceedances - Site 4/Youth Pond Surface Sediment

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virgini

Chemical	Sediment ESV - SLC	Background UTL	14	CAS04-SD18	CAS04-SD19	CAS04-SD20	CAS04-SD21	CAS04-SD22	CAS04-SD23	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAS04-SD15	CAS04-SD16	CAS04-SD17	CAYP-SWSD01	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05
			-1012	CAS04-SD18-1012	CAS04-SD19-1012	CAS04-SD20-1012	CAS04-SD21-1012	CAS04-SD22-1012	CAS04-SD23-1012	CAS04-SD05-1209A	CAS04-SD06-1209A	CAS04-SD07-1209A	CAS04-SD07P-1209A	CAS04-SD08-1209A	CAS04-SD09-1209A	CAS04-SD15-1012	CAS04-SD16-1012	CAS04-SD17-1012	CAYP-SD01-1012	CAYP-SD02-1012	CAYP-SD02P-1012	CAYP-SD03-1012	CAYP-SD04-1112	CAYP-SD05-1112
			Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond
			2	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/11/12	10/11/12	10/11/12	10/12/12	10/22/12	10/22/12	10/11/12	11/09/12	11/09/12
Inorganics (MG/KG)																								
Aluminum	25,500	23,200		**14,400**	**21,100**	**18,700**	**8,490**	**17,600**	**16,800**	**10,100**	**5,510**	**11,400**	**11,600**	**6,550**	**7,320**	**6,580**	**7,580**	**10,200**	**2,620 K**	**13,600**	**15,100**	**3,120**	**6,160**	**12,500**
Antimony	3.00	1.70	J	**0.83 J**	**0.47 J**	**0.78 J**	**0.63 J**	**0.92 J**	**0.89 J**	1.1 UL	0.8 UL	0.29 B	0.92 UL	0.34 B	0.44 B	0.18 B	0.42 U	0.26 B	2.62 U	4.83 U	6.4 U	**2.84 J**	2.53 U	**2.4 J**
Arsenic	9.79	108		**111**	**20.1**	**18.1**	**7.3**	**19.1**	**18**	**4.9 L**	**2.5 L**	**3.3 L**	**3.6 L**	**5 L**	**10.4 L**	**3.5**	**4.5**	**5**	**2.65 J**	**12.3**	**11.4 J**	**8.77 J**	**45**	**265**
Barium	20.0	75.0		**78.6**	**74.7**	**76.7**	**34.5**	**62.8**	**56.1**	**31.6**	**17.1**	**27.7**	**26.9**	**19.5**	**21.8**	25.7 B	21.2 B	35 B	**17.9**	**80.3**	**89.5**	**20.4**	**38.2**	**100**
Beryllium	NSV	1.39		**0.47 J**	**0.99**	**0.98**	**0.51 J**	**1.1**	**0.93**	**0.57 J**	**0.34 J**	**0.65**	**0.64**	**0.39 J**	**0.38 J**	**0.43 J**	**0.5**	**0.59**	**0.233**	**0.959**	**1.07**	**0.307**	**0.446**	**0.881**
Cadmium	0.99	0.571		**0.54 J**	**2.1**	**3.3**	**2.5**	**5.9**	**5.2**	**0.32**	**0.17**	**0.44**	**0.36**	**0.65**	**0.16**	**1.2**	**1.4**	**1.6**	**0.499**	**0.698**	**0.79**	**0.79**	**0.678**	**2.7**
Chromium	43.4	52.0		**23.9**	**32.6**	**31.4**	**18.8**	**33.9**	**29.7**	**18.5 L**	**10.5 L**	**27.2 L**	**25.9 L**	**17.3 L**	**9.4 L**	**15.8**	**16**	**19.1**	**7.54**	**20.4**	**23.1**	**8.27**	**12.8**	**24.7**
Cobalt	50.0	--		**3.1**	**4.7**	**5.1**	**2.8**	**5.5**	**4.5**	**2.7 J**	**1.3 J**	**2.7**	**2.6 J**	**2.4 J**	**1.7 J**	**2.4**	**2.2**	**2.8**	**0.837 J**	**3.89**	**3.73**	**1.57 J**	**1.85**	**3.29**
Copper	31.6	25.6		**19.6**	**41.7**	**85.6**	**68.4**	**125**	**85.2**	**7.5 J**	**3.7 J**	**2.5 J**	**3.5 J**	**24.6 J**	**5.6 J**	**44.5**	**19.9**	**33.5**	**11.2**	**15.2**	**16.6**	**87.2**	**8.34**	**29.4**
Cyanide	NSV	No value		NA	NA	NA	NA	NA	NA	1.3 U	0.91 U	0.77 U	0.91 U	0.91 U	1.2 U	NA	NA	NA	0.3 U	**0.38 J**	0.7 U	0.6 U	0.41 U	0.69 U
Iron	20,000	45,600		**13,300**	**24,600**	**24,500**	**15,900**	**30,200**	**28,900**	**13,200**	**6,690**	**11,800**	**12,000**	**13,600**	**6,400**	**11,000**	**12,300**	**13,000**	**4,100**	**15,700**	**17,100**	**6,500**	**12,500**	**40,500 J**
Lead	35.8	41.6		**42.6**	**44**	**76.7**	**23.2**	**53.7**	**46.3**	**17.5**	**5.7**	**5.7**	**5.6**	**10.6**	**14.2**	**13.6**	**13.3**	**23**	**15**	**36.6**	**40.4**	**13.6**	**17.9**	**77.2**
Manganese	460	--		**75.1**	**91.3**	--	**121**	**74.4**	**157**	**132**	**47.4**	**20.2**	**16.5**	**20.2**	**62.2**	**21.7**	105 B	65.8 B	105 B	**17.3**	**68.6**	**73.1**	**51.5**	**64.7**	**200**
Mercury	0.18	0.255		**0.05**	**0.17**	**0.14**	**0.06**	**0.15**	**0.08**	**0.12**	**0.02 J**	**0.02 J**	**0.02 J**	**0.01 J**	**0.04 J**	**0.03 J**	**0.02 J**	**0.13**	0.0084 U	**0.06**	**0.0565**	**0.027 J**	**0.0467**	**0.787**
Nickel	22.7	17.1		**26.3**	**11.7**	**13.5**	**7.9**	**15.6**	**12.9**	**6.5**	**2.9 J**	**7**	**7.4**	**6.9**	**4.6 J**	**6.6**	**5**	**8.3**	**2.24**	**6.63**	**7.05**	**3.94**	**3.3**	**7.82**
Selenium	2.00	2.69	U	0.82 U	1.1 U	**0.41 J**	0.8 U	1.1 U	1.2 U	**0.87 J**	**0.37 J**	**0.3 J**	**0.33 J**	**0.25 J**	1.5 U	**0.22 J**	**0.39 J**	**0.47 J**	2.62 U	4.83 U	6.4 U	4.79 U	**1.67 J**	**3.97 J**
Silver	1.00	No value	J	**0.14 J**	**0.06 J**	**0.26 J**	**0.12 J**	**0.17 J**	**0.25 J**	0.18 B	1.5 U	1.1 U	0.08 B	1.3 U	2.2 U	**0.34 J**	**0.45 J**	**0.36 J**	0.656 U	1.21 U	1.6 U	1.2 U	**0.168 J**	1.17 U
Thallium	NSV	6.50	U	0.59 U	0.8 U	0.89 U	0.58 U	0.78 U	0.85 U	2 U	1.5 U	1.1 U	1.7 U	1.3 U	**0.5 J**	0.44 U	0.42 U	0.42 U	2.62 U	4.83 U	6.4 U	4.79 U	**0.841 J**	**1.86 J**
Vanadium	57.0	62.5		**31.5**	**45.8**	**44.2**	**23**	**45.8**	**40.8**	**23**	**12.2**	**30.4**	**30.6**	**19.5**	**15.6**	**18.6**	**18.6**	**24.3**	**6.81**	**30.3**	**33.3**	**11.5**	**16.1**	**38**
Zinc	121	110		**88.5**	**244**	**354**	**178**	**388**	**298**	**53.2**	**20.1**	**19.7**	**21.2**	**64.5**	**49.9**	**88**	**79**	**134**	**160**	**125**	**131**	**137**	**83.6**	**470**
Polychlorinated Biphenyls (UG/KG)																								
Aroclor-1242	59.8	--	U	14 U	20 U	25 U	16 U	21 U	18 U	32 U	**52 J**	22 U	24 U	25 U	**20 J**	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL
Aroclor-1248	59.8	--	U	14 U	20 U	25 U	16 U	21 U	18 U	34 U	26 U	24 U	25 U	26 U	30 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL
Aroclor-1254	59.8	--		14 U	20 U	25 U	16 U	21 U	**510**	**330**	24 U	21 U	22 U	24 U	27 U	12 U	10 U	12 U	66 U	150 UL	150 UL	130 U	89 U	150 UL
Aroclor-1260	59.8	--		**69 J**	**290 J**	**1,000 J**	**630 J**	**2,300 J**	**1,600**	**320**	**44**	**23**	24 U	**230**	29 U	**380**	**500**	**390**	**48 J**	150 UL	150 UL	**140 J**	89 U	150 UL
Pesticides (UG/KG)																								
4,4'-DDD	4.88	10.1		NA	NA	NA	NA	NA	NA	**34 J**	**4.5 J**	**1.6 J**	4.3 UJ	**21 J**	**12 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	**30 L**	**110 L**
4,4'-DDE	3.16	44.1		NA	NA	NA	NA	NA	NA	**9.1 J**	**1.4 J**	4.1 U	4.3 UJ	**6.7**	**13 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
4,4'-DDT	4.16	1.45		NA	NA	NA	NA	NA	NA	**37 J**	**4.3 J**	4.1 U	**0.83 J**	**43 J**	**4.6 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	**3,300 L**
Aldrin	2.00	--		NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	**1 J**	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
alpha-Chlordane	3.24	No value		NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Dieldrin	1.90	0.948		NA	NA	NA	NA	NA	NA	5.9 UJ	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Endosulfan I	NSV	No value		NA	NA	NA	NA	NA	NA	**9.4 J**	2.4 UJ	2.1 U	2.2 UJ	2.4 U	**1.8 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Endosulfan II	NSV	No value		NA	NA	NA	NA	NA	NA	**9.4 J**	**1.1 J**	**0.64 J**	4.3 UJ	**2.9 J**	**1.5 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Endosulfan sulfate	NSV	No value		NA	NA	NA	NA	NA	NA	5.9 UJ	**3.4 J**	4.1 U	4.3 UJ	**18 J**	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Endrin	2.22	8.64		NA	NA	NA	NA	NA	NA	5.9 UJ	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Endrin aldehyde	2.22	No value		NA	NA	NA	NA	NA	NA	**13 J**	4.6 UJ	4.1 U	4.3 UJ	4.6 U	5.3 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
gamma-BHC (Lindane)	2.37	--		NA	NA	NA	NA	NA	NA	3 UJ	**0.78 J**	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
gamma-Chlordane	3.24	1.10		NA	NA	NA	NA	NA	NA	**12 J**	**1.6 J**	2.1 U	2.2 UJ	**1.4 J**	**2 J**	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Heptachlor	NSV	No value		NA	NA	NA	NA	NA	NA	**1.7 J**	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Heptachlor epoxide	2.47	No value		NA	NA	NA	NA	NA	NA	3 UJ	2.4 UJ	2.1 U	2.2 UJ	2.4 U	2.7 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Methoxychlor	NSV	No value		NA	NA	NA	NA	NA	NA	30 UJ	24 UJ	21 U	22 UJ	24 U	27 UJ	NA	NA	NA	33 UL	38 UL	38 UL	66 UL	22 UL	38 UL
Semivolatile Organic Compounds (UG/KG)																								
2-Methylnaphthalene	70.0	--	U	**29 J**	23 U	32 U	21 U	**7 J**	**10 J**	36 U	29 U	25 U	27 U	26 U	32 U	0.014 U	12 U	16 U	84 U	95 UL	98 UL	84 U	56 U	96 UL
Acenaphthene	290	No value	J	**33 J**	23 U	**6.1 J**	**7.9 J**	**18 J**	**30 J**	**12 J**	29 U	25 U	27 U	26 U	**3.2 J**	**0.014 J**	**4.1 J**	**8.1 J**	84 U	95 UL	98 UL	84 U	56 U	96 UL
Acenaphthylene	160	No value	J	**9.2 J**	23 U	**4.8 J**	**5.9 J**	**14 J**	**20 J**	**30 J**	29 U	25 U	27 U	26 U	**5.4 J**	**0.0032 J**	**1.8 J**	**4.3 J**	84 U	95 UL	98 UL	84 U	56 U	96 UL
Anthracene	57.2	No value	J	**41**	**7.3 J**	**17 J**	**18 J**	**53**	**82**	**55**	29 U	25 U	27 U	26 U	**2.3 J**	**0.031**	**11 J**	**23 J**	84 U	95 UL	98 UL	84 U	56 U	96 UL
Benzo(a)anthracene	108	18.2		**210**	**55**	**110**	**120**	**330**	**520**	**420**	28 B	7.3 B	7.4 B	14 B	**53**	**0.11**	**63**	**140**	**170 K**	95 UL	98 UL	**82 J**	**25 J**	**140 L**
Benzo(a)pyrene	150	No value		**440**	**60**	**120**	**120**	**330**	**500**	**380**	**18 J**	25 U	27 U	**9 J**	**54**	**0.12**	**57**	**140**	**160 K**	95 UL	98 UL	**58 J**	56 U	**140 L**
Benzo(b)fluoranthene	240	30.3		**580**	**110**	**220**	**210**	**640**	**950**	**690**	40 B	25 U	27 U	26 U	**82**	**0.21**	**110**	**240**	**310 K**	95 UL	98 UL	**130**	56 U	**240 L**
Benzo(g,h,i)perylene	170	25.0	L	**210**	**33 J**	**68**	**66**	**190**	**270**	**130 L**	**10 L**	25 UL	27 UL	26 UL	**16 L**	**0.056**	**31**	**63**	**110**	95 UL	98 UL	**58 J**	56 U	**89 L**
Benzo(k)fluoranthene	240	No value		**180**	**34 J**	**97**	**95**	**220**	**320**	**150**	**11 J**	25 U	27 U	26 U	**25 J**	**0.066**	**34**	**71**	**120**	95 UL	98 UL	**49 J**	56 U	**91 L**
bis(2-Ethylhexyl)phthalate	750	No value		NA	NA	NA	NA	NA	NA	180 U	140 U	130 U	140 U	**100 J**	160 U	NA	NA	NA	**590 J**	750 U	770 U	650 UJ	440 UL	380 UL
Butylbenzylphthalate	NSV	No value		NA	NA	NA	NA	NA	NA	590 U	470 U	420 U	450 U	440 U	530 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL
Carbazole	140	--		NA	NA	NA	NA	NA	NA	**23 J**	**7.2 J**	**6 J**	27 U	26 U	**9 J**	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL
Chrysene	166	21.7		**300**	**79**	**190**	**200**	**560**	**810**	**440**	**17 J**	25 U	27 U	**3.1 J**	**55**	**0.16**	**87**	**190**	**230 K**	95 UL	98 UL	**57 J**	56 U	**170 L**
Dibenz(a,h)anthracene	33.0	No value		**88**	**12 J**	**14 J**	**24 J**	**74**	**110**	**120**	**16 J**	25 U	27 U	26 U	**16 J**	**0.02 J**	**11 J**	**25 J**	84 U	95 UL	98 UL	84 U	56 U	96 UL
Di-n-butylphthalate	110	--		NA	NA	NA	NA	NA	NA	180 U	140 U	130 U	140 U	130 U	160 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL
Di-n-octylphthalate	NSV	No value		NA	NA	NA	NA	NA	NA	1,100 U	920 U	810 U	880 U	840 U	1,000 U	NA	NA	NA	660 U	750 U	770 U	650 U	440 UL	380 UL
Fluoranthene	423	26.0		**260**	**120**	**280**	**230**	**620**	**1,100**	**820**	**41**	25 U	27 U	**22 J**	**110**	**0.24 L**	**130 L**	**270 L**	**420 K**	95 UL	98 UL	**140**	56 U	**300 L**
Fluorene	77.4	No value	J	**50**	23 U	**12 J**	**14 J**	**36 J**	**58**	**30 J**	29 U	25 U	27 U	26 U	5.7 B	**0.016 J**	**5.8 J**	**12 J**	84 U	95 UL	98 UL	84 U	56 U	96 UL
Indeno(1,2,3-cd)pyrene	200	No value		**340 K**	**44 K**	**95 K**	**100 K**	**290 K**	**420 K**	**300**	**23 J**	25 U	27 U	**11 J**	**42**	**0.084**	**44**	**100**	**92 J**	95 UL	98 UL	84 U	56 U	**75 L**
Naphthalene	176	No value	U	**260**	23 U	**11 J**	21 U	26 U	**12 J**	**6 J**	29 U	25 U	27 U	26 U	32 U	**0.0056 J**	12 U	16 U	84 U	95 UL	98 UL	84 U	56 U	96 UL
PAH (HMW)	2,900	381		**2,618**	**547**	**1,154**	**1,185**	**3,334**	**5,000**	**3,329**	**156**	104 U	112 U	**97.1**	**453**	**1.07**	**567**	**1,259**	**1,574**	428 U	441 U	**628**	**249**	**1,273**
PAH (LMW)	786	1,670		**942**	**244**	**487**	**417**	**1,111**	**1,902**	**1,329**	**156**	113 U	122 U	**123**	**246**	**0.477**	**241**	**493**	**1,242**	755 U	777 U	**759**	444 U	**928**
PAH (total)	3,553	2,110		**3,560**	**791**	**1,641**	**1,602**	**4,445**	**6,902**	**4,649**	**312**	216 U	233 U	**220**	**699**	**1.54**	**808**	**1,752**	**2,816**	1,183 U	1,218 U	**1,387**	**693**	**2,201**
Pentachlorophenol	NSV	No value		NA	NA	NA	NA	NA	NA	180 UL	140 UL	130 UL	140 UL	130 UL	160 UL	NA	NA	NA	2,000 U	2,300 U	2,300 U	2,000 U	1,300 UL	1,100 UL
Phenanthrene	204	30.2		**160**	**59**	**140**	**120**	**350**	**590**	**340**	**13 J**	25 U	27 U	**9.7 J**	**74**	**0.16**	**76**	**160**	**240 K**	95 UL	98 UL	84 U	56 U	**150 L**
Pyrene	195	35.3		**270**	**120**	**240**	**250**	**700**	**1,100**	**690**	**27 J**	25 U	27 U	**15 J**	**110**	**0.24**	**130**	**290**	**340 K**	95 UL	98 UL	**110**	56 U	**280 L**
Volatile Organic Compounds (UG/KG)																								
2-Butanone	NSV	591		NA	NA	NA	NA	NA	NA	**51 J**	**25 J**	29 U	33 U	34 UJ	**44 J**	NA	NA	NA	**18 J**	**110**	**130**	**58**	**100**	**220**
Acetone	NSV	2,500		NA	NA	NA	NA	NA	NA	**230 J**	**120 J**	24 B	34 B	42 B	**170 J**	NA	NA	NA	**73 L**	**470**	**480**	**230**	**360**	**710**
Carbon disulfide	NSV	25.8		NA	NA	NA	NA	NA	NA	**2 J**	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	7.4 U	24 U	25 U	19 U	11 U	23 U
Ethylbenzene	NSV	No value		NA	NA	NA	NA	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 U	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U
Methyl acetate	NSV	No value		NA	NA	NA	NA	NA	NA	16 UJ	12 UJ	10 U	12 U	12 UJ	14 UJ	NA	NA	NA	7.4 U	24 U	25 U	19 U	11 U	23 U
Methylcyclohexane	NSV	No value		NA	NA	NA	NA	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U
Tetrachloroethene	NSV	No value		NA	NA	NA	NA	NA	NA	**14 J**	**8 J**	6 U	**5 J**	**4 J**	**15 J**	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U
Toluene	NSV	No value		NA	NA	NA	NA	NA	NA	9 UJ	7 UJ	6 U	6 U	7 UJ	8 UJ	NA	NA	NA	1.5 UL	4.8 U	5.1 U	3.8 U	2.3 U	4.6 U
Xylene, total	NSV	No value		NA	NA	NA	NA	NA	NA	26 UJ	21 UJ	17 U	20 U	20 UJ	24 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters																								
pH (PH)	--	--		**7**	**6.7**	**6.6**	**6.7**	**6.8**	**6.1**	**7.4**	**8**	**8.2**	NA	**8**	**7.2**	**7.1**	**7.4**	**7.5**	**6.7**	**6.4**	NA	**6.6**	**6.7**	**6.6**
Total organic carbon (MG/KG)	--	--		**36,000**	**66,000**	**92,000**	**34,000**	**62,000**	**46,000**	**36,000**	**19,000**	**2,300**	NA	**9,900**	**40,000**	**21,000**	**8,200**	**53,000**	**15,000**	**89,000**	NA	**74,000**	**46,000**	**100,000**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-62

Exceedances - Site 4/Youth Pond Surface Sediment

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virgini.

Chemical	Sediment ESV - SLC	Background UTL	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD12		CAYP-SD13	CAYP-SD11	CAYP-SD14	CAYP-SD15	CAYP-SO03		CAYP-SO04	CAYP-SO05	CAYP-SO06
			CAYP-SD06-1112	CAYP-SD07-1012	CAYP-SD08-1012	CAYP-SD09-1012	CAYP-SD10-1012	CAYP-SD12-1012	CAYP-SD12P-1012	CAYP-SD13-1012	CAYP-SD11-1012	CAYP-SD14-1012	CAYP-SD15-1012	CAYP-SS03-1012	CAYP-SS03P-1012	CAYP-SS04-1012	CAYP-SS05-1012	CAYP-SS06-1012
			Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	York River Ditch	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch	Northern Ditch
			11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12	10/12/12	10/12/12	10/19/12	10/19/12	10/19/12	10/19/12	10/19/12
Inorganics (MG/KG)																		
Aluminum	25,500	23,200	2,670	11,600	6,090	15,000	19,200	14,100	12,000	11,700	1,780	1,580	1,820	6,840	6,900	5,710	4,460	2,560
Antimony	3.00	1.70	1.6 U	4.72 U	3.09 U	3.11 U	5.42 U	3.72 J	2.52 J	1.8 J	0.882 J	1.57 U	1.73 U	2.37 U	1.96 U	1.55 U	0.56 J	1.98 UL
Arsenic	9.79	108	2.97 J	12.5	11.5	14.7	20.4	14 J	13.7	191	3.79 J	2.07 J	1.46 J	7.69	7.54	4.86	6.08	3.65 J
Barium	20.0	75.0	13	74	26.2	101	108	75.3	64.3	79.5	12.8	9.34	13.3	41.2	41.2	35.4	25.5	20.6
Beryllium	NSV	1.39	0.272	0.916	0.303	0.978	1.26	1.09	0.922	0.826	0.17	0.26	0.185	0.748	0.726	0.491	0.315	0.297
Cadmium	0.99	0.571	0.345	1.5	0.425	0.495	1.13	0.356 J	0.63	0.985	0.101 J	0.153 J	0.204	0.934	1.03	0.671	0.808	0.245
Chromium	43.4	52.0	8.52	25	12.5	23.1	34.7	25.7	21.9	22.6	7.44	5.19	3.77	10.4	10.9	10.5	17.8	11.5
Cobalt	50.0	--	1.17	3.34	1.23 J	4.37	4.67	3.57 J	3.48	3.5	1.19	0.556 J	0.746 J	2.48	2.48	2.69	2.59	1.18
Copper	31.6	25.6	9.71	21.8	13.6	13.3	30.2	9.6	12.7	12.2	14.9	3.34	4.38	30.3	34.1	17.2	26.4	7.08
Cyanide	NSV	No value	0.26 U	0.64 U	0.46 U	0.56 U	0.82 U	1.1 U	0.82 U	0.35 J	0.25 U	0.22 U	0.23 U	0.23 U	0.23 U	0.22 U	0.22 U	0.22 U
Iron	20,000	45,600	7,570	14,700	11,000	28,800 J	29,500 J	16,200	15,700	44,200	6,300	5,820	2,940	6,510	6,870	11,300	10,500	7,230
Lead	35.8	41.6	6.57	46.8	18.2	27.9	41.9	23.6	29	54.6	181	5.14	6.57	15.8	17.4	14.7	71.9	9.21
Manganese	460	--	19.7	50.7	47.6	135	127	69.8	76	338	52.8	19.7	12	217	205	189	88.3	28.9 K
Mercury	0.18	0.255	0.00538 J	0.0646	0.0131 J	0.0873	0.12	0.0527 J	0.0673	0.116	0.028	0.00697 U	0.00743 U	0.0213	0.0221	0.00587 J	0.0352	0.00667 J
Nickel	22.7	17.1	2.58	6.78	2.72	7.27	9.84	7.71	6.84	6.55	4.79	1.19	1.41	5.24	5.6	5.57	4.64	2.13
Selenium	2.00	2.69	0.654 J	4.72 U	3.09 U	3.11 U	2.53 J	6.48 J	2.31 J	3.44 U	2.24 U	1.57 U	1.73 U	2.37 U	1.96 U	1.55 U	0.663 J	1.98 U
Silver	1.00	No value	0.399 U	1.18 U	0.773 U	0.778 U	1.36 U	2.54 U	1.46 U	0.861 U	0.56 U	0.393 U	0.434 U	0.592 U	0.49 U	0.387 U	0.299 U	0.494 U
Thallium	NSV	6.50	0.529 J	4.72 U	3.09 U	1.1 J	5.42 U	10.1 U	5.83 U	3.44 U	2.24 U	1.57 U	1.73 U	2.37 U	1.96 U	1.55 U	1.2 U	1.98 U
Vanadium	57.0	62.5	9.34	28.2	21.6	37.2	52.2	35.8	31.4	35.2	7.19	6.41	4.62	11.9	12.2	10.4	14.9	8.33
Zinc	121	110	44.1	300	59.7	95.3	162	58 J	80.9 J	229	40.1	51.6	79.2	234	258	272	271	107 K
Polychlorinated Biphenyls (UG/KG)																		
Aroclor-1242	59.8	--	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1248	59.8	--	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1254	59.8	--	56 U	140 UL	100 U	120 UL	180 R	240 UL	180 UL	93 U	55 U	48 U	51 U	25 UL	25 UL	25 UL	24 UL	24 UL
Aroclor-1260	59.8	--	70 J	140 UL	100 J	120 UL	180 R	240 UL	180 UL	53 J	55 U	48 U	51 U	25 UL	25 UL	25 UL	26 L	24 UL
Pesticides (UG/KG)																		
4,4'-DDD	4.88	10.1	14 UL	35 UL	65 L	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UJ
4,4'-DDE	3.16	44.1	14 UL	35 UL	93 L	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
4,4'-DDT	4.16	1.45	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	20 J	12 UL
Aldrin	2.00	--	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
alpha-Chlordane	3.24	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Dieldrin	1.90	0.948	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan I	NSV	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan II	NSV	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endosulfan sulfate	NSV	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin	2.22	8.64	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Endrin aldehyde	2.22	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-BHC (Lindane)	2.37	--	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
gamma-Chlordane	3.24	1.10	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Heptachlor	NSV	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Heptachlor epoxide	2.47	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Methoxychlor	NSV	No value	14 UL	35 UL	50 UL	30 R	46 UL	60 UL	45 UL	46 UL	27 UL	24 UL	26 UL	13 UL	13 UL	12 UL	12 UL	12 UL
Semivolatile Organic Compounds (UG/KG)																		
2-Methylnaphthalene	70.0	--	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	35 U	31 U	33 U	31 U	31 U	31 U	30 U	30 UL
Acenaphthene	290	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	65	31 U	33 U	31 U	31 U	31 U	36 J	30 U
Acenaphthylene	160	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	320	31 U	33 U	31 U	31 U	31 U	70	30 U
Anthracene	57.2	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	44 J	600	31 U	33 U	31 U	31 U	31 J	120	22 J
Benzo(a)anthracene	108	18.2	37 J	81 J	57 J	68 J	110 L	150 UL	110 UL	140	2,400	25 J	68	51	41	110	450	88
Benzo(a)pyrene	150	No value	25 J	64 J	45 J	50 J	84 L	150 UL	110 UL	130	2,700	17 J	64	45	38 J	94	450	77
Benzo(b)fluoranthene	240	30.3	45 J	110 J	89	96 J	160 L	150 UL	110 UL	320	3,700	33 J	130	80	69	170	810	130
Benzo(g,h,i)perylene	170	25.0	22 J	49 J	64 U	78 U	110 UL	150 UL	110 UL	62 J	1,600	31 U	28 J	32 J	27 J	42	190	49
Benzo(k)fluoranthene	240	No value	36 U	43 J	64 U	78 U	110 UL	150 UL	110 UL	90	1,200	31 U	36 J	30 J	24 J	45	260	48
bis(2-Ethylhexyl)phthalate	750	No value	280 UL	700 U	500 UJ	610 U	910 U	1,200 U	900 U	470 UJ	280 UJ	240 UJ	390 J	130 UL	130 UL	250 UL	3,500 L	240 UL
Butylbenzylphthalate	NSV	No value	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	7,400 J	130 UL	130 UL	250 UL	240 UL	240 UL
Carbazole	140	--	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	130 UL	130 UL	250 UL	240 UL	240 UL
Chrysene	166	21.7	22 J	77 J	53 J	54 J	88 L	150 UL	110 UL	270	2,400	17 J	86	58	47	120	580	97
Dibenz(a,h)anthracene	33.0	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	400	31 U	33 U	31 U	31 U	31 U	54	30 U
Di-n-butylphthalate	110	--	280 UL	700 U	500 U	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	130 UL	130 UL	250 UL	240 UL	240 UL
Di-n-octylphthalate	NSV	No value	280 UL	700 U	440 J	610 U	910 U	1,200 U	900 U	470 U	280 U	240 UL	260 U	130 UL	130 UL	250 UL	240 UL	240 UL
Fluoranthene	423	26.0	44 J	150	110	110	200 L	150 UL	110 UL	430	4,700	36 J	180	100	92	260	1,100	180
Fluorene	77.4	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	78	31 U	33 U	31 U	31 U	31 U	67	30 U
Indeno(1,2,3-cd)pyrene	200	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	62 J	1,500	31 U	26 J	28 J	24 J	40 J	190	44
Naphthalene	176	No value	36 U	89 U	64 U	78 U	110 UL	150 UL	110 UL	60 U	67	31 U	33 U	31 U	31 U	31 U	28 J	30 U
PAH (HMW)	2,900	381	247	653	462	521	812	675 U	495 U	1,504	20,400	185	585	425	363	837	3,874	698
PAH (LMW)	786	1,670	310	832	604	688	1,040	1,200 U	890 U	1,159	8,188	271	539	312	300	674	2,256	507
PAH (total)	3,553	2,110	557	1,485	1,066	1,209	1,852	1,875 U	1,385 U	2,663	28,588	456	1,124	737	663	1,510	6,130	1,205
Pentachlorophenol	NSV	No value	840 UL	2,100 U	1,500 U	1,800 U	2,700 U	3,500 U	2,700 U	1,400 U	850 U	710 UL	770 U	380 UL	380 UL	740 UL	720 UL	720 UL
Phenanthrene	204	30.2	36 U	65 J	52 J	78 U	110 UL	150 UL	110 UL	300	2,200	22 J	130	54	50	180	700	110
Pyrene	195	35.3	42 J	140	90	97 J	150 L	150 UL	110 UL	400	4,500	31 J	130	85	77	200	890	150
Volatile Organic Compounds (UG/KG)																		
2-Butanone	NSV	591	15	110	98	270	220	330 J	160 J	80	5.5 J	6.4	2.9 U	3.5 J	3.2 J	3.1 U	3 U	3 U
Acetone	NSV	2,500	52	440	420	960	810	1,200 J	630 J	320	26 J	42	5.4 J	45	27 J	15 U	9.6 J	15 U
Carbon disulfide	NSV	25.8	5.7 U	18 U	13 U	19 U	29 U	56 U	30 U	12 U	7.1 U	4.7 U	5.8 U	7.2 U	7.6 U	6.2 U	6 U	6 U
Ethylbenzene	NSV	No value	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Methyl acetate	NSV	No value	5.7 U	18 U	13 U	19 U	29 U	56 U	30 U	12 U	7.1 U	4.7 U	5.8 U	7.2 U	7.6 U	6.2 U	6 U	6 U
Methylcyclohexane	NSV	No value	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Tetrachloroethene	NSV	No value	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.9 U	1.2 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Toluene	NSV	No value	1.1 U	3.6 U	2.5 U	3.8 U	5.8 U	11 U	6.1 U	2.4 U	1.4 U	0.4 J	1.2 U	1.4 U	1.5 U	1.2 U	1.2 U	1.2 U
Xylene, total	NSV	No value	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters																		
pH (PH)	--	--	7	6.6	6.5	6.5	6.5	6.8	NA	7	7.4	6.6	6.9	6.4	NA	6.9	6.3	6.7
Total organic carbon (MG/KG)	--	--	13,000	78,000	46,000	80,000	120,000	180,000	NA	41,000	9,600	2,700	2,700	17,000	NA	7,100	11,000	4,100

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-63

Area-Specific Screening Statistics - Surface Sediment - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	23 / 23	1,570	30,900	CAS04-SD10-1012	12,172	7,090	14,710	25,500	1 / 23	1.21	0.58	0.48	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.40 - 1.70	13 / 23	0.34	2.20	CAA03-SD02-1209A	0.74	0.51	0.92	3.00	0 / 23	0.73	0.31	0.25	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	23 / 23	1.40	111	CAS04-SD18-1012	18.3	23.2	26.6	9.79	12 / 23	11.3	2.72	1.87	--	-- / --	--	--	--	108	1 / 23	1.03	**YES**
Barium	-- - --	23 / 23	8.40	166	CAS04-SD04-1209A	58.3	37.3	71.7	20.0	21 / 23	8.30	3.58	2.92	--	-- / --	--	--	--	75.0	7 / 23	2.21	**YES**
Beryllium	0.73 - 0.73	22 / 23	0.14	1.60	CAS04-SD10-1012	0.66	0.35	0.79	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	1 / 23	1.15	**YES**
Cadmium	-- - --	23 / 23	0.11	9.60	CAS04-SD10-1012	2.85	2.64	3.80	0.99	14 / 23	9.70	3.84	2.88	--	-- / --	--	--	--	0.571	16 / 23	16.8	**YES**
Chromium	-- - --	23 / 23	5.50	57.0	CAS04-SD10-1012	24.5	13.6	29.3	43.4	2 / 23	1.31	0.68	0.56	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	23 / 23	3.30	197	CAS04-SD10-1012	56.6	50.7	74.8	31.6	13 / 23	6.23	2.37	1.79	--	-- / --	--	--	--	25.6	15 / 23	7.70	**YES**
Cyanide	0.030 - 2.70	0 / 12	--	--	--	0.41	0.38	0.61	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	23 / 23	4,010	44,000	CAS04-SD10-1012	18,407	9,782	21,909	20,000	10 / 23	2.20	1.10	0.92	--	-- / --	--	--	--	45,600	0 / 23	0.96	NO
Lead	-- - --	23 / 23	4.50	417	CAS04-SD03-1209A	67.6	94.3	101	35.8	13 / 23	11.6	2.83	1.89	--	-- / --	--	--	--	41.6	12 / 23	10.0	**YES**
Mercury	0.010 - 0.040	20 / 23	0.010	0.62	CAS04-SD03-1209A	0.097	0.13	0.14	0.18	2 / 23	3.44	0.79	0.54	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	1.40 - 1.40	22 / 23	2.20	27.2	CAS04-SD10-1012	10.9	7.41	13.6	22.7	3 / 23	1.20	0.60	0.48	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	0.24 - 1.20	3 / 23	0.41	1.40	CAA03-SD02-1209A	0.46	0.29	0.57	2.00	0 / 23	0.70	0.28	0.23	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.55 - 5.60	17 / 23	0.050	6.10	CAS04-SD03-1209A	0.91	1.42	1.41	1.00	1 / 23	6.10	1.41	0.91	--	-- / --	--	--	--	--	-- / --	--	**YES**
Thallium	0.40 - 4.10	2 / 23	0.15	0.53	CAA03-SD01-1209A	0.57	0.41	0.72	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	6.50	0 / 23	0.08	NO
Vanadium	-- - --	23 / 23	5.30	73.4	CAS04-SD10-1012	31.0	15.9	36.7	57.0	1 / 23	1.29	0.64	0.54	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	23 / 23	11.8	626	CAS04-SD10-1012	212	167	272	121	15 / 23	5.17	2.25	1.76	--	-- / --	--	--	--	110	15 / 23	5.69	**YES**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	11.0 - 78.0	6 / 23	240	21,000	CAS04-SD03-1209A	1,021	4,359	2,582	59.8	6 / 23	351	43.2	17.1	4,949	1 / 23	4.24	0.52	0.21	--	-- / --	--	**YES**
Aroclor-1260	52.0 - 280	21 / 23	30.0	2,400	CAS04-SD10-1012	684	811	974	59.8	19 / 23	40.1	16.3	11.4	4,949	0 / 23	0.48	0.20	0.14	--	-- / --	--	**YES**
Pesticides (UG/KG)																						
4,4'-DDD	3.60 - 7.80	5 / 12	6.60	380	CAS04-SD03-1209A	71.7	132	140	4.88	5 / 12	77.9	28.7	14.7	672	0 / 12	0.57	0.21	0.11	10.1	4 / 12	37.6	**YES**
4,4'-DDE	1.00 - 6.00	7 / 12	0.92	600	CAS04-SD03-1209A	67.1	174	157	3.16	5 / 12	190	49.7	21.2	2,077	0 / 12	0.29	0.08	0.03	44.1	2 / 12	13.6	**YES**
4,4'-DDT	4.80 - 7.80	6 / 12	2.10	1,600	CAS04-SD03-1209A	149	458	386	4.16	5 / 12	385	92.9	35.8	2,077	0 / 12	0.77	0.19	0.07	1.45	6 / 12	1,103	**YES**
alpha-Chlordane	2.20 - 7.10	2 / 12	1.70	17.0	CAS04-SD03-1209A	2.90	4.49	5.22	3.24	1 / 12	5.25	1.61	0.89	17,108	0 / 12	0.0010	0.0003	0.0002	--	-- / --	--	**YES**
Dieldrin	2.40 - 14.0	4 / 12	1.70	1,400	CAS04-SD03-1209A	123	402	332	1.90	2 / 12	737	175	64.7	318	1 / 12	4.41	1.04	0.39	0.948	4 / 12	1,477	**YES**
Endosulfan I	2.20 - 7.10	3 / 12	1.60	58.0	CAS04-SD03-1209A	6.33	16.3	14.8	NSV	-- / --	NSV	NSV	NSV	17.7	1 / 12	3.27	0.83	0.36	--	-- / --	--	NO
Endosulfan II	4.30 - 7.80	3 / 12	1.30	830	CAS04-SD03-1209A	80.5	238	204	NSV	-- / --	NSV	NSV	NSV	85.5	2 / 12	9.70	2.38	0.94	--	-- / --	--	**YES**
Endosulfan sulfate	4.30 - 14.0	2 / 12	14.0	35.0	CAA03-SD03-1209A	6.71	9.53	11.6	NSV	-- / --	NSV	NSV	NSV	33.0	1 / 12	1.06	0.35	0.20	--	-- / --	--	NO
Endrin	4.30 - 14.0	3 / 12	9.60	1,200	CAS04-SD03-1209A	105	345	283	2.22	3 / 12	541	128	47.1	122	1 / 12	9.82	2.32	0.86	8.64	3 / 12	139	**YES**
Endrin aldehyde	4.30 - 14.0	3 / 12	3.30	290	CAS04-SD03-1209A	27.2	82.8	70.1	2.22	3 / 12	131	31.6	12.2	122	1 / 12	2.37	0.57	0.22	--	-- / --	--	**YES**
gamma-Chlordane	2.40 - 4.00	6 / 12	1.10	780	CAS04-SD03-1209A	68.2	224	184	3.24	3 / 12	241	56.9	21.1	17,108	0 / 12	0.046	0.011	0.004	1.10	6 / 12	709	**YES**
Heptachlor	2.20 - 7.10	1 / 12	0.69	0.69	CAA03-SD04-1209A	1.51	0.71	1.88	NSV	-- / --	NSV	NSV	NSV	415	0 / 12	0.002	--	--	--	-- / --	--	NO
Heptachlor epoxide	2.20 - 7.10	1 / 12	540	540	CAS04-SD03-1209A	46.4	155	127	2.47	1 / 12	219	51.4	18.8	415	1 / 12	1.30	0.31	0.11	--	-- / --	--	**YES**
Methoxychlor	22.0 - 71.0	1 / 12	520	520	CAS04-SD03-1209A	57.7	146	133	NSV	-- / --	NSV	NSV	NSV	116	1 / 12	4.48	1.15	0.50	--	-- / --	--	**YES**
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	23.0 - 1,600	16 / 23	2.90	300	CAA03-SD02-1209A	109	210	184	290	1 / 23	1.03	0.63	0.38	3,788	0 / 23	0.08	0.05	0.03	--	-- / --	--	NO
Acenaphthylene	23.0 - 1,600	17 / 23	1.80	120	CAS04-SD03-1209A	102	206	176	160	0 / 23	0.75	--	0.64	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Anthracene	530 - 1,600	19 / 23	2.80	260	CAS04-SD03-1209A	123	202	196	57.2	6 / 23	4.55	3.42	2.16	1,344	0 / 23	0.19	0.15	0.09	--	-- / --	--	**YES**
Benzo(a)anthracene	16.0 - 35.0	19 / 23	26.0	1,500	CAS04-SD04-1209A	305	383	442	108	17 / 23	13.9	4.10	2.83	672	2 / 23	2.23	0.66	0.45	18.2	19 / 23	82.4	**YES**
Benzo(a)pyrene	13.0 - 17.0	21 / 23	31.0	2,100	CAS04-SD03-1209A	352	492	528	150	14 / 23	14.0	3.52	2.35	855	2 / 23	2.45	0.62	0.41	--	-- / --	--	**YES**
Benzo(b)fluoranthene	31.0 - 34.0	21 / 23	62.0	3,900	CAS04-SD03-1209A	654	975	1,003	240	14 / 23	16.3	4.18	2.73	NSV	-- / --	NSV	NSV	NSV	30.3	21 / 23	129	**YES**
Benzo(g,h,i)perylene	7.10 - 27.0	19 / 23	27.0	1,900	CAS04-SD03-1209A	206	388	345	170	9 / 23	11.2	2.03	1.21	NSV	-- / --	NSV	NSV	NSV	25.0	19 / 23	76.0	**YES**
Benzo(k)fluoranthene	8.50 - 19.0	20 / 23	24.0	1,600	CAS04-SD03-1209A	255	372	389	240	7 / 23	6.67	1.62	1.06	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
bis(2-Ethylhexyl)phthalate	120 - 420	5 / 12	110	280	CAS004-4-SD04-00-1199	123	69.6	159	750	0 / 12	0.37	0.21	0.16	5,437,900	0 / 12	0.00005	0.00003	0.00002	--	-- / --	--	NO
Butylbenzylphthalate	410 - 1,600	0 / 12	--	--	--	356	213	467	NSV	-- / --	NSV	NSV	NSV	67,210	-- / --	0.024	0.007	0.005	--	-- / --	--	NO
Chrysene	-- - --	23 / 23	18.0	2,700	CAS04-SD03-1209A	477	634	704	166	16 / 23	16.3	4.24	2.87	NSV	-- / --	NSV	NSV	NSV	21.7	21 / 23	124	**YES**
Dibenz(a,h)anthracene	6.80 - 1,600	14 / 23	9.10	660	CAS04-SD03-1209A	164	228	245	33.0	10 / 23	20.0	7.43	4.96	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Di-n-octylphthalate	530 - 2,700	0 / 12	--	--	--	540	292	691	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Fluoranthene	-- - --	23 / 23	37.0	1,800	CAS04-SD04-1209A	454	419	604	423	9 / 23	4.26	1.43	1.07	17,719	0 / 23	0.10	0.03	0.03	26.0	23 / 23	69.2	**YES**
Fluorene	6.10 - 1,600	11 / 23	5.30	420	CAA03-SD02-1209A	122	213	198	77.4	1 / 23	5.43	2.56	1.57	3,299	0 / 23	0.13	0.06	0.04	--	-- / --	--	**YES**
Indeno(1,2,3-cd)pyrene	9.90 - 550	18 / 23	34.0	2,800	CAS04-SD03-1209A	357	621	579	200	10 / 23	14.0	2.90	1.79	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Naphthalene	18.0 - 1,600	10 / 23	4.00	360	CAS04-SD18-1012	120	216	198	176	2 / 23	2.05	1.12	0.68	2,933	0 / 23	0.12	0.07	0.04	--	-- / --	--	**YES**
PAH (HMW)	-- - --	23 / 23	127	18,060	CAS04-SD03-1209A	3,371	4,520	4,989	2,900	9 / 23	6.23	1.72	1.16	NSV	-- / --	NSV	NSV	NSV	381	18 / 23	47.4	**YES**
PAH (LMW)	-- - --	23 / 23	87.1	6,510	CAS004-4-SD04-00-1199	1,429	1,608	2,005	786	13 / 23	8.28	2.55	1.82	NSV	-- / --	NSV	NSV	NSV	1,670	7 / 23	3.90	**YES**
PAH (total)	-- - --	23 / 23	234	18,895	CAS04-SD03-1209A	4,779	5,077	6,596	3,553	13 / 23	5.32	1.86	1.34	NSV	-- / --	NSV	NSV	NSV	2,110	14 / 23	8.95	**YES**
Pentachlorophenol	120 - 4,000	2 / 12	24.0	110	CAA03-SD02-1209A	455	665	800	NSV	-- / --	NSV	NSV	NSV	3,079	0 / 12	0.04	--	--	--	-- / --	--	NO
Phenanthrene	-- - --	23 / 23	19.0	590	CAS04-SD23-1012	215	172	277	204	10 / 23	2.89	1.36	1.05	5,194	0 / 23	0.11	0.05	0.04	30.2	20 / 23	19.5	**YES**
Pyrene	-- - --	23 / 23	36.0	3,800	CAS04-SD04-1209A	581	784	861	195	17 / 23	19.5	4.42	2.98	NSV	-- / --	NSV	NSV	NSV	35.3	23 / 23	108	**YES**

TABLE L-63

Area-Specific Screening Statistics - Surface Sediment - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																						
2-Butanone	12.0 - 42.0	4 / 12	12.0	56.0	CAA03-SD04-1209A	20.3	14.2	27.6	NSV	-- / --	NSV	NSV	NSV	1,650	0 / 12	0.03	0.02	0.01	--	-- / --	--	NO
Acetone	13.0 - 44.0	6 / 12	74.0	270	CAA03-SD02-1209A	94.5	99.5	146	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	2,500	0 / 12	0.11	NO
Carbon disulfide	6.00 - 26.4	2 / 12	2.00	3.00	CAA03-SD04-1209A	6.09	3.80	8.06	NSV	-- / --	NSV	NSV	NSV	5.19	0 / 12	0.58	--	--	--	-- / --	--	NO
Ethylbenzene	6.00 - 21.0	2 / 12	2.00	3.00	CAS004-4-SD04-00-1199	4.92	3.04	6.49	NSV	-- / --	NSV	NSV	NSV	21,996	0 / 12	0.0001	--	--	--	-- / --	--	NO
Methyl acetate	11.0 - 38.0	1 / 7	5.00	5.00	CAA03-SD04-1209A	8.21	4.85	11.8	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	6.00 - 8.00	1 / 8	4.00	4.00	CAA03-SD02-1209A	3.56	0.42	3.84	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	15.8 - 26.4	8 / 12	5.00	50.0	CAA03-SD01-1209A	20.3	17.1	29.2	NSV	-- / --	NSV	NSV	NSV	3,238	0 / 12	0.015	0.009	0.006	--	-- / --	--	NO
Toluene	6.00 - 26.4	1 / 12	3.00	3.00	CAS004-4-SD02-00-1199	5.66	3.51	7.48	NSV	-- / --	NSV	NSV	NSV	4,094	0 / 12	0.001	--	--	--	-- / --	--	NO
Xylene, total	15.8 - 64.0	1 / 12	10.0	10.0	CAS004-4-SD04-00-1199	12.0	6.48	15.4	NSV	-- / --	NSV	NSV	NSV	978	0 / 12	0.01	--	--	--	-- / --	--	NO
Other Parameters																						
Ammonia (MG/KG)	-- - --	6 / 6	74.0	230	CAS04-SD22-1012	142	62.5	194	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
pH	-- - --	19 / 19	6.10	7.70	CAS04-SD02-1209A	6.83	0.45	7.00	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Sulfide (MG/KG)	120 - 170	0 / 6	--	--	--	75.0	10.0	83.2	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	19 / 19	12,000	250,000	CAA03-SD02-1209A	61,105	51,827	81,723	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-64

Area-Specific Screening Statistics - Surface Sediment - Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	8 / 8	5,510	11,600	CAS04-SD07-1209A	8,180	2,168	9,632	25,500	0 / 8	0.45	0.38	0.32	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	0.18 - 1.10	0 / 8	--	--	--	0.28	0.17	0.39	3.00	-- / --	0.37	0.13	0.09	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	8 / 8	2.50	10.4	CAS04-SD09-1209A	4.93	2.39	6.52	9.79	1 / 8	1.06	0.67	0.50	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	21.2 - 35.0	5 / 8	17.1	31.6	CAS04-SD05-1209A	19.8	7.08	24.6	20.0	3 / 8	1.58	1.23	0.99	--	-- / --	--	--	--	75.0	0 / 8	0.42	NO
Beryllium	-- - --	8 / 8	0.34	0.65	CAS04-SD07-1209A	0.48	0.11	0.56	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	0 / 8	0.47	NO
Cadmium	-- - --	8 / 8	0.16	1.60	CAS04-SD17-1012	0.74	0.58	1.13	0.99	3 / 8	1.62	1.14	0.75	--	-- / --	--	--	--	0.571	4 / 8	2.80	**YES**
Chromium	-- - --	8 / 8	9.40	27.2	CAS04-SD07-1209A	16.7	5.51	20.4	43.4	0 / 8	0.63	0.47	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	8 / 8	3.50	44.5	CAS04-SD15-1012	17.9	15.4	28.2	31.6	2 / 8	1.41	0.89	0.56	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.91 - 1.30	0 / 5	--	--	--	0.52	0.095	0.61	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	8 / 8	6,400	13,600	CAS04-SD08-1209A	11,024	2,879	12,952	20,000	0 / 8	0.68	0.65	0.55	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	8 / 8	5.70	23.0	CAS04-SD17-1012	13.0	5.79	16.8	35.8	0 / 8	0.64	0.47	0.36	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	-- - --	8 / 8	0.010	0.13	CAS04-SD17-1012	0.049	0.048	0.081	0.18	0 / 8	0.72	0.45	0.27	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	8 / 8	2.90	8.30	CAS04-SD17-1012	6.03	1.74	7.19	22.7	0 / 8	0.37	0.32	0.27	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	1.50 - 1.50	7 / 8	0.22	0.87	CAS04-SD05-1209A	0.46	0.23	0.61	2.00	0 / 8	0.44	0.31	0.23	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.18 - 2.20	3 / 8	0.34	0.45	CAS04-SD16-1012	0.54	0.31	0.74	1.00	0 / 8	0.45	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	0.42 - 2.00	1 / 8	0.50	0.50	CAS04-SD09-1209A	0.55	0.31	0.76	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	6.50	0 / 8	0.08	NO
Vanadium	-- - --	8 / 8	12.2	30.6	CAS04-SD07-1209A	20.3	5.65	24.1	57.0	0 / 8	0.54	0.42	0.36	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	8 / 8	20.1	134	CAS04-SD17-1012	63.7	37.4	88.8	121	1 / 8	1.11	0.73	0.53	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	10.0 - 27.0	1 / 8	330	330	CAS04-SD05-1209A	49.4	113	125	59.8	1 / 8	5.52	2.10	0.83	1,920	0 / 8	0.17	0.07	0.03	--	-- / --	--	**YES**
Aroclor-1260	29.0 - 29.0	7 / 8	23.0	500	CAS04-SD16-1012	238	190	365	59.8	5 / 8	8.36	6.10	3.97	1,920	0 / 8	0.26	0.19	0.12	--	-- / --	--	**YES**
Pesticides (UG/KG)																						
4,4'-DDD	-- - --	5 / 5	1.60	34.0	CAS04-SD05-1209A	14.6	13.2	27.2	4.88	3 / 5	6.97	5.57	3.00	261	0 / 5	0.13	0.10	0.06	10.1	3 / 5	3.37	**YES**
4,4'-DDE	4.30 - 4.30	4 / 5	1.40	13.0	CAS04-SD09-1209A	6.47	4.85	11.1	3.16	3 / 5	4.11	3.51	2.05	806	0 / 5	0.016	0.014	0.008	44.1	0 / 5	0.29	NO
4,4'-DDT	-- - --	5 / 5	0.83	43.0	CAS04-SD08-1209A	17.9	20.3	37.3	4.16	4 / 5	10.3	8.97	4.31	806	0 / 5	0.053	0.046	0.022	1.45	4 / 5	29.7	**YES**
alpha-Chlordane	2.20 - 3.00	0 / 5	--	--	--	1.27	0.16	1.42	3.24	-- / --	0.93	0.44	0.39	6,636	-- / --	0.0005	0.0002	0.0002	--	-- / --	--	NO
Dieldrin	4.30 - 5.90	0 / 5	--	--	--	2.47	0.33	2.78	1.90	-- / --	3.11	1.46	1.30	123	-- / --	0.05	0.02	0.02	--	-- / --	--	NO
Endosulfan I	2.20 - 2.40	2 / 5	1.30	9.40	CAS04-SD05-1209A	2.84	3.67	6.34	NSV	-- / --	NSV	NSV	NSV	6.87	1 / 5	1.37	0.92	0.41	--	-- / --	--	NO
Endosulfan II	-- - --	5 / 5	0.64	9.40	CAS04-SD05-1209A	3.11	3.62	6.56	NSV	-- / --	NSV	NSV	NSV	33.2	0 / 5	0.28	0.20	0.09	--	-- / --	--	NO
Endosulfan sulfate	4.30 - 5.90	2 / 5	3.40	18.0	CAS04-SD08-1209A	5.83	6.82	12.3	NSV	-- / --	NSV	NSV	NSV	12.8	1 / 5	1.41	0.96	0.46	--	-- / --	--	NO
Endrin	4.30 - 5.90	0 / 5	--	--	--	2.47	0.33	2.78	2.22	-- / --	2.66	1.25	1.11	47.4	-- / --	0.12	0.06	0.05	--	-- / --	--	NO
Endrin aldehyde	4.30 - 5.30	1 / 5	13.0	13.0	CAS04-SD05-1209A	4.48	4.77	9.02	2.22	1 / 5	5.86	4.06	2.02	47.4	0 / 5	0.27	0.19	0.09	--	-- / --	--	**YES**
gamma-Chlordane	2.20 - 2.20	4 / 5	1.40	12.0	CAS04-SD05-1209A	3.62	4.70	8.10	3.24	1 / 5	3.70	2.50	1.12	6,636	0 / 5	0.002	0.001	0.001	1.10	4 / 5	10.9	**YES**
Heptachlor	2.20 - 2.70	1 / 5	1.70	1.70	CAS04-SD05-1209A	1.31	0.24	1.53	NSV	-- / --	NSV	NSV	NSV	161	0 / 5	0.01	0.01	0.01	--	-- / --	--	NO
Heptachlor epoxide	2.20 - 3.00	0 / 5	--	--	--	1.27	0.16	1.42	2.47	-- / --	1.21	0.57	0.51	161	-- / --	0.02	0.01	0.01	--	-- / --	--	NO
Methoxychlor	22.0 - 30.0	0 / 5	--	--	--	12.7	1.57	14.2	NSV	-- / --	NSV	NSV	NSV	45.0	-- / --	0.67	0.32	0.28	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	26.0 - 29.0	5 / 8	0.014	12.0	CAS04-SD05-1209A	8.55	5.52	12.2	290	0 / 8	0.04	0.04	0.03	1,469	0 / 8	0.01	0.01	0.01	--	-- / --	--	NO
Acenaphthylene	26.0 - 29.0	5 / 8	0.0032	30.0	CAS04-SD05-1209A	10.3	9.72	16.8	160	0 / 8	0.19	0.11	0.06	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Anthracene	26.0 - 29.0	5 / 8	0.031	55.0	CAS04-SD05-1209A	16.5	17.1	28.0	57.2	0 / 8	0.96	0.49	0.29	521	0 / 8	0.11	0.05	0.03	--	-- / --	--	NO
Benzo(a)anthracene	7.40 - 28.0	5 / 8	0.11	420	CAS04-SD05-1209A	87.6	142	183	108	2 / 8	3.89	1.69	0.81	261	1 / 8	1.61	0.70	0.34	18.2	4 / 8	23.1	**YES**
Benzo(a)pyrene	27.0 - 27.0	7 / 8	0.12	380	CAS04-SD05-1209A	84.0	128	170	150	1 / 8	2.53	1.13	0.56	332	1 / 8	1.15	0.51	0.25	--	-- / --	--	**YES**
Benzo(b)fluoranthene	26.0 - 40.0	5 / 8	0.21	690	CAS04-SD05-1209A	146	234	303	240	2 / 8	2.88	1.26	0.61	NSV	-- / --	NSV	NSV	NSV	30.3	4 / 8	22.8	**YES**
Benzo(g,h,i)perylene	26.0 - 27.0	6 / 8	0.056	130	CAS04-SD05-1209A	34.6	43.1	63.4	170	0 / 8	0.76	0.37	0.20	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	26.0 - 27.0	6 / 8	0.066	150	CAS04-SD05-1209A	39.7	49.6	72.9	240	0 / 8	0.63	0.30	0.17	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
bis(2-Ethylhexyl)phthalate	140 - 180	1 / 5	100	100	CAS04-SD08-1209A	82.0	13.0	94.4	750	0 / 5	0.13	0.13	0.11	2,109,300	0 / 5	0.00005	0.00004	0.00004	--	-- / --	--	NO
Butylbenzylphthalate	440 - 590	0 / 5	--	--	--	248	31.5	278	NSV	-- / --	NSV	NSV	NSV	26,070	-- / --	0.02	0.01	0.01	--	-- / --	--	NO
Chrysene	27.0 - 27.0	7 / 8	0.16	440	CAS04-SD05-1209A	101	151	202	166	2 / 8	2.65	1.22	0.61	NSV	-- / --	NSV	NSV	NSV	21.7	4 / 8	20.3	**YES**
Dibenz(a,h)anthracene	26.0 - 27.0	6 / 8	0.020	120	CAS04-SD05-1209A	26.8	38.3	52.5	33.0	1 / 8	3.64	1.59	0.81	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Di-n-octylphthalate	840 - 1,100	0 / 5	--	--	--	474	51.8	523	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Fluoranthene	27.0 - 27.0	7 / 8	0.24	820	CAS04-SD05-1209A	176	275	360	423	1 / 8	1.94	0.85	0.42	6,873	0 / 8	0.12	0.05	0.03	--	-- / --	--	NO
Fluorene	5.70 - 29.0	4 / 8	0.016	30.0	CAS04-SD05-1209A	11.5	9.23	17.6	77.4	0 / 8	0.39	0.23	0.15	1,280	0 / 8	0.02	0.01	0.01	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	27.0 - 27.0	7 / 8	0.084	300	CAS04-SD05-1209A	66.7	99.2	133	200	1 / 8	1.50	0.67	0.33	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Naphthalene	12.0 - 32.0	2 / 8	0.0056	6.00	CAS04-SD05-1209A	9.63	5.51	13.3	176	0 / 8	0.03	--	--	1,138	0 / 8	0.01	--	--	--	-- / --	--	NO
PAH (HMW)	112 - 112	7 / 8	1.07	3,320	CAS04-SD05-1209A	739	1,122	1,490	2,900	1 / 8	1.14	0.51	0.25	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	122 - 122	7 / 8	0.48	1,329	CAS04-SD05-1209A	331	430	619	786	1 / 8	1.69	0.79	0.42	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (total)	233 - 233	7 / 8	1.54	4,649	CAS04-SD05-1209A	1,070	1,551	2,108	3,553	1 / 8	1.31	0.59	0.30	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pentachlorophenol	130 - 180	0 / 5	--	--	--	75.0	10.0	84.5	NSV	-- / --	NSV	NSV	NSV	1,194	-- / --	0.15	0.07	0.06	--	-- / --	--	NO
Phenanthrene	27.0 - 27.0	7 / 8	0.16	340	CAS04-SD05-1209A	85.8	116	163	204	1 / 8	1.67	0.80	0.42	2,015	0 / 8	0.17	0.08	0.04	--	-- / --	--	NO
Pyrene	27.0 - 27.0	7 / 8	0.24	690	CAS04-SD05-1209A	159	235	317	195	2 / 8	3.54	1.63	0.82	NSV	-- / --	NSV	NSV	NSV	35.3	4 / 8	19.5	**YES**

TABLE L-64

Area-Specific Screening Statistics - Surface Sediment - Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																						
2-Butanone	33.0 - 34.0	3 / 5	25.0	51.0	CAS04-SD05-1209A	30.7	15.9	45.9	NSV	-- / --	NSV	NSV	NSV	640	0 / 5	0.08	0.07	0.05	--	-- / --	--	NO
Acetone	34.0 - 42.0	3 / 5	120	230	CAS04-SD05-1209A	112	93.1	200	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	2,500	0 / 5	0.09	NO
Carbon disulfide	6.00 - 8.00	1 / 5	2.00	2.00	CAS04-SD05-1209A	3.20	0.76	3.92	NSV	-- / --	NSV	NSV	NSV	2.01	0 / 5	0.99	--	--	--	-- / --	--	NO
Ethylbenzene	6.00 - 9.00	0 / 5	--	--	--	3.70	0.57	4.24	NSV	-- / --	NSV	NSV	NSV	8,532	-- / --	0.0011	0.0005	0.0004	--	-- / --	--	NO
Methyl acetate	12.0 - 16.0	0 / 5	--	--	--	6.60	0.89	7.45	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	6.00 - 9.00	0 / 5	--	--	--	3.70	0.57	4.24	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	-- - --	5 / 5	4.00	15.0	CAS04-SD09-1209A	9.20	5.07	14.0	NSV	-- / --	NSV	NSV	NSV	1,256	0 / 5	0.012	0.011	0.007	--	-- / --	--	NO
Toluene	6.00 - 9.00	0 / 5	--	--	--	3.70	0.57	4.24	NSV	-- / --	NSV	NSV	NSV	1,588	-- / --	0.006	0.003	0.002	--	-- / --	--	NO
Xylene, total	20.0 - 26.0	0 / 5	--	--	--	11.1	1.34	12.4	NSV	-- / --	NSV	NSV	NSV	379	-- / --	0.07	0.03	0.03	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	8 / 8	7.10	8.20	CAS04-SD07-1209A	7.60	0.41	7.88	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	8 / 8	2,300	53,000	CAS04-SD17-1012	23,675	17,702	35,532	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-65

Area-Specific Screening Statistics - Surface Sediment - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	12 / 12	2,620	19,200	CAYP-SD10-1012	9,988	5,639	12,911	25,500	0 / 12	0.75	0.51	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	1.60 - 6.40	4 / 12	1.80	3.72	CAYP-SD12-1012	2.13	0.88	2.58	3.00	1 / 12	1.24	0.86	0.71	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	12 / 12	2.65	265	CAYP-SD05-1112	50.1	85.3	94.3	9.79	9 / 12	27.1	9.63	5.11	--	-- / --	--	--	--	108	2 / 12	2.45	**YES**
Barium	-- - --	12 / 12	13.0	108	CAYP-SD10-1012	61.9	36.2	80.7	20.0	10 / 12	5.40	4.03	3.10	--	-- / --	--	--	--	75.0	6 / 12	1.44	**YES**
Beryllium	-- - --	12 / 12	0.23	1.26	CAYP-SD10-1012	0.72	0.38	0.91	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	0 / 12	0.91	NO
Cadmium	-- - --	12 / 12	0.35	2.70	CAYP-SD05-1112	0.91	0.65	1.25	0.99	3 / 12	2.73	1.26	0.92	--	-- / --	--	--	--	0.571	8 / 12	4.73	**YES**
Chromium	-- - --	12 / 12	7.54	34.7	CAYP-SD10-1012	19.0	8.76	23.6	43.4	0 / 12	0.80	0.54	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	12 / 12	8.34	87.2	CAYP-SD03-1012	22.2	21.7	33.4	31.6	1 / 12	2.76	1.06	0.70	--	-- / --	--	--	--	25.6	3 / 12	3.41	**YES**
Cyanide	0.26 - 1.10	2 / 12	0.25	0.33	CAYP-SD02-1012	0.29	0.11	0.35	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	**YES**
Iron	-- - --	12 / 12	4,100	44,200	CAYP-SD13-1012	19,389	13,304	26,286	20,000	4 / 12	2.21	1.31	0.97	--	-- / --	--	--	--	45,600	0 / 12	0.97	NO
Lead	-- - --	12 / 12	6.57	77.2	CAYP-SD05-1112	32.4	20.5	43.1	35.8	5 / 12	2.16	1.20	0.91	--	-- / --	--	--	--	41.6	4 / 12	1.86	**YES**
Mercury	0.0084 - 0.0084	11 / 12	0.0054	0.79	CAYP-SD05-1112	0.12	0.21	0.23	0.18	1 / 12	4.37	1.27	0.65	--	-- / --	--	--	--	0.255	1 / 12	3.09	**YES**
Nickel	-- - --	12 / 12	2.24	9.84	CAYP-SD10-1012	5.65	2.55	6.97	22.7	0 / 12	0.43	0.31	0.25	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	2.62 - 6.40	5 / 12	0.65	6.48	CAYP-SD12-1012	2.45	1.55	3.25	2.00	3 / 12	3.24	1.63	1.22	--	-- / --	--	--	--	2.69	2 / 12	2.41	**YES**
Silver	0.40 - 2.54	1 / 12	0.17	0.17	CAYP-SD04-1112	0.54	0.30	0.69	1.00	0 / 12	0.17	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	2.62 - 10.1	4 / 12	0.53	1.86	CAYP-SD05-1112	2.05	1.23	2.69	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	6.50	1 / 12	0.29	NO
Vanadium	-- - --	12 / 12	6.81	52.2	CAYP-SD10-1012	27.1	14.0	34.4	57.0	0 / 12	0.92	0.60	0.48	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	12 / 12	44.1	470	CAYP-SD05-1112	163	121	226	121	7 / 12	3.88	1.86	1.34	--	-- / --	--	--	--	110	7 / 12	4.27	**YES**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	56.0 - 240	0 / 11	--	--	--	60.6	25.4	74.5	59.8	-- / --	4.01	1.25	1.01	5,954	-- / --	0.04	0.01	0.01	--	-- / --	--	NO
Aroclor-1260	89.0 - 240	5 / 11	48.0	140	CAYP-SD03-1012	77.8	30.3	94.4	59.8	3 / 11	2.34	1.58	1.30	5,954	0 / 11	0.02	0.02	0.01	--	-- / --	--	**YES**
Pesticides (UG/KG)																						
4,4'-DDD	14.0 - 66.0	3 / 11	30.0	110	CAYP-SD05-1112	34.0	29.2	50.0	4.88	3 / 11	22.5	10.2	6.97	809	0 / 11	0.14	0.06	0.04	10.1	3 / 11	10.9	**YES**
4,4'-DDE	14.0 - 66.0	1 / 11	93.0	93.0	CAYP-SD08-1012	26.5	23.3	39.3	3.16	1 / 11	29.4	12.4	8.40	2,499	0 / 11	0.04	0.02	0.01	44.1	1 / 11	2.11	**YES**
4,4'-DDT	14.0 - 66.0	1 / 11	3,300	3,300	CAYP-SD05-1112	319	989	859	4.16	1 / 11	793	206	76.6	2,499	1 / 11	1.32	0.34	0.13	1.45	1 / 11	2,276	**YES**
alpha-Chlordane	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	3.24	-- / --	20.4	7.57	6.29	20,580	-- / --	0.003	0.001	0.001	--	-- / --	--	NO
Dieldrin	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	1.90	-- / --	34.7	12.9	10.7	382	-- / --	0.17	0.06	0.05	--	-- / --	--	NO
Endosulfan I	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	NSV	-- / --	NSV	NSV	NSV	21.3	-- / --	3.10	1.15	0.96	--	-- / --	--	NO
Endosulfan II	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	NSV	-- / --	NSV	NSV	NSV	103	-- / --	0.64	0.24	0.20	--	-- / --	--	NO
Endosulfan sulfate	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	NSV	-- / --	NSV	NSV	NSV	39.7	-- / --	1.66	0.62	0.51	--	-- / --	--	NO
Endrin	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	2.22	-- / --	29.7	11.0	9.17	147	-- / --	0.45	0.17	0.14	--	-- / --	--	NO
Endrin aldehyde	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	2.22	-- / --	29.7	11.0	9.17	147	-- / --	0.45	0.17	0.14	--	-- / --	--	NO
gamma-Chlordane	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	3.24	-- / --	20.4	7.57	6.29	20,580	-- / --	0.003	0.001	0.001	--	-- / --	--	NO
Heptachlor	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	NSV	-- / --	NSV	NSV	NSV	500	-- / --	0.13	0.05	0.04	--	-- / --	--	NO
Heptachlor epoxide	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	2.47	-- / --	26.7	9.93	8.24	500	-- / --	0.13	0.05	0.04	--	-- / --	--	NO
Methoxychlor	14.0 - 66.0	0 / 11	--	--	--	20.4	7.62	24.5	NSV	-- / --	NSV	NSV	NSV	140	-- / --	0.47	0.18	0.15	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	36.0 - 150	0 / 12	--	--	--	41.9	14.7	49.5	290	-- / --	0.52	0.17	0.14	4,557	-- / --	0.03	0.01	0.01	--	-- / --	--	NO
Acenaphthylene	36.0 - 150	0 / 12	--	--	--	41.9	14.7	49.5	160	-- / --	0.94	0.31	0.26	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Anthracene	36.0 - 150	1 / 12	44.0	44.0	CAYP-SD13-1012	43.0	14.2	50.4	57.2	0 / 12	0.77	--	0.75	1,617	0 / 12	0.03	0.03	0.03	--	-- / --	--	NO
Benzo(a)anthracene	98.0 - 150	10 / 12	25.0	170	CAYP-SD01-1012	86.2	45.0	109	108	4 / 12	1.57	1.01	0.80	809	0 / 12	0.21	0.14	0.11	18.2	10 / 12	9.34	**YES**
Benzo(a)pyrene	56.0 - 150	9 / 12	25.0	160	CAYP-SD01-1012	75.7	44.6	98.8	150	1 / 12	1.07	0.66	0.50	1,029	0 / 12	0.16	0.10	0.07	--	-- / --	--	NO
Benzo(b)fluoranthene	56.0 - 150	9 / 12	45.0	320	CAYP-SD13-1012	138	101	190	240	3 / 12	1.33	0.79	0.57	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(g,h,i)perylene	56.0 - 150	6 / 12	22.0	110	CAYP-SD01-1012	55.7	25.8	69.0	170	0 / 12	0.65	0.41	0.33	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	36.0 - 150	5 / 12	43.0	120	CAYP-SD01-1012	57.4	30.4	73.2	240	0 / 12	0.50	0.30	0.24	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
bis(2-Ethylhexyl)phthalate	280 - 1,200	1 / 12	590	590	CAYP-SD01-1012	337	149	414	750	0 / 12	0.79	0.55	0.45	6,541,500	0 / 12	0.0001	0.0001	0.0001	--	-- / --	--	NO
Butylbenzylphthalate	280 - 1,200	0 / 12	--	--	--	315	126	380	NSV	-- / --	NSV	NSV	NSV	80,850	-- / --	0.015	0.005	0.004	--	-- / --	--	NO
Chrysene	56.0 - 150	9 / 12	22.0	270	CAYP-SD13-1012	97.8	80.9	140	166	3 / 12	1.63	0.84	0.59	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Dibenz(a,h)anthracene	36.0 - 150	0 / 12	--	--	--	41.9	14.7	49.5	33.0	-- / --	4.55	1.50	1.27	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Di-n-octylphthalate	280 - 1,200	1 / 12	440	440	CAYP-SD08-1012	331	128	398	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Fluoranthene	56.0 - 150	9 / 12	44.0	430	CAYP-SD13-1012	171	140	244	423	1 / 12	1.02	0.58	0.41	21,315	0 / 12	0.02	0.01	0.01	--	-- / --	--	NO
Fluorene	36.0 - 150	0 / 12	--	--	--	41.9	14.7	49.5	77.4	-- / --	1.94	0.64	0.54	3,969	-- / --	0.04	0.01	0.01	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	36.0 - 150	3 / 12	62.0	92.0	CAYP-SD01-1012	51.0	21.8	62.3	200	0 / 12	0.46	0.31	0.25	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Naphthalene	36.0 - 150	0 / 12	--	--	--	41.9	14.7	49.5	176	-- / --	0.85	0.28	0.24	3,528	-- / --	0.04	0.01	0.01	--	-- / --	--	NO
PAH (HMW)	441 - 675	10 / 12	247	1,574	CAYP-SD01-1012	707	488	960	2,900	0 / 12	0.54	0.33	0.24	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	444 - 1,200	9 / 12	310	1,242	CAYP-SD01-1012	731	327	901	786	5 / 12	1.58	1.15	0.93	NSV	-- / --	NSV	NSV	NSV	1,670	0 / 12	0.74	NO
PAH (total)	1,218 - 1,875	10 / 12	557	2,816	CAYP-SD01-1012	1,456	775	1,858	3,553	0 / 12	0.79	0.52	0.41	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pentachlorophenol	840 - 3,500	0 / 12	--	--	--	939	368	1,130	NSV	-- / --	NSV	NSV	NSV	3,704	-- / --	0.94	0.31	0.25	--	-- / --	--	NO
Phenanthrene	36.0 - 150	5 / 12	52.0	300	CAYP-SD13-1012	92.8	90.1	139	204	2 / 12	1.47	0.68	0.45	6,248	0 / 12	0.05	0.02	0.01	--	-- / --	--	NO
Pyrene	56.0 - 150	9 / 12	42.0	400	CAYP-SD13-1012	150	123	214	195	3 / 12	2.05	1.10	0.77	NSV	-- / --	NSV	NSV	NSV	35.3	9 / 12	11.3	**YES**

TABLE L-65

Area-Specific Screening Statistics - Surface Sediment - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																						
2-Butanone	-- - --	12 / 12	15.0	330	CAYP-SD12-1012	137	100	189	NSV	-- / --	NSV	NSV	NSV	1,985	0 / 12	0.17	0.10	0.07	--	-- / --	--	NO
Acetone	-- - --	12 / 12	52.0	1,200	CAYP-SD12-1012	505	352	687	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	2,500	0 / 12	0.48	NO
Carbon disulfide	5.70 - 56.0	0 / 12	--	--	--	9.92	6.70	13.4	NSV	-- / --	NSV	NSV	NSV	6.25	-- / --	8.96	2.14	1.59	--	-- / --	--	NO
Ethylbenzene	1.10 - 11.0	0 / 12	--	--	--	1.98	1.32	2.66	NSV	-- / --	NSV	NSV	NSV	26,460	-- / --	0.0004	0.0001	0.0001	--	-- / --	--	NO
Methyl acetate	5.70 - 56.0	0 / 12	--	--	--	9.92	6.70	13.4	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	1.10 - 11.0	0 / 12	--	--	--	1.98	1.32	2.66	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	1.10 - 11.0	0 / 12	--	--	--	1.98	1.32	2.66	NSV	-- / --	NSV	NSV	NSV	3,896	-- / --	0.003	0.001	0.001	--	-- / --	--	NO
Toluene	1.10 - 11.0	0 / 12	--	--	--	1.98	1.32	2.66	NSV	-- / --	NSV	NSV	NSV	4,925	-- / --	0.0022	0.0005	0.0004	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	12 / 12	6.40	7.00	CAYP-SD06-1112	6.66	0.19	6.76	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	12 / 12	13,000	180,000	CAYP-SD12-1012	73,500	46,866	97,797	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-66

Area-Specific Screening Statistics - Surface Sediment - York River Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	1 / 1	1,780	1,780	CAYP-SD11-1012	1,780	--	--	25,500	0 / 1	0.07	--	0.07	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	-- - --	1 / 1	0.88	0.88	CAYP-SD11-1012	0.88	--	--	3.00	0 / 1	0.29	--	0.29	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	1 / 1	3.79	3.79	CAYP-SD11-1012	3.79	--	--	9.79	0 / 1	0.39	--	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	-- - --	1 / 1	12.8	12.8	CAYP-SD11-1012	12.8	--	--	20.0	0 / 1	0.64	--	0.64	--	-- / --	--	--	--	--	-- / --	--	NO
Beryllium	-- - --	1 / 1	0.17	0.17	CAYP-SD11-1012	0.17	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	0 / 1	0.12	NO
Cadmium	-- - --	1 / 1	0.10	0.10	CAYP-SD11-1012	0.10	--	--	0.99	0 / 1	0.10	--	0.10	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	1 / 1	7.44	7.44	CAYP-SD11-1012	7.44	--	--	43.4	0 / 1	0.17	--	0.17	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	1 / 1	14.9	14.9	CAYP-SD11-1012	14.9	--	--	31.6	0 / 1	0.47	--	0.47	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.25 - 0.25	0 / 1	--	--	--	0.13	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	1 / 1	6,300	6,300	CAYP-SD11-1012	6,300	--	--	20,000	0 / 1	0.32	--	0.32	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	1 / 1	181	181	CAYP-SD11-1012	181	--	--	35.8	1 / 1	5.06	--	5.06	--	-- / --	--	--	--	41.6	1 / 1	4.35	**YES**
Mercury	-- - --	1 / 1	0.028	0.028	CAYP-SD11-1012	0.028	--	--	0.18	0 / 1	0.16	--	0.16	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	1 / 1	4.79	4.79	CAYP-SD11-1012	4.79	--	--	22.7	0 / 1	0.21	--	0.21	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	2.24 - 2.24	0 / 1	--	--	--	1.12	--	--	2.00	-- / --	1.12	--	0.56	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.56 - 0.56	0 / 1	--	--	--	0.28	--	--	1.00	-- / --	0.56	--	0.28	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	2.24 - 2.24	0 / 1	--	--	--	1.12	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	1 / 1	7.19	7.19	CAYP-SD11-1012	7.19	--	--	57.0	0 / 1	0.13	--	0.13	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	1 / 1	40.1	40.1	CAYP-SD11-1012	40.1	--	--	121	0 / 1	0.33	--	0.33	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	55.0 - 55.0	0 / 1	--	--	--	27.5	--	--	59.8	-- / --	0.92	--	0.46	778	-- / --	0.07	--	0.04	--	-- / --	--	NO
Aroclor-1260	55.0 - 55.0	0 / 1	--	--	--	27.5	--	--	59.8	-- / --	0.92	--	0.46	778	-- / --	0.07	--	0.04	--	-- / --	--	NO
Pesticides (UG/KG)																						
4,4'-DDD	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	4.88	-- / --	5.53	--	2.77	106	-- / --	0.26	--	0.13	--	-- / --	--	NO
4,4'-DDE	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	3.16	-- / --	8.54	--	4.27	326	-- / --	0.08	--	0.04	--	-- / --	--	NO
4,4'-DDT	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	4.16	-- / --	6.49	--	3.25	326	-- / --	0.08	--	0.04	--	-- / --	--	NO
alpha-Chlordane	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	3.24	-- / --	8.33	--	4.17	2,688	-- / --	0.01	--	0.01	--	-- / --	--	NO
Dieldrin	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	1.90	-- / --	14.2	--	7.11	49.9	-- / --	0.54	--	0.27	--	-- / --	--	NO
Endosulfan I	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	NSV	-- / --	NSV	NSV	NSV	2.78	-- / --	9.70	--	4.85	--	-- / --	--	NO
Endosulfan II	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	NSV	-- / --	NSV	NSV	NSV	13.4	-- / --	2.01	--	1.00	--	-- / --	--	NO
Endosulfan sulfate	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	NSV	-- / --	NSV	NSV	NSV	5.18	-- / --	5.21	--	2.60	--	-- / --	--	NO
Endrin	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	2.22	-- / --	12.2	--	6.08	19.2	-- / --	1.41	--	0.70	--	-- / --	--	NO
Endrin aldehyde	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	2.22	-- / --	12.2	--	6.08	19.2	-- / --	1.41	--	0.70	--	-- / --	--	NO
gamma-Chlordane	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	3.24	-- / --	8.33	--	4.17	2,688	-- / --	0.01	--	0.01	--	-- / --	--	NO
Heptachlor	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	NSV	-- / --	NSV	NSV	NSV	65.3	-- / --	0.41	--	0.21	--	-- / --	--	NO
Heptachlor epoxide	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	2.47	-- / --	10.9	--	5.47	65.3	-- / --	0.41	--	0.21	--	-- / --	--	NO
Methoxychlor	27.0 - 27.0	0 / 1	--	--	--	13.5	--	--	NSV	-- / --	NSV	NSV	NSV	18.2	-- / --	1.48	--	0.74	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	-- - --	1 / 1	65.0	65.0	CAYP-SD11-1012	65.0	--	--	290	0 / 1	0.22	--	0.22	595	0 / 1	0.11	--	0.11	--	-- / --	--	NO
Acenaphthylene	-- - --	1 / 1	320	320	CAYP-SD11-1012	320	--	--	160	1 / 1	2.00	--	2.00	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Anthracene	-- - --	1 / 1	600	600	CAYP-SD11-1012	600	--	--	57.2	1 / 1	10.5	--	10.5	211	1 / 1	2.84	--	2.84	--	-- / --	--	**YES**
Benzo(a)anthracene	-- - --	1 / 1	2,400	2,400	CAYP-SD11-1012	2,400	--	--	108	1 / 1	22.2	--	22.2	106	1 / 1	22.7	--	22.7	18.2	1 / 1	132	**YES**
Benzo(a)pyrene	-- - --	1 / 1	2,700	2,700	CAYP-SD11-1012	2,700	--	--	150	1 / 1	18.0	--	18.0	134	1 / 1	20.1	--	20.1	--	-- / --	--	**YES**
Benzo(b)fluoranthene	-- - --	1 / 1	3,700	3,700	CAYP-SD11-1012	3,700	--	--	240	1 / 1	15.4	--	15.4	NSV	-- / --	NSV	NSV	NSV	30.3	1 / 1	122	**YES**
Benzo(g,h,i)perylene	-- - --	1 / 1	1,600	1,600	CAYP-SD11-1012	1,600	--	--	170	1 / 1	9.41	--	9.41	NSV	-- / --	NSV	NSV	NSV	25.0	1 / 1	64.0	**YES**
Benzo(k)fluoranthene	-- - --	1 / 1	1,200	1,200	CAYP-SD11-1012	1,200	--	--	240	1 / 1	5.00	--	5.00	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
bis(2-Ethylhexyl)phthalate	280 - 280	0 / 1	--	--	--	140	--	--	750	-- / --	0.37	--	0.19	854,400	-- / --	0.0003	--	0.0002	--	-- / --	--	NO
Butylbenzylphthalate	280 - 280	0 / 1	--	--	--	140	--	--	NSV	-- / --	NSV	NSV	NSV	10,560	-- / --	0.03	--	0.01	--	-- / --	--	NO
Chrysene	-- - --	1 / 1	2,400	2,400	CAYP-SD11-1012	2,400	--	--	166	1 / 1	14.5	--	14.5	NSV	-- / --	NSV	NSV	NSV	21.7	1 / 1	111	**YES**
Dibenz(a,h)anthracene	-- - --	1 / 1	400	400	CAYP-SD11-1012	400	--	--	33.0	1 / 1	12.1	--	12.1	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Di-n-octylphthalate	280 - 280	0 / 1	--	--	--	140	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Fluoranthene	-- - --	1 / 1	4,700	4,700	CAYP-SD11-1012	4,700	--	--	423	1 / 1	11.1	--	11.1	2,784	1 / 1	1.69	--	1.69	26.0	1 / 1	181	**YES**
Fluorene	-- - --	1 / 1	78.0	78.0	CAYP-SD11-1012	78.0	--	--	77.4	1 / 1	1.01	--	1.01	518	0 / 1	0.15	--	0.15	--	-- / --	--	**YES**
Indeno(1,2,3-cd)pyrene	-- - --	1 / 1	1,500	1,500	CAYP-SD11-1012	1,500	--	--	200	1 / 1	7.50	--	7.50	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Naphthalene	-- - --	1 / 1	67.0	67.0	CAYP-SD11-1012	67.0	--	--	176	0 / 1	0.38	--	0.38	461	0 / 1	0.15	--	0.15	--	-- / --	--	NO
PAH (HMW)	-- - --	1 / 1	20,400	20,400	CAYP-SD11-1012	20,400	--	--	2,900	1 / 1	7.03	--	7.03	NSV	-- / --	NSV	NSV	NSV	381	1 / 1	53.5	**YES**
PAH (LMW)	-- - --	1 / 1	8,188	8,188	CAYP-SD11-1012	8,188	--	--	786	1 / 1	10.4	--	10.4	NSV	-- / --	NSV	NSV	NSV	1,670	1 / 1	4.90	**YES**
PAH (total)	-- - --	1 / 1	28,588	28,588	CAYP-SD11-1012	28,588	--	--	3,553	1 / 1	8.05	--	8.05	NSV	-- / --	NSV	NSV	NSV	2,110	1 / 1	13.5	**YES**
Pentachlorophenol	850 - 850	0 / 1	--	--	--	425	--	--	NSV	-- / --	NSV	NSV	NSV	484	-- / --	1.76	--	0.88	--	-- / --	--	NO
Phenanthrene	-- - --	1 / 1	2,200	2,200	CAYP-SD11-1012	2,200	--	--	204	1 / 1	10.8	--	10.8	816	1 / 1	2.70	--	2.70	30.2	1 / 1	72.8	**YES**
Pyrene	-- - --	1 / 1	4,500	4,500	CAYP-SD11-1012	4,500	--	--	195	1 / 1	23.1	--	23.1	NSV	-- / --	NSV	NSV	NSV	35.3	1 / 1	127	**YES**

TABLE L-66

Area-Specific Screening Statistics - Surface Sediment - York River Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																						
2-Butanone	-- - --	1 / 1	5.50	5.50	CAYP-SD11-1012	5.50	--	--	NSV	-- / --	NSV	NSV	NSV	259	0 / 1	0.02	--	0.02	--	-- / --	--	NO
Acetone	-- - --	1 / 1	26.0	26.0	CAYP-SD11-1012	26.0	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	2,500	0 / 1	0.01	NO
Carbon disulfide	7.10 - 7.10	0 / 1	--	--	--	3.55	--	--	NSV	-- / --	NSV	NSV	NSV	0.82	-- / --	8.70	--	4.35	--	-- / --	--	NO
Ethylbenzene	1.40 - 1.40	0 / 1	--	--	--	0.70	--	--	NSV	-- / --	NSV	NSV	NSV	3,456	-- / --	0.0004	--	0.0002	--	-- / --	--	NO
Methyl acetate	7.10 - 7.10	0 / 1	--	--	--	3.55	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	1.40 - 1.40	0 / 1	--	--	--	0.70	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	1.40 - 1.40	0 / 1	--	--	--	0.70	--	--	NSV	-- / --	NSV	NSV	NSV	509	-- / --	0.003	--	0.001	--	-- / --	--	NO
Toluene	1.40 - 1.40	0 / 1	--	--	--	0.70	--	--	NSV	-- / --	NSV	NSV	NSV	643	-- / --	0.002	--	0.001	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	1 / 1	7.40	7.40	CAYP-SD11-1012	7.40	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	1 / 1	9,600	9,600	CAYP-SD11-1012	9,600	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-67

Area-Specific Screening Statistics - Surface Sediment - Northern Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	6 / 6	1,580	6,900	CAYP-SS03-1012	3,838	2,194	5,643	25,500	0 / 6	0.27	0.22	0.15	--	-- / --	--	--	--	--	-- / --	--	NO
Antimony	1.55 - 2.37	1 / 6	0.56	0.56	CAYP-SS05-1012	0.86	0.21	1.03	3.00	0 / 6	0.19	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	6 / 6	1.46	7.69	CAYP-SS03-1012	4.30	2.38	6.26	9.79	0 / 6	0.79	0.64	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	-- - --	6 / 6	9.34	41.2	CAYP-SS03-1012	24.2	12.4	34.4	20.0	4 / 6	2.06	1.72	1.21	--	-- / --	--	--	--	75.0	0 / 6	0.55	NO
Beryllium	-- - --	6 / 6	0.19	0.75	CAYP-SS03-1012	0.38	0.21	0.55	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	1.39	0 / 6	0.54	NO
Cadmium	-- - --	6 / 6	0.15	1.03	CAYP-SS03-1012	0.52	0.37	0.82	0.99	1 / 6	1.04	0.83	0.52	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	6 / 6	3.77	17.8	CAYP-SS05-1012	9.94	5.02	14.1	43.4	0 / 6	0.41	0.32	0.23	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	6 / 6	3.34	34.1	CAYP-SS03-1012	15.4	12.7	25.9	31.6	1 / 6	1.08	0.82	0.49	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.22 - 0.23	0 / 6	--	--	--	0.11	0.0026	0.11	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	6 / 6	2,940	11,300	CAYP-SS04-1012	7,443	3,082	9,979	20,000	0 / 6	0.57	0.50	0.37	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	6 / 6	5.14	71.9	CAYP-SS05-1012	20.8	25.5	41.8	35.8	1 / 6	2.01	1.17	0.58	--	-- / --	--	--	--	41.6	1 / 6	1.73	**YES**
Mercury	0.0070 - 0.0074	4 / 6	0.0059	0.035	CAYP-SS05-1012	0.013	0.013	0.024	0.18	0 / 6	0.20	0.13	0.07	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	6 / 6	1.19	5.60	CAYP-SS03-1012	3.42	2.08	5.13	22.7	0 / 6	0.25	0.23	0.15	--	-- / --	--	--	--	--	-- / --	--	NO
Selenium	1.55 - 2.37	1 / 6	0.66	0.66	CAYP-SS05-1012	0.88	0.19	1.03	2.00	0 / 6	0.33	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.30 - 0.59	0 / 6	--	--	--	0.22	0.050	0.26	1.00	-- / --	0.59	0.26	0.22	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	1.20 - 2.37	0 / 6	--	--	--	0.87	0.20	1.03	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	6 / 6	4.62	14.9	CAYP-SS05-1012	9.48	3.79	12.6	57.0	0 / 6	0.26	0.22	0.17	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	6 / 6	51.6	272	CAYP-SS04-1012	173	104	259	121	3 / 6	2.25	2.14	1.43	--	-- / --	--	--	--	110	3 / 6	2.47	**YES**
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	24.0 - 51.0	0 / 6	--	--	--	16.4	6.48	21.7	59.8	-- / --	0.85	0.36	0.27	599	-- / --	0.09	0.04	0.03	--	-- / --	--	NO
Aroclor-1260	24.0 - 51.0	1 / 6	26.0	26.0	CAYP-SS05-1012	18.8	7.06	24.6	59.8	0 / 6	0.43	0.41	0.31	599	0 / 6	0.04	0.04	0.03	--	-- / --	--	NO
Pesticides (UG/KG)																						
4,4'-DDD	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	4.88	-- / --	5.33	2.25	1.69	81.4	-- / --	0.32	0.13	0.10	--	-- / --	--	NO
4,4'-DDE	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	3.16	-- / --	8.23	3.47	2.61	252	-- / --	0.10	0.04	0.03	--	-- / --	--	NO
4,4'-DDT	12.0 - 26.0	1 / 6	20.0	20.0	CAYP-SS05-1012	10.6	5.57	15.2	4.16	1 / 6	4.81	3.65	2.54	252	0 / 6	0.08	0.06	0.04	1.45	1 / 6	13.8	**YES**
alpha-Chlordane	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	3.24	-- / --	8.02	3.39	2.55	2,072	-- / --	0.013	0.005	0.004	--	-- / --	--	NO
Dieldrin	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	1.90	-- / --	13.7	5.78	4.34	38.5	-- / --	0.68	0.29	0.21	--	-- / --	--	NO
Endosulfan I	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	NSV	-- / --	NSV	NSV	NSV	2.15	-- / --	12.1	5.11	3.84	--	-- / --	--	NO
Endosulfan II	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	NSV	-- / --	NSV	NSV	NSV	10.4	-- / --	2.51	1.06	0.80	--	-- / --	--	NO
Endosulfan sulfate	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	NSV	-- / --	NSV	NSV	NSV	4.00	-- / --	6.51	2.75	2.06	--	-- / --	--	NO
Endrin	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	2.22	-- / --	11.7	4.94	3.72	14.8	-- / --	1.76	0.74	0.56	--	-- / --	--	NO
Endrin aldehyde	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	2.22	-- / --	11.7	4.94	3.72	14.8	-- / --	1.76	0.74	0.56	--	-- / --	--	NO
gamma-Chlordane	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	3.24	-- / --	8.02	3.39	2.55	2,072	-- / --	0.013	0.005	0.004	--	-- / --	--	NO
Heptachlor	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	NSV	-- / --	NSV	NSV	NSV	50.3	-- / --	0.52	0.22	0.16	--	-- / --	--	NO
Heptachlor epoxide	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	2.47	-- / --	10.5	4.44	3.34	50.3	-- / --	0.52	0.22	0.16	--	-- / --	--	NO
Methoxychlor	12.0 - 26.0	0 / 6	--	--	--	8.25	3.31	11.0	NSV	-- / --	NSV	NSV	NSV	14.1	-- / --	1.85	0.78	0.59	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	30.0 - 33.0	1 / 6	36.0	36.0	CAYP-SS05-1012	19.0	8.34	25.9	290	0 / 6	0.12	0.09	0.07	459	0 / 6	0.08	0.06	0.04	--	-- / --	--	NO
Acenaphthylene	30.0 - 33.0	1 / 6	70.0	70.0	CAYP-SS05-1012	24.7	22.2	42.9	160	0 / 6	0.44	0.27	0.15	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Anthracene	31.0 - 33.0	3 / 6	22.0	120	CAYP-SS05-1012	36.8	41.2	70.7	57.2	1 / 6	2.10	1.24	0.64	163	0 / 6	0.74	0.43	0.23	--	-- / --	--	**YES**
Benzo(a)anthracene	-- - --	6 / 6	25.0	450	CAYP-SS05-1012	132	159	262	108	2 / 6	4.17	2.43	1.22	81.4	3 / 6	5.53	3.22	1.62	18.2	6 / 6	24.7	**YES**
Benzo(a)pyrene	-- - --	6 / 6	17.0	450	CAYP-SS05-1012	125	162	257	150	1 / 6	3.00	1.72	0.83	104	1 / 6	4.34	2.49	1.20	--	-- / --	--	**YES**
Benzo(b)fluoranthene	-- - --	6 / 6	33.0	810	CAYP-SS05-1012	226	290	464	240	1 / 6	3.38	1.93	0.94	NSV	-- / --	NSV	NSV	NSV	30.3	6 / 6	26.7	**YES**
Benzo(g,h,i)perylene	31.0 - 31.0	5 / 6	28.0	190	CAYP-SS05-1012	59.4	65.0	113	170	1 / 6	1.12	0.66	0.35	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	31.0 - 31.0	5 / 6	30.0	260	CAYP-SS05-1012	72.4	92.6	149	240	1 / 6	1.08	0.62	0.30	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
bis(2-Ethylhexyl)phthalate	130 - 250	2 / 6	390	3,500	CAYP-SS05-1012	720	1,367	1,844	750	1 / 6	4.67	2.46	0.96	658,600	0 / 6	0.005	0.003	0.001	--	-- / --	--	**YES**
Butylbenzylphthalate	130 - 250	1 / 6	7,400	7,400	CAYP-SD15-1012	1,325	2,976	3,773	NSV	-- / --	NSV	NSV	NSV	8,140	0 / 6	0.91	0.46	0.16	--	-- / --	--	NO
Chrysene	-- - --	6 / 6	17.0	580	CAYP-SS05-1012	160	209	332	166	1 / 6	3.49	2.00	0.96	NSV	-- / --	NSV	NSV	NSV	21.7	5 / 6	26.7	**YES**
Dibenz(a,h)anthracene	30.0 - 33.0	1 / 6	54.0	54.0	CAYP-SS05-1012	22.0	15.7	34.9	33.0	1 / 6	1.64	1.06	0.67	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Di-n-octylphthalate	130 - 260	0 / 6	--	--	--	113	24.0	133	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Fluoranthene	-- - --	6 / 6	36.0	1,100	CAYP-SS05-1012	309	395	634	423	1 / 6	2.60	1.50	0.73	2,146	0 / 6	0.51	0.30	0.14	26.0	6 / 6	42.3	**YES**
Fluorene	30.0 - 33.0	1 / 6	67.0	67.0	CAYP-SS05-1012	24.2	21.0	41.4	77.4	0 / 6	0.87	0.54	0.31	400	0 / 6	0.17	0.10	0.06	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	31.0 - 31.0	5 / 6	26.0	190	CAYP-SS05-1012	57.3	65.8	111	200	0 / 6	0.95	0.56	0.29	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Naphthalene	30.0 - 33.0	1 / 6	28.0	28.0	CAYP-SS05-1012	17.7	5.09	21.9	176	0 / 6	0.16	0.12	0.10	355	0 / 6	0.08	0.06	0.05	--	-- / --	--	NO
PAH (HMW)	-- - --	6 / 6	185	3,874	CAYP-SS05-1012	1,100	1,377	2,233	2,900	1 / 6	1.34	0.77	0.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	-- - --	6 / 6	271	2,256	CAYP-SS05-1012	760	748	1,375	786	1 / 6	2.87	1.75	0.97	NSV	-- / --	NSV	NSV	NSV	1,670	1 / 6	1.35	**YES**
PAH (total)	-- - --	6 / 6	456	6,130	CAYP-SS05-1012	1,860	2,124	3,608	3,553	1 / 6	1.73	1.02	0.52	NSV	-- / --	NSV	NSV	NSV	2,110	1 / 6	2.91	**YES**
Pentachlorophenol	380 - 770	0 / 6	--	--	--	337	72.6	396	NSV	-- / --	NSV	NSV	NSV	373	-- / --	2.06	1.06	0.90	--	-- / --	--	NO
Phenanthrene	-- - --	6 / 6	22.0	700	CAYP-SS05-1012	199	252	406	204	1 / 6	3.43	1.99	0.98	629	1 / 6	1.11	0.65	0.32	30.2	5 / 6	23.2	**YES**
Pyrene	-- - --	6 / 6	31.0	890	CAYP-SS05-1012	248	320	511	195	2 / 6	4.56	2.62	1.27	NSV	-- / --	NSV	NSV	NSV	35.3	5 / 6	25.2	**YES**

TABLE L-67

Area-Specific Screening Statistics - Surface Sediment - Northern Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																						
2-Butanone	2.90 - 3.10	2 / 6	3.50	6.40	CAYP-SD14-1012	2.65	2.00	4.30	NSV	-- / --	NSV	NSV	NSV	200	0 / 6	0.03	0.02	0.01	--	-- / --	--	NO
Acetone	15.0 - 15.0	4 / 6	5.40	45.0	CAYP-SS03-1012	19.5	18.7	34.9	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	2,500	0 / 6	0.02	NO
Carbon disulfide	4.70 - 7.60	0 / 6	--	--	--	3.03	0.46	3.41	NSV	-- / --	NSV	NSV	NSV	0.63	-- / --	12.1	5.42	4.81	--	-- / --	--	NO
Ethylbenzene	0.90 - 1.50	0 / 6	--	--	--	0.60	0.095	0.68	NSV	-- / --	NSV	NSV	NSV	2,664	-- / --	0.0006	0.0003	0.0002	--	-- / --	--	NO
Methyl acetate	4.70 - 7.60	0 / 6	--	--	--	3.03	0.46	3.41	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	0.90 - 1.50	0 / 6	--	--	--	0.60	0.095	0.68	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	0.90 - 1.50	0 / 6	--	--	--	0.60	0.095	0.68	NSV	-- / --	NSV	NSV	NSV	392	-- / --	0.004	0.002	0.002	--	-- / --	--	NO
Toluene	1.20 - 1.50	1 / 6	0.40	0.40	CAYP-SD14-1012	0.59	0.11	0.68	NSV	-- / --	NSV	NSV	NSV	496	0 / 6	0.001	--	--	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	6 / 6	6.30	6.90	CAYP-SD15-1012	6.63	0.25	6.84	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	6 / 6	2,700	17,000	CAYP-SS03-1012	7,433	5,662	12,091	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-68

Initial Screening Statistics - Site 4/Youth Pond Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	-- - --	30 / 30	1,140	28,700	CAS04-SD07-1209B	25,500	2 / 30	1.13	**YES**
Antimony	0.20 - 7.88	7 / 30	0.10	1.57	CAYP-SSD13-1012	3.00	0 / 30	0.52	NO
Arsenic	-- - --	30 / 30	0.98	126	CAYP-SSD05-1112	9.79	11 / 30	12.9	**YES**
Barium	6.40 - 9.90	28 / 30	9.60	132	CAS04-SD04-1209B	20.0	19 / 30	6.60	**YES**
Beryllium	0.49 - 0.49	29 / 30	0.14	1.80	CAS04-SD07-1209B	NSV	-- / --	NSV	**YES**
Cadmium	0.12 - 0.12	29 / 30	0.050	7.20	CAS004-4-SED01-01-1199	0.99	5 / 30	7.27	**YES**
Calcium [3]	-- - --	30 / 30	233	22,200	CAYP-SSD13-1012	NSV	-- / --	NSV	NO
Chromium	-- - --	30 / 30	3.14	71.8	CAS04-SD07-1209B	43.4	2 / 30	1.65	**YES**
Cobalt	1.20 - 1.50	27 / 30	0.68	6.80	CAS04-SD07-1209B	50.0	0 / 30	0.14	NO
Copper	3.80 - 7.30	27 / 30	2.25	63.9	CAS04-SD03-1209B	31.6	1 / 30	2.02	**YES**
Cyanide	0.020 - 1.10	1 / 30	0.25	0.25	CAYP-SSD09-1012	NSV	-- / --	NSV	**YES**
Iron	-- - --	30 / 30	2,060	36,300	CAYP-SSD09-1012	20,000	8 / 30	1.82	**YES**
Lead	-- - --	30 / 30	3.40	235	CAS04-SD03-1209B	35.8	4 / 30	6.56	**YES**
Magnesium [3]	-- - --	30 / 30	178	4,050	CAS04-SD07-1209B	NSV	-- / --	NSV	NO
Manganese	-- - --	30 / 30	9.34	221	CAYP-SSD09-1012	460	0 / 30	0.48	NO
Mercury	0.0065 - 0.040	23 / 30	0.0052	0.44	CAYP-SSD05-1112	0.18	2 / 30	2.47	**YES**
Nickel	-- - --	30 / 30	0.87	22.9	CAS04-SD03-1209B	22.7	1 / 30	1.01	**YES**
Potassium [3]	272 - 272	29 / 30	172	4,710	CAS04-SD07-1209B	NSV	-- / --	NSV	NO
Selenium	0.25 - 7.88	7 / 30	0.39	1.67	CAYP-SSD05-1112	2.00	0 / 30	0.84	NO
Silver	0.080 - 3.40	7 / 30	0.070	3.10	CAS04-SD03-1209B	1.00	1 / 30	3.10	**YES**
Sodium [3]	26.3 - 162	14 / 30	14.5	210	CAS04-SD08-1209B	NSV	-- / --	NSV	NO
Thallium	0.47 - 7.88	3 / 30	0.39	1.16	CAYP-SSD05-1112	NSV	-- / --	NSV	**YES**
Vanadium	-- - --	30 / 30	3.51	82.0	CAS04-SD07-1209B	57.0	2 / 30	1.44	**YES**
Zinc	30.2 - 87.6	27 / 30	11.1	325	CAS04-SD03-1209B	121	4 / 30	2.69	**YES**
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	22.0 - 210	0 / 30	--	--	--	59.8	-- / --	3.51	**YES**
Aroclor-1221	51.0 - 270	0 / 30	--	--	--	59.8	-- / --	4.52	**YES**
Aroclor-1232	34.0 - 210	0 / 30	--	--	--	59.8	-- / --	3.51	**YES**
Aroclor-1242	22.0 - 210	0 / 30	--	--	--	59.8	-- / --	3.51	**YES**
Aroclor-1248	23.0 - 210	1 / 30	33.0	33.0	CAS004-4-SD02-01-1199	59.8	0 / 30	0.55	NO
Aroclor-1254	20.0 - 210	2 / 30	63.0	8,900	CAS04-SD03-1209B	59.8	2 / 30	149	**YES**
Aroclor-1260	22.0 - 210	13 / 30	7.90	580	CAA03-SD02-1209B	59.8	7 / 30	9.70	**YES**
Pesticides (UG/KG)									
4,4'-DDD	1.30 - 51.0	8 / 30	4.70	260	CAS04-SD03-1209B	4.88	7 / 30	53.3	**YES**
4,4'-DDE	0.97 - 51.0	8 / 30	2.00	270	CAS04-SD03-1209B	3.16	7 / 30	85.4	**YES**
4,4'-DDT	0.89 - 51.0	7 / 30	1.30	740	CAS04-SD03-1209B	4.16	6 / 30	178	**YES**
Aldrin	2.00 - 51.0	0 / 30	--	--	--	2.00	-- / --	25.5	**YES**
alpha-BHC	2.00 - 51.0	0 / 30	--	--	--	6.00	-- / --	8.50	**YES**
alpha-Chlordane	2.00 - 51.0	2 / 30	2.60	6.00	CAS04-SD03-1209B	3.24	1 / 30	1.85	**YES**
beta-BHC	2.00 - 51.0	0 / 30	--	--	--	5.00	-- / --	10.2	**YES**

TABLE L-68

Initial Screening Statistics - Site 4/Youth Pond Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
delta-BHC	2.00 - 51.0	0 / 30	--	--	--	3.00	-- / --	17.0	**YES**
Dieldrin	4.00 - 51.0	3 / 30	3.30	600	CAS04-SD03-1209B	1.90	3 / 30	316	**YES**
Endosulfan I	2.00 - 51.0	3 / 30	0.63	23.0	CAS04-SD03-1209B	NSV	-- / --	NSV	**YES**
Endosulfan II	4.00 - 51.0	4 / 30	0.86	360	CAS04-SD03-1209B	NSV	-- / --	NSV	**YES**
Endosulfan sulfate	4.10 - 51.0	2 / 30	2.00	3.20	CAS04-SD04-1209B	NSV	-- / --	NSV	**YES**
Endrin	4.00 - 51.0	3 / 30	39.0	520	CAS04-SD03-1209B	2.22	3 / 30	234	**YES**
Endrin aldehyde	4.00 - 51.0	2 / 30	3.60	140	CAS04-SD03-1209B	2.22	2 / 30	63.1	**YES**
Endrin ketone	4.00 - 51.0	1 / 30	140	140	CAS04-SD03-1209B	2.22	1 / 30	63.1	**YES**
gamma-BHC (Lindane)	2.00 - 51.0	0 / 30	--	--	--	2.37	-- / --	21.5	**YES**
gamma-Chlordane	2.10 - 51.0	4 / 30	0.75	340	CAS04-SD03-1209B	3.24	1 / 30	105	**YES**
Heptachlor	2.00 - 51.0	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Heptachlor epoxide	2.00 - 51.0	2 / 30	0.71	230	CAS04-SD03-1209B	2.47	1 / 30	93.1	**YES**
Methoxychlor	13.0 - 51.0	1 / 30	230	230	CAS04-SD03-1209B	NSV	-- / --	NSV	**YES**
Toxaphene	40.0 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
1,2,4,5-Tetrachlorobenzene	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
2,2'-Oxybis(1-chloropropane)	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
2,3,4,6-Tetrachlorophenol	500 - 2,000	0 / 13	--	--	--	NSV	-- / --	NSV	NO
2,4,5-Trichlorophenol	250 - 1,500	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trichlorophenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,4-Dichlorophenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,4-Dimethylphenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,4-Dinitrophenol	750 - 3,100	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,4-Dinitrotoluene	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2,6-Dinitrotoluene	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2-Chloronaphthalene	23.0 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2-Chlorophenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2-Methylnaphthalene	23.0 - 600	0 / 30	--	--	--	70.0	-- / --	8.57	**YES**
2-Methylphenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2-Nitroaniline	250 - 1,500	0 / 30	--	--	--	NSV	-- / --	NSV	NO
2-Nitrophenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
3- and 4-Methylphenol	500 - 2,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
3,3'-Dichlorobenzidine	250 - 1,000	0 / 29	--	--	--	NSV	-- / --	NSV	NO
3-Nitroaniline	250 - 1,500	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4,6-Dinitro-2-methylphenol	750 - 3,100	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Bromophenyl-phenylether	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Chloro-3-methylphenol	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Chloroaniline	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Chlorophenyl-phenylether	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Methylphenol	410 - 600	0 / 4	--	--	--	NSV	-- / --	NSV	NO

TABLE L-68

Initial Screening Statistics - Site 4/Youth Pond Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
4-Nitroaniline	250 - 1,500	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Nitrophenol	250 - 1,500	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Acenaphthene	23.0 - 600	4 / 30	2.60	190	CAYP-SSD11-1012	290	0 / 30	0.66	NO
Acenaphthylene	23.0 - 600	4 / 30	8.90	94.0	CAYP-SSD11-1012	160	0 / 30	0.59	NO
Acetophenone	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Anthracene	24.0 - 600	8 / 30	2.20	450	CAYP-SSD11-1012	57.2	1 / 30	7.87	**YES**
Atrazine	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Benzaldehyde	250 - 1,000	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Benzo(a)anthracene	12.0 - 410	15 / 30	29.0	1,300	CAYP-SSD11-1012	108	8 / 30	12.0	**YES**
Benzo(a)pyrene	12.0 - 410	18 / 30	6.00	1,400	CAYP-SSD11-1012	150	3 / 30	9.33	**YES**
Benzo(b)fluoranthene	14.0 - 130	14 / 30	32.0	1,800	CAYP-SSD11-1012	240	3 / 30	7.50	**YES**
Benzo(g,h,i)perylene	9.80 - 600	12 / 30	8.60	710	CAYP-SSD11-1012	170	1 / 30	4.18	**YES**
Benzo(k)fluoranthene	9.90 - 410	13 / 30	4.20	490	CAYP-SSD11-1012	240	2 / 30	2.04	**YES**
bis(2-Chloroethoxy)methane	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroethyl)ether	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
bis(2-Chloroisopropyl)ether	410 - 600	0 / 4	--	--	--	NSV	-- / --	NSV	NO
bis(2-Ethylhexyl)phthalate	110 - 1,000	8 / 30	59.0	120	CAS004-4-SED01-01-1199	750	0 / 30	0.16	NO
Butylbenzylphthalate	250 - 1,000	1 / 30	140	140	CAS04-SD03-1209B	NSV	-- / --	NSV	**YES**
Caprolactam	500 - 2,000	0 / 13	--	--	--	NSV	-- / --	NSV	NO
Carbazole	2.40 - 1,000	4 / 30	6.50	9.60	CAS04-SD05-1209B	140	0 / 30	0.07	NO
Chrysene	24.0 - 130	19 / 30	3.30	1,300	CAYP-SSD11-1012	166	4 / 30	7.83	**YES**
Dibenz(a,h)anthracene	6.40 - 600	6 / 30	12.0	170	CAYP-SSD11-1012	33.0	4 / 30	5.15	**YES**
Dibenzofuran	250 - 1,000	0 / 30	--	--	--	5,100	-- / --	0.20	NO
Diethylphthalate	250 - 1,000	0 / 30	--	--	--	630	-- / --	1.59	**YES**
Dimethyl phthalate	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Di-n-butylphthalate	110 - 1,000	4 / 30	61.0	110	CAS04-SD03-1209B	110	1 / 30	1.00	**YES**
Di-n-octylphthalate	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Fluoranthene	26.0 - 130	23 / 30	4.70	2,600	CAYP-SSD11-1012	423	2 / 30	6.15	**YES**
Fluorene	8.30 - 600	2 / 30	130	180	CAA03-SD02-1209B	77.4	2 / 30	2.33	**YES**
Hexachlorobenzene	23.0 - 1,000	0 / 30	--	--	--	20.0	-- / --	50.0	**YES**
Hexachlorobutadiene	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Hexachlorocyclopentadiene	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Hexachloroethane	23.0 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Indeno(1,2,3-cd)pyrene	7.10 - 600	12 / 30	8.10	660	CAYP-SSD11-1012	200	2 / 30	3.30	**YES**
Isophorone	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Naphthalene	23.0 - 600	2 / 30	36.0	53.0	CAA03-SD02-1209B	176	0 / 30	0.30	NO
n-Nitroso-di-n-propylamine	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
n-Nitrosodiphenylamine	410 - 2,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Nitrobenzene	250 - 1,000	0 / 30	--	--	--	NSV	-- / --	NSV	NO
PAH (HMW)	117 - 585	24 / 30	75.5	10,230	CAYP-SSD11-1012	2,900	1 / 30	3.53	**YES**
PAH (LMW)	117 - 1,020	23 / 30	91.1	5,347	CAYP-SSD11-1012	786	7 / 30	6.80	**YES**

TABLE L-68

Initial Screening Statistics - Site 4/Youth Pond Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
PAH (total)	234 - 1,605	24 / 30	172	15,577	CAYP-SSD11-1012	3,553	3 / 30	4.38	**YES**
Pentachlorophenol	110 - 3,100	1 / 30	19.0	19.0	CAS04-SD08-1209B	NSV	-- / --	NSV	**YES**
Phenanthrene	26.0 - 410	20 / 30	2.40	1,700	CAYP-SSD11-1012	204	4 / 30	8.33	**YES**
Phenol	250 - 1,000	0 / 30	--	--	--	48.0	-- / --	20.8	**YES**
Pyrene	26.0 - 130	23 / 30	4.60	2,400	CAYP-SSD11-1012	195	6 / 30	12.3	**YES**
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,1,2,2-Tetrachloroethane	0.70 - 16.9	0 / 29	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.70 - 9.00	0 / 26	--	--	--	NSV	-- / --	NSV	NO
1,1,2-Trichloroethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,1-Dichloroethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,1-Dichloroethene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,2,3-Trichlorobenzene	0.70 - 7.10	0 / 13	--	--	--	NSV	-- / --	NSV	NO
1,2,4-Trichlorobenzene	0.70 - 600	0 / 29	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromo-3-chloropropane	0.70 - 7.10	0 / 25	--	--	--	NSV	-- / --	NSV	NO
1,2-Dibromoethane	0.70 - 7.10	0 / 26	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichlorobenzene	0.70 - 600	1 / 30	2.00	2.00	CAS04-SD04-1209B	NSV	-- / --	NSV	**YES**
1,2-Dichloroethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichloroethene (total)	13.9 - 16.9	0 / 4	--	--	--	NSV	-- / --	NSV	NO
1,2-Dichloropropane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
1,3-Dichlorobenzene	0.70 - 600	0 / 29	--	--	--	NSV	-- / --	NSV	NO
1,4-Dichlorobenzene	0.70 - 600	1 / 30	6.00	6.00	CAS04-SD04-1209B	NSV	-- / --	NSV	**YES**
2-Butanone	7.00 - 35.0	19 / 30	2.00	150	CAYP-SSD05-1112	NSV	-- / --	NSV	**YES**
2-Hexanone	1.80 - 37.0	0 / 30	--	--	--	NSV	-- / --	NSV	NO
4-Methyl-2-pentanone	1.80 - 37.0	1 / 30	2.00	2.00	CAS004-4-SD03-01-1199	NSV	-- / --	NSV	**YES**
Acetone	8.00 - 64.0	19 / 30	24.0	600	CAYP-SSD12-1012	NSV	-- / --	NSV	**YES**
Benzene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Bromochloromethane	0.70 - 7.10	0 / 13	--	--	--	NSV	-- / --	NSV	NO
Bromodichloromethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Bromoform	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Bromomethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Carbon disulfide	3.50 - 36.0	1 / 30	1.00	1.00	CAS04-SD06-1209B	NSV	-- / --	NSV	**YES**
Carbon tetrachloride	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Chlorobenzene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Chloroethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Chloroform	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Chloromethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
cis-1,2-Dichloroethene	0.70 - 9.00	0 / 26	--	--	--	NSV	-- / --	NSV	NO
cis-1,3-Dichloropropene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Cyclohexane	0.70 - 7.10	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Dibromochloromethane	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO

TABLE L-68

Initial Screening Statistics - Site 4/Youth Pond Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Dichlorodifluoromethane (Freon-12)	0.70 - 15.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Ethylbenzene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Isopropylbenzene	0.70 - 7.10	0 / 25	--	--	--	NSV	-- / --	NSV	NO
m- and p-Xylene	1.40 - 16.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Methyl acetate	3.50 - 36.0	1 / 26	4.00	4.00	CAA03-SD04-1209B	NSV	-- / --	NSV	**YES**
Methylcyclohexane	0.70 - 7.10	2 / 26	0.70	2.00	CAA03-SD02-1209B	NSV	-- / --	NSV	**YES**
Methylene chloride	3.50 - 37.0	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Methyl-tert-butyl ether (MTBE)	0.70 - 13.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
o-Xylene	0.70 - 7.10	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Styrene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Tetrachloroethene	0.70 - 16.9	12 / 30	2.00	42.0	CAA03-SD01-1209B	NSV	-- / --	NSV	**YES**
Toluene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
trans-1,2-Dichloroethene	0.70 - 10.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
trans-1,3-Dichloropropene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Trichloroethene	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Trichlorofluoromethane (Freon-11)	0.70 - 15.0	0 / 26	--	--	--	NSV	-- / --	NSV	NO
Vinyl chloride	0.70 - 16.9	0 / 30	--	--	--	NSV	-- / --	NSV	NO
Xylene, total	13.9 - 22.0	0 / 17	--	--	--	NSV	-- / --	NSV	NO
Explosives (UG/KG)									
1,3,5-Trinitrobenzene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
1,3-Dinitrobenzene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
2,4,6-Trinitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
2-Amino-4,6-dinitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
2-Nitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
3-Nitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
4-Amino-2,6-dinitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
4-Nitrotoluene	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
HMX	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
RDX	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
Tetryl	300 - 450	0 / 17	--	--	--	NSV	-- / --	NSV	NO
Other Parameters									
pH	-- - --	26 / 26	6.10	8.30	CAS04-SD08-1209B	--	-- -- --	--	--
Total organic carbon (MG/KG)	-- - --	26 / 26	2,400	140,000	CAYP-SSD12-1012	--	-- -- --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-69

Exceedances - Site 4/Youth Pond Subsurface Sediment

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Sediment SLC ESV	Background Value	CAA03-SD01	CAA03-SD02	CAA03-SD03	CAA03-SD04	CAS004-4SD01	CAS004-4SD02	CAS004-4SD03	CAS004-4SD04	CAS04-SD01		CAS04-SD02	CAS04-SD03	CAS04-SD04	CAS04-SD05	CAS04-SD06	CAS04-SD07		CAS04-SD08	CAS04-SD09	CAYP-SWSD01
			CAA03-SD01-1209B	CAA03-SD02-1209B	CAA03-SD03-1209B	CAA03-SD04-1209B	CAS004-4-SED01-01-1199	CAS004-4-SD02-01-1199	CAS004-4-SD03-01-1199	CAS004-4-SD04-01-1199	CAS04-SD01-1209B	CAS04-SD01P-1209B	CAS04-SD02-1209B	CAS04-SD03-1209B	CAS04-SD04-1209B	CAS04-SD05-1209B	CAS04-SD06-1209B	CAS04-SD07-1209B	CAS04-SD07P-1209B	CAS04-SD08-1209B	CAS04-SD09-1209B	CAYP-SSD01-1012
			Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Site 4 Streams	Youth Pond
			12/09/09	12/09/09	12/09/09	12/09/09	11/12/99	11/14/99	11/13/99	11/13/99	12/09/09	12/09/09	12/09/09	12/09/09	12/09/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	12/08/09	10/12/12
Inorganics (MG/KG)																						
Aluminum	25,500	19,400	10,300	6,100	20,600	13,500	5,120 L	2,780 L	1,500 L	3,370 L	25,700	14,000	4,810	16,700	7,840	11,300	5,830	28,700 J	9,020 J	3,170	6,900	1,140 K
Antimony	3.00	--	0.14 L	0.76 B	0.66 L	0.72 UL	1 J	0.48 U	0.43 U	0.55 U	0.56 L	0.83 UL	0.91 UL	1.2 L	0.1 L	1 UL	0.89 UL	0.81 B	0.66 B	0.44 B	0.2 B	2.26 U
Arsenic	9.79	51.1	7.7 K	14 L	9.1 K	7.5 K	11.2	1.9 J	0.98 J	9.5	14.6 K	7.9 K	2.3 K	7.4 K	2.2 K	4.2 L	2.3 L	9 L	3.4 L	2.7 L	13.2 L	0.975 J
Barium	20.0	98.1	32.2	38.5	28.3	46.6	39.2 J	9.9 B	6.4 B	19.2 J	24.1	17.6	12.5	63.2	132	29.8	19.6	68.4 J	21.8 J	9.6	19.6	9.99
Beryllium	NSV	0.96	0.52 J	0.34 J	1.00	0.45 J	0.49 B	0.27 J	0.21 J	0.31 J	0.87	0.51 J	0.22 J	0.76	0.5	0.57 J	0.35 J	1.8 J	0.6 J	0.21 J	0.4 J	0.144
Cadmium	0.99	0.18	0.33	1.3	0.14	0.05 J	7.2	0.15 J	0.85 J	0.09 J	0.14	0.12	0.11	3.1	0.07 J	0.25	0.07 J	1.4 J	0.34 J	0.21	0.19	0.136 J
Chromium	43.4	25.8	23.6 K	11.3 L	42.1 K	17.8 K	25	9.3	7.7	7	49 K	26.4 K	8.1 K	37.8 K	8.2 K	19.8 L	10.6 L	71.8 L	25.5 L	13.3 L	14.5 L	3.14
Cobalt	50.0	--	2 J	1.2 J	3.9 J	3 J	3.1 J	1.3 U	1.2 U	1.5 U	4.1 J	2.1 J	0.76 J	4.1 J	1.6 J	2.7 J	1.2 J	6.8 J	1.9 J	0.8 J	2.2 J	0.682 J
Copper	31.6	8.90	5	20.5 J	17.2	4.5	10.1	3.8 B	7.3 B	5.1 B	4.4	3.7	2.8	63.9	3.8	5.9 J	2.5 J	3 J	2.9 J	3.1 J	2.8 J	2.59
Cyanide	NSV	No value	0.84 U	0.98 U	0.77 U	0.91 U	0.04 UL	0.03 UL	0.02 UL	0.03 UL	0.84 U	0.77 U	0.98 U	0.84 U	0.84 U	1.1 U	1 U	0.84 U	0.84 U	0.84 U	0.91 U	0.23 U
Iron	20,000	43,800	14,000 J	7,220	34,000 J	16,500 J	9,040	7,840 L	4,540 L	4,950 L	32,900 J	17,800 J	5,200 J	23,200 J	5,260 J	12,300	5,740	28,200 J	8,850 J	4,260	7,550	2,060
Lead	35.8	17.2	27.9	16.4	14.3	18.6	59.8	4.2	5.4	10.9	11.2	6.8	9.2	235	136	13.2	4.6	14.3	4.8	3.4	7.2	4.21 J
Manganese	460	--	31.8 J	31.2	34.8 J	23.2 J	26.8	14.5	12.1	36	27.4 J	17.6 J	13.1 J	92.4 J	40.1 J	34.4	15.9	50.4	17.2	17	15.9	9.34
Mercury	0.18	0.09	0.03 J	0.06	0.02 J	0.02 J	0.04 U	0.02 UL	0.03 UL	0.03 UL	0.02 J	0.01 J	0.03 J	0.18	0.01 J	0.05	0.01 J	0.04 J	0.01 J	0.04 U	0.01 J	0.00649 U
Nickel	22.7	9.10	5.9	4.5	9.4 J	5.4	18.3	1.7 J	2 J	2.3 J	10.2	5.4	1.9 J	22.9	3.3 J	6.3	2.7 J	20.9	7.2	2.9	4.9	0.865 J
Selenium	2.00	--	0.39 B	0.85 U	1.1 B	0.25 B	1 U	0.65 U	0.59 U	0.75 U	0.59 B	0.38 B	0.35 B	0.98 U	0.85 U	0.4 J	1.1 U	2.2 U	1.1 U	0.39 J	0.91 U	2.26 U
Silver	1.00	No value	0.12 J	1.3 U	0.31 J	0.15 J	2.1 B	2.3 B	1.5 B	0.97 U	2.1 U	0.14 J	1.7 U	3.1	0.07 J	0.14 B	1.7 U	3.4 U	1.6 U	0.98 U	0.08 B	0.564 U
Thallium	NSV	No value	1.8 U	1.3 U	0.39 J	1.3 U	0.81 UL	0.52 UL	0.47 UL	0.6 UL	0.52 J	1.6 U	1.7 U	1.5 U	1.3 U	1.9 U	1.7 U	3.4 U	1.6 U	0.98 U	1.4 U	2.26 U
Vanadium	57.0	40.8	30.4 K	14.7	51.4 K	28 K	25.4	9.6 J	6.8 J	9.8 J	64.3 K	34.2 K	11.4 K	35.5 K	10.6 K	24.4	12.1	82	29	17.2	18.5	3.51
Zinc	121	52.8	29 K	83.5	51.6 K	18.7 K	87.6 B	30.2 B	44.4 B	307	27.7 K	17.1 K	13.5 K	325 K	21.2 K	40.9	11.1	54.1 J	17.4 J	14	24.6	38.4
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1248	59.8	--	26 UJ	29 U	24 UL	24 UJ	60 U	33 J	41 U	49 UL	24 UJ	22 UJ	27 UJ	120 UJ	23 UL	28 U	29 U	25 U	23 U	23 U	25 U	51 U
Aroclor-1254	59.8	--	23 UJ	26 U	21 UL	21 UJ	60 U	46 U	41 U	49 UL	21 UJ	20 UJ	24 UJ	8,900 J	20 UL	63	26 U	22 U	21 U	21 U	23 U	51 U
Aroclor-1260	59.8	--	72 J	580	16 L	22 UJ	60 U	210	170	18 JP	23 UJ	7.9 J	39 J	120 UJ	25 L	72	28 U	23 U	22 U	30	24 U	51 U
Pesticides (UG/KG)																						
4,4'-DDD	4.88	4.20	4.5 UJ	21 J	2 B	1.3 B	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.97 B	4.7 UJ	260 J	22 J	8.4 J	5 UJ	4.3 U	4.1 UJ	4.7 J	14	26 UL
4,4'-DDE	3.16	14.0	1 B	4.8 J	1.3 B	1.3 B	6.6	4.6 U	4.1 U	4.9 UL	4.2 UJ	0.73 B	0.97 B	270 J	4.4 J	3.3 J	5 UJ	4.3 U	4.1 UJ	2 J	5	26 UL
4,4'-DDT	4.16	No value	4.5 UJ	19 J	2.1 B	0.89 B	6 U	49 J	400 D	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	740 J	2.5 B	8.2 J	5 UJ	4.3 U	4.1 UJ	120 J	1.3 J	26 UL
alpha-Chlordane	3.24	No value	2.3 UJ	2.6 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	6 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL
Dieldrin	1.90	No value	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	600 J	3.4 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	3.3 J	26 UL
Endosulfan I	NSV	No value	2.3 UJ	2.5 UJ	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	23 J	2 UJ	2.7 J	2.6 UJ	2.2 U	2.1 UJ	2.1 U	0.63 J	26 UL
Endosulfan II	NSV	No value	4.5 UJ	2.3 J	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	360 J	0.96 J	2.2 J	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL
Endosulfan sulfate	NSV	No value	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	4.3 UJ	3.2 J	4.8 UJ	5 UJ	4.3 U	4.1 UJ	2 J	4.4 U	26 UL
Endrin	2.22	No value	39 J	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	43 J	520	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL
Endrin aldehyde	2.22	No value	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	140 J	4 UJ	3.6 J	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL
Endrin ketone	2.22	No value	4.5 UJ	4.8 UJ	4.1 UJ	4.1 UJ	6 U	4.6 U	4.1 U	4.9 UL	4.2 UJ	3.9 UJ	4.7 UJ	140 J	4 UJ	4.8 UJ	5 UJ	4.3 U	4.1 UJ	4 U	4.4 U	26 UL
gamma-Chlordane	3.24	No value	2.3 UJ	3 J	2.1 UJ	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	340 J	0.75 J	2.8 J	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL
Heptachlor epoxide	2.47	No value	2.3 UJ	2.5 UJ	0.71 J	2.1 UJ	3.1 U	2.4 U	2.1 U	2.5 UL	2.1 UJ	2 UJ	2.4 UJ	230 J	2 UJ	2.5 UJ	2.6 UJ	2.2 U	2.1 UJ	2.1 U	2.3 U	26 UL
Methoxychlor	NSV	No value	23 UJ	25 UJ	21 UJ	21 UJ	31 U	24 U	21 U	25 UL	21 UJ	20 UJ	24 UJ	230 J	20 UJ	25 UJ	26 UJ	22 U	21 UJ	21 U	23 U	26 UL
Semivolatile Organic Compounds (UG/KG)																						
Acenaphthene	290	--	27 U	90	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	2.6 J	23 U	3.5 J	30 U	25 U	26 U	24 U	27 U	32 U
Acenaphthylene	160	--	27 U	31 U	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	15 J	8.9 J	10 J	30 U	25 U	26 U	24 U	27 U	32 U
Anthracene	57.2	4.60	4 J	33	2.2 J	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.3 J	30	8.3 J	11 J	30 U	25 U	26 U	24 U	27 U	32 U
Benzo(a)anthracene	108	14.0	28 B	120	15 B	24 U	150 J	230 J	410 U	110 J	23 U	2.7 B	12 B	180	120 L	130	21 B	25 U	26 U	12 B	12 B	56
Benzo(a)pyrene	150	15.0	28	110	16 B	24 U	110 J	240 J	410 U	130 J	23 U	24 U	12 B	220	100 L	130	9.7 J	25 U	26 U	6.4 J	6 J	49
Benzo(b)fluoranthene	240	25.0	46 B	200	32 B	24 U	100 J	330 J	57 J	210 J	23 U	24 U	26 B	510	23 U	220	30 B	25 U	26 U	14 B	18 B	79
Benzo(g,h,i)perylene	170	12.0	9.8 B	29 J	23 UL	24 UL	600 U	100 J	410 U	60 J	23 UL	24 UL	28 UL	93 L	23 UL	56 L	30 UL	25 UL	26 UL	8.6 L	27 UL	30 J
Benzo(k)fluoranthene	240	16.0	18 B	52	12 B	24 U	86 J	280 J	410 U	130 J	23 U	24 U	9.9 B	140	23 U	46	5.6 J	25 U	26 U	4.2 J	27 U	31 J
bis(2-Ethylhexyl)phthalate	750	--	140 U	150 U	120 U	67 J	120 J	79 J	68 J	78 J	110 U	120 U	140 U	59 J	110 U	100 J	150 U	130 U	130 U	89 J	130 U	250 UJ
Butylbenzylphthalate	NSV	No value	450 U	510 U	390 U	400 U	600 U	470 U	410 U	490 U	380 U	390 U	460 U	140 J	380 U	500 U	500 U	420 U	420 U	400 U	440 U	250 U
Carbazole	140	--	4.8 B	12 B	2.7 B	24 U	600 U	470 U	410 U	490 U	23 U	24 U	2.4 B	7.6 B	23 U	9.6 J	7.5 J	25 U	26 U	7.3 J	6.5 J	250 U
Chrysene	166	No value	34	130	17 J	24 U	180 J	330 J	52 J	160 J	23 U	3.3 J	13 J	310	100 L	130	5.5 J	25 U	26 U	24 U	27 U	60
Dibenz(a,h)anthracene	33.0	8.60	6.4 B	45 J	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	84	23 U	48	12 J	25 U	26 U	14 J	27 U	32 U
Di-n-butylphthalate	110	No value	140 U	150 U	120 U	120 U	61 J	62 J	410 U	84 J	110 U	120 U	140 U	110 J	110 U	150 U	150 U	130 U	130 U	120 U	130 U	250 U
Fluoranthene	423	16.0	49	250	42	5 J	230 J	520	87 J	250 J	23 U	4.7 J	30	140	170 L	250	23 J	25 U	26 U	10 J	14 J	140 L
Fluorene	77.4	No value	27 U	180	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	8.3 B	30 U	25 U	26 U	24 U	27 U	32 U
Indeno(1,2,3-cd)pyrene	200	8.40	31 B	110	9.1 B	24 U	600 U	120 J	410 U	64 J	23 U	24 U	7.1 B	370	71	110	14 J	25 U	26 U	12 J	8.1 J	27 J
Naphthalene	176	--	27 U	53	23 U	24 U	600 U	470 U	410 U	490 U	23 U	24 U	28 U	25 U	23 U	30 U	30 U	25 U	26 U	24 U	27 U	32 U
PAH (HMW)	2,900	142	219	986	115	101	1,776	2,335	1,423	1,359	104 U	81.3	101	2,207	617	1,060	103	113 U	117 U	75.5	97.1	458
PAH (LMW)	786	601	168	863	131	94.7	2,430	2,405	1,727	2,105	104 U	91.1	130	276	256	424	136	113 U	117 U	99.2	118	471
PAH (total)	3,553	735	387	1,849	246	196	4,206	4,740	3,150	3,464	207 U	172	231	2,483	873	1,484	239	225 U	234 U	175	215	929
Pentachlorophenol	NSV	No value	140 UL	150 U	120 UL	120 UL	1,500 U	1,200 U	1,000 U	1,200 U	110 UL	120 UL	140 UL	120 UL	110 UL	150 UL	150 UL	130 UL	130 UL	19 J	130 UL	750 U
Phenanthrene	204	10.0	34	210	18 J	5.7 J	100 J	240 J	410 U	140 J	23 U	2.4 J	14 J	38	11 J	100	7.5 J	25 U	26 U	5.2 J	9.6 J	110
Pyrene	195	16.0	87	190	33	4.8 J	250 J	470	84 J	250 J	23 U	4.6 J	26 J	300	180 L	190	16 J	25 U	26 U	5.3 J	14 J	110
Volatile Organic Compounds (UG/KG)																						
1,2-Dichlorobenzene	NSV	No value	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	2 J	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U
1,4-Dichlorobenzene	NSV	No value	7 U	7 UJ	6 U	6 UJ	600 U	470 U	410 U	490 U	6 U	6 U	6 UJ	6 U	6 J	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U
2-Butanone	NSV	340	35 U	110 J	30 U	13 J	7 B	14.9 U	13.9 U	16.0 U	28 U	30 U	32 UJ	31 U	9 J	14 J	26 J	32 U	30 U	28 U	18 J	2 J
4-Methyl-2-pentanone	NSV	No value	35 U	37 UJ	30 U	32 UJ	16.9 U	14.9 U	2 J	16.0 U	28 U	30 U	32 UJ	31 U	33 UJ	36 UJ	36 UJ	32 U	30 U	28 U	34 U	2.4 U
Acetone	NSV	1,400	12 B	420 J	60 B	88 J	26 B	27 B	24 B	22 B	190 J	27 B	21 B	11 B	64 B	87 J	130 J	22 B	19 B	8 B	110 K	24
Carbon disulfide	NSV	11.0	7 U	7 UJ	6 U	6 UJ	16.9 U	14.9 U	13.9 U	16.0 U	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	1 J	6 U	6 U	6 U	7 U	4.9 U
Methyl acetate	NSV	No value	12 U	13 UJ	11 U	4 J	NA	NA	NA	NA	10 U	11 U	12 UJ	11 U	12 UJ	13 UJ	13 UJ	12 U	11 U	10 U	12 U	4.9 U
Methylcyclohexane	NSV	No value	7 U	2 J	6 U	6 UJ	NA	NA	NA	NA	6 U	6 U	6 UJ	6 U	6 UJ	7 UJ	7 UJ	6 U	6 U	6 U	7 U	1 U
Tetrachloroethene	NSV	No value	42	23 J	9	8 J	16.9 U	14.9 U	13.9 U	16.0 U	14	17	13 J	9	16 J	16 J	17 J	6 U	2 J	2 J	7 U	1 U
Other Parameters																						
pH	--	--	7.1	6.5	6.1	6.9	NA	NA	NA	NA	7.5	7.6	7.8	8.2	7.0	7.8	7.9	8.0	NA	8.3	7.5	6.5
Total organic carbon (MG/KG)	--	--	40,000	71,000	6,500	7,300	NA	NA	NA	NA	9,500	17,000	28,000	19,000	22,000	14,000	34,000	2,400	NA	2,500	16,000	3,200

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-69

Exceedances - Site 4/Youth Pond Subsurface Sediment

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virgi

Chemical	Sediment SLC ESV	Background Value	CAYP-SWSD02		CAYP-SWSD03	CAYP-SWSD04	CAYP-SWSD05	CAYP-SWSD06	CAYP-SD07	CAYP-SD08	CAYP-SD09	CAYP-SD10	CAYP-SD12	CAYP-SD13	CAYP-SD11
			CAYP-SSD02-1012	CAYP-SSD02P-1012	CAYP-SSD03-1012	CAYP-SSD04-1112	CAYP-SSD05-1112	CAYP-SSD06-1112	CAYP-SSD07-1012	CAYP-SSD08-1012	CAYP-SSD09-1012	CAYP-SSD10-1012	CAYP-SSD12-1012	CAYP-SSD13-1012	CAYP-SSD11-1012
			Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	York River Ditch
			10/22/12	10/22/12	10/11/12	11/09/12	11/09/12	11/09/12	10/22/12	10/12/12	10/22/12	10/22/12	10/22/12	10/12/12	10/11/12
Inorganics (MG/KG)															
Aluminum	25,500	19,400	**14,300**	**15,400**	**3,690**	**3,490**	**11,100**	**2,250**	**9,750**	**6,840**	**16,700**	**20,200**	**13,800**	**13,000**	**3,460**
Antimony	3.00	--	5.14 U	4.5 U	3.22 U	1.74 U	3.03 U	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	7.88 U	**1.57 J**	2.3 U
Arsenic	9.79	51.1	**9.37 J**	**9.98**	**5.01 J**	**15.5**	**126**	**2.31 J**	**5.06 J**	**4.19 J**	**12**	**14.7**	**12.1 J**	**108**	**4.96**
Barium	20.0	98.1	**81.8**	**83.8**	**23.2**	**21.3**	**69.3**	**9.86**	**61.2**	**15.1**	**116**	**109**	**79.3**	**76.6**	**16**
Beryllium	NSV	0.96	**0.943**	**0.972**	**0.368**	**0.276**	**0.762**	**0.213**	**0.799**	**0.226**	**1.08**	**1.35**	**1.12**	**0.905**	**0.261**
Cadmium	0.99	0.18	**0.592**	**0.713**	**0.363**	**0.199**	**1.04**	**0.354**	**0.395**	0.122 U	**0.283 J**	**0.683**	**0.59 J**	**0.69**	**0.119 J**
Chromium	43.4	25.8	**21.2**	**22.8**	**8.73**	**6.91**	**20.3**	**7.15**	**15.6**	**12.1**	**24.5**	**35**	**24.3**	**22.7**	**9.39**
Cobalt	50.0	--	**3.22**	**3.83**	**1.63**	**0.942**	**2.82**	**0.955**	**2.03**	**0.969 J**	**4.04**	**4.68**	**3.64 J**	**3.79**	**2.51**
Copper	31.6	8.90	**10.6**	**10.8**	**12.6**	**3.43**	**10.5**	**7.67**	**9.18**	**2.25**	**7.7**	**12.6**	**12.4**	**9.31**	**8.49**
Cyanide	NSV	No value	0.56 U	0.59 U	0.3 U	0.31 U	0.46 U	0.24 U	0.53 U	0.26 U	**0.24 J**	0.57 U	0.94 U	0.46 U	0.24 U
Iron	20,000	43,800	**16,000**	**16,600**	**6,240**	**6,680**	**23,500**	**6,070**	**10,900**	**9,120**	**36,300 J**	**29,200 J**	**18,100**	**26,500 J**	**9,000**
Lead	35.8	17.2	**26.5**	**27.2**	**15**	**7.44**	**34.9**	**4.59**	**19.3**	**7.03**	**25.4**	**32.3**	**32.5**	**54.4**	**13.8**
Manganese	460	--	**67.3**	**68.8**	**30.6**	**28.3**	**92.8**	**15.5**	**29.8**	**14.7**	**221**	**138**	**85.2**	**158**	**69.4**
Mercury	0.18	0.09	**0.0402**	**0.0483**	**0.112**	**0.0156**	**0.444**	0.00648 U	**0.0492**	**0.00516 J**	**0.0734**	**0.0752**	**0.064**	**0.0899**	**0.117**
Nickel	22.7	9.10	**5.97**	**6.45**	**3.39**	**1.74**	**6.04**	**2.12**	**4.51**	**1.9**	**7.18**	**9.59**	**7.68**	**6.83**	**5.47**
Selenium	2.00	--	5.14 U	4.5 U	3.22 U	**0.733 J**	**1.67 J**	**0.518 J**	3.46 U	2.45 U	4.35 U	5.17 U	7.88 U	**1.54 J**	**0.771 J**
Silver	1.00	No value	1.28 U	1.12 U	0.804 U	0.435 U	**0.181 J**	0.372 U	0.865 U	0.612 U	1.09 U	1.29 U	1.97 U	0.805 U	0.575 U
Thallium	NSV	No value	5.14 U	4.5 U	3.22 U	1.74 U	**1.16 J**	1.49 U	3.46 U	2.45 U	4.35 U	5.17 U	7.88 U	3.22 U	2.3 U
Vanadium	57.0	40.8	**33.5**	**35.6**	**11.2**	**9.08**	**30.4**	**8.24**	**24.7**	**21**	**39.6**	**52**	**35.3**	**32.9**	**14.5**
Zinc	121	52.8	**89**	**90.4**	**57.3**	**30**	**187**	**36.1**	**77.6**	**11.2**	**63.6**	**93.5**	**84.2**	**191**	**33.3**
Polychlorinated Biphenyls (UG/KG)															
Aroclor-1248	59.8	--	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	210 UL	100 U	51 U
Aroclor-1254	59.8	--	120 UL	130 UL	67 U	69 U	100 UL	53 U	120 UL	58 U	91 UL	120 UL	210 UL	100 U	51 U
Aroclor-1260	59.8	--	120 UL	130 UL	**94 J**	69 U	100 UL	**60 J**	120 UL	58 U	91 UL	120 UL	210 UL	100 U	51 U
Pesticides (UG/KG)															
4,4'-DDD	4.88	4.20	30 UL	33 UL	33 UL	17 UL	**20 J**	13 UL	29 UL	**8.1 L**	23 UL	31 UL	51 UL	51 UL	26 UL
4,4'-DDE	3.16	14.0	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	**14 L**	23 UL	31 UL	51 UL	51 UL	26 UL
4,4'-DDT	4.16	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
alpha-Chlordane	3.24	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Dieldrin	1.90	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endosulfan I	NSV	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endosulfan II	NSV	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endosulfan sulfate	NSV	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endrin	2.22	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endrin aldehyde	2.22	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Endrin ketone	2.22	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
gamma-Chlordane	3.24	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Heptachlor epoxide	2.47	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Methoxychlor	NSV	No value	30 UL	33 UL	33 UL	17 UL	26 UL	13 UL	29 UL	14 UL	23 UL	31 UL	51 UL	51 UL	26 UL
Semivolatile Organic Compounds (UG/KG)															
Acenaphthene	290	--	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**190**
Acenaphthylene	160	--	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**94**
Anthracene	57.2	4.60	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**490**
Benzo(a)anthracene	108	14.0	**32 J**	83 U	**51 J**	44 UL	**47 L**	**29 J**	**82 L**	36 U	59 U	79 U	130 UL	**75 J**	**1,300**
Benzo(a)pyrene	150	15.0	78 U	83 U	**42 J**	44 UL	**33 L**	**19 J**	**67 L**	36 U	59 U	79 U	130 UL	**68 J**	**1,400**
Benzo(b)fluoranthene	240	25.0	78 U	83 U	**74**	44 UL	**54 L**	**32 J**	**120 L**	36 U	59 U	79 U	130 UL	**180**	**1,800**
Benzo(g,h,i)perylene	170	12.0	78 U	83 U	**30 J**	44 UL	64 UL	**16 J**	**53 L**	36 U	59 U	79 U	130 UL	**38 J**	**710**
Benzo(k)fluoranthene	240	16.0	78 U	83 U	**29 J**	44 UL	64 UL	33 U	**48 L**	36 U	59 U	79 U	130 UL	**53 J**	**490**
bis(2-Ethylhexyl)phthalate	750	--	630 U	650 U	330 UJ	340 UL	510 UL	270 UL	590 U	280 UJ	460 U	630 U	1,000 U	500 UJ	260 UJ
Butylbenzylphthalate	NSV	No value	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	1,000 U	500 U	260 U
Carbazole	140	--	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	1,000 U	500 U	260 U
Chrysene	166	No value	78 U	83 U	**53 J**	44 UL	**32 L**	33 U	**82 L**	36 U	59 U	79 U	130 UL	**160**	**1,300**
Dibenz(a,h)anthracene	33.0	8.60	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**170**
Di-n-butylphthalate	110	No value	630 U	650 U	330 UL	340 UL	510 UL	270 UL	590 U	280 U	460 U	630 U	1,000 U	500 U	260 U
Fluoranthene	423	16.0	78 U	83 U	**110**	44 UL	**62 L**	**35 J**	**160 L**	36 U	59 U	79 U	130 UL	**250**	**2,600**
Fluorene	77.4	No value	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**130**
Indeno(1,2,3-cd)pyrene	200	8.40	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	**39 J**	**660**
Naphthalene	176	--	78 U	83 U	42 U	44 UL	64 UL	33 U	73 UL	36 U	59 U	79 U	130 UL	64 U	**36 J**
PAH (HMW)	2,900	142	**344**	374 U	**408**	198 U	**349**	**194**	**665**	162 U	266 U	356 U	585 U	**905**	**10,230**
PAH (LMW)	786	601	627 U	657 U	**471**	346 U	**541**	**286**	**744**	284 U	466 U	631 U	1,020 U	**982**	**5,347**
PAH (total)	3,553	735	**971**	1,031 U	**879**	544 U	**890**	**480**	**1,409**	446 U	732 U	987 U	1,605 U	**1,867**	**15,577**
Pentachlorophenol	NSV	No value	1,900 U	1,900 U	980 UL	1,000 UL	1,500 UL	800 UL	1,800 U	850 U	1,400 U	1,900 U	3,100 U	1,500 U	780 U
Phenanthrene	204	10.0	78 U	83 U	**70**	44 UL	64 UL	33 U	**70 L**	36 U	59 U	79 U	130 UL	**270**	**1,700**
Pyrene	195	16.0	78 U	83 U	**87**	44 UL	**55 L**	**32 J**	**140 L**	36 U	59 U	79 U	130 UL	**260**	**2,400**
Volatile Organic Compounds (UG/KG)															
1,2-Dichlorobenzene	NSV	No value	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	7.1 U	2.6 U	1 U
1,4-Dichlorobenzene	NSV	No value	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	7.1 U	2.6 U	1 U
2-Butanone	NSV	340	**99**	**140**	**14**	**26**	**150**	**14**	**120**	**19**	**110**	**150**	**140**	**85**	**13**
4-Methyl-2-pentanone	NSV	No value	9.1 U	11 U	3.2 U	3.9 U	7.8 U	1.8 U	9.6 U	3 U	5.9 U	9.8 U	18 U	6.4 U	2.5 U
Acetone	NSV	1,400	**380**	**530**	**49**	**83**	**480**	**52**	**530**	**89**	**420**	**560**	**600**	**320**	**57**
Carbon disulfide	NSV	11.0	18 U	23 U	6.3 U	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	36 U	13 U	5 U
Methyl acetate	NSV	No value	18 U	23 U	6.3 U	7.8 U	16 U	3.5 U	19 U	5.9 U	12 U	20 U	36 U	13 U	5 U
Methylcyclohexane	NSV	No value	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	**0.7 J**	2.3 U	3.9 U	7.1 U	2.6 U	1 U
Tetrachloroethene	NSV	No value	3.7 U	4.5 U	1.3 U	1.6 U	3.1 U	0.7 U	3.8 U	1.2 U	2.3 U	3.9 U	7.1 U	2.6 U	1 U
Other Parameters															
pH	--	--	**6.3**	NA	**6.6**	**6.7**	**6.6**	**7.2**	**6.4**	**6.2**	**6.2**	**6.4**	**6.8**	**7.0**	**7.5**
Total organic carbon (MG/KG)	--	--	**73,000**	NA	**28,000**	**33,000**	**69,000**	**12,000**	**69,000**	**16,000**	**64,000**	**99,000**	**140,000**	**52,000**	**8,800**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-70

Area-Specific Screening Statistics - Subsurface Sediment - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	12 / 12	1,500	25,700	CAS04-SD01-1209B	9,860	7,715	13,860	25,500	1 / 12	1.01	0.54	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	12 / 12	0.98	14.6	CAS04-SD01-1209B	7.37	4.69	9.80	9.79	3 / 12	1.49	1.00	0.75	--	-- / --	--	--	--	51.1	0 / 12	0.29	NO
Barium	6.40 - 9.90	10 / 12	12.5	132	CAS04-SD04-1209B	37.0	34.6	54.9	20.0	8 / 12	6.60	2.75	1.85	--	-- / --	--	--	--	98.1	1 / 12	1.35	**YES**
Beryllium	0.49 - 0.49	11 / 12	0.21	1.00	CAA03-SD03-1209B	0.47	0.27	0.61	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.96	1 / 12	1.04	NO
Cadmium	-- - --	12 / 12	0.050	7.20	CAS004-4-SED01-01-1199	1.13	2.11	2.22	0.99	3 / 12	7.27	2.24	1.14	--	-- / --	--	--	--	0.18	5 / 12	40.0	**YES**
Chromium	-- - --	12 / 12	7.00	49.0	CAS04-SD01-1209B	20.6	15.0	28.4	43.4	1 / 12	1.13	0.65	0.47	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	3.80 - 7.30	9 / 12	2.80	63.9	CAS04-SD03-1209B	11.7	17.5	20.8	31.6	1 / 12	2.02	0.66	0.37	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.020 - 0.98	0 / 12	--	--	--	0.30	0.21	0.41	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	12 / 12	4,540	34,000	CAA03-SD03-1209B	13,721	10,791	19,315	20,000	3 / 12	1.70	0.97	0.69	--	-- / --	--	--	--	43,800	0 / 12	0.78	NO
Lead	-- - --	12 / 12	4.20	235	CAS04-SD03-1209B	45.7	70.2	82.1	35.8	3 / 12	6.56	2.29	1.28	--	-- / --	--	--	--	17.2	5 / 12	13.7	**YES**
Mercury	0.020 - 0.040	8 / 12	0.010	0.18	CAS04-SD03-1209B	0.036	0.047	0.060	0.18	1 / 12	1.00	0.34	0.20	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	12 / 12	1.70	22.9	CAS04-SD03-1209B	7.32	6.88	10.9	22.7	1 / 12	1.01	0.48	0.32	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.97 - 2.30	6 / 12	0.070	3.10	CAS04-SD03-1209B	0.74	0.83	1.17	1.00	1 / 12	3.10	1.17	0.74	--	-- / --	--	--	--	--	-- / --	--	**YES**
Thallium	0.47 - 1.80	2 / 12	0.39	0.52	CAS04-SD01-1209B	0.55	0.23	0.67	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	**YES**
Vanadium	-- - --	12 / 12	6.80	64.3	CAS04-SD01-1209B	24.8	18.3	34.3	57.0	1 / 12	1.13	0.60	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	30.2 - 87.6	9 / 12	13.5	325	CAS04-SD03-1209B	79.9	112	138	121	2 / 12	2.69	1.14	0.66	--	-- / --	--	--	--	52.8	3 / 12	6.16	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	20.0 - 60.0	1 / 12	8,900	8,900	CAS04-SD03-1209B	756	2,565	2,086	59.8	1 / 12	149	34.9	12.6	2,138	1 / 12	4.16	0.98	0.35	--	-- / --	--	**YES**
Aroclor-1260	22.0 - 120	9 / 12	7.90	580	CAA03-SD02-1209B	103	164	188	59.8	4 / 12	9.70	3.14	1.73	2,138	0 / 12	0.27	0.09	0.05	--	-- / --	--	**YES**
Pesticides (UG/KG)																						
4,4'-DDD	1.30 - 6.00	3 / 12	21.0	260	CAS04-SD03-1209B	26.8	73.8	65.0	4.88	3 / 12	53.3	13.3	5.48	290	0 / 12	0.90	0.22	0.09	4.20	3 / 12	61.9	**YES**
4,4'-DDE	0.97 - 4.90	4 / 12	4.40	270	CAS04-SD03-1209B	24.7	77.3	64.8	3.16	4 / 12	85.4	20.5	7.83	898	0 / 12	0.30	0.07	0.03	14.0	1 / 12	19.3	**YES**
4,4'-DDT	0.89 - 6.00	4 / 12	19.0	740	CAS04-SD03-1209B	102	231	222	4.16	4 / 12	178	53.3	24.5	898	0 / 12	0.82	0.25	0.11	--	-- / --	--	**YES**
alpha-Chlordane	2.00 - 3.10	2 / 12	2.60	6.00	CAS04-SD03-1209B	1.68	1.43	2.42	3.24	1 / 12	1.85	0.75	0.52	7,392	0 / 12	0.0008	0.0003	0.0002	--	-- / --	--	NO
Dieldrin	4.10 - 6.00	2 / 12	3.40	600	CAS04-SD03-1209B	52.2	173	142	1.90	2 / 12	316	74.5	27.5	137	1 / 12	4.37	1.03	0.38	--	-- / --	--	**YES**
Endosulfan I	2.00 - 3.10	1 / 12	23.0	23.0	CAS04-SD03-1209B	2.98	6.31	6.25	NSV	-- / --	NSV	NSV	NSV	7.66	1 / 12	3.00	0.82	0.39	--	-- / --	--	NO
Endosulfan II	4.10 - 6.00	3 / 12	0.86	360	CAS04-SD03-1209B	32.0	103	85.5	NSV	-- / --	NSV	NSV	NSV	37.0	1 / 12	9.74	2.31	0.87	--	-- / --	--	**YES**
Endosulfan sulfate	4.10 - 6.00	1 / 12	3.20	3.20	CAS04-SD04-1209B	2.36	0.37	2.56	NSV	-- / --	NSV	NSV	NSV	14.3	0 / 12	0.22	0.18	0.17	--	-- / --	--	NO
Endrin	4.00 - 6.00	3 / 12	39.0	520	CAS04-SD03-1209B	51.9	148	129	2.22	3 / 12	234	58.0	23.4	52.8	1 / 12	9.85	2.44	0.98	--	-- / --	--	**YES**
Endrin aldehyde	4.00 - 6.00	1 / 12	140	140	CAS04-SD03-1209B	13.8	39.8	34.4	2.22	1 / 12	63.1	15.5	6.19	52.8	1 / 12	2.65	0.65	0.26	--	-- / --	--	**YES**
Endrin ketone	4.00 - 6.00	1 / 12	140	140	CAS04-SD03-1209B	13.8	39.8	34.4	2.22	1 / 12	63.1	15.5	6.19	52.8	1 / 12	2.65	0.65	0.26	--	-- / --	--	**YES**
gamma-Chlordane	2.10 - 3.10	3 / 12	0.75	340	CAS04-SD03-1209B	29.5	97.8	80.2	3.24	1 / 12	105	24.8	9.11	7,392	0 / 12	0.046	0.011	0.004	--	-- / --	--	**YES**
Heptachlor epoxide	2.00 - 3.10	2 / 12	0.71	230	CAS04-SD03-1209B	20.2	66.1	54.5	2.47	1 / 12	93.1	22.0	8.18	180	1 / 12	1.28	0.30	0.11	--	-- / --	--	**YES**
Methoxychlor	20.0 - 31.0	1 / 12	230	230	CAS04-SD03-1209B	29.8	63.1	62.5	NSV	-- / --	NSV	NSV	NSV	50.2	1 / 12	4.59	1.25	0.59	--	-- / --	--	**YES**
Semivolatile Organic Compounds (UG/KG)																						
Anthracene	24.0 - 600	6 / 12	2.20	33.0	CAA03-SD02-1209B	90.7	117	151	57.2	0 / 12	0.58	--	--	581	0 / 12	0.06	--	--	--	-- / --	--	NO
Benzo(a)anthracene	12.0 - 410	6 / 12	110	230	CAS004-4-SD02-01-1199	97.2	84.2	141	108	6 / 12	2.13	1.30	0.90	290	0 / 12	0.79	0.48	0.33	14.0	6 / 12	16.4	**YES**
Benzo(a)pyrene	12.0 - 410	7 / 12	28.0	240	CAS004-4-SD02-01-1199	98.4	87.4	144	150	2 / 12	1.60	0.96	0.66	370	0 / 12	0.65	0.39	0.27	--	-- / --	--	NO
Benzo(b)fluoranthene	23.0 - 46.0	6 / 12	57.0	510	CAS04-SD03-1209B	125	160	207	240	2 / 12	2.13	0.86	0.52	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(g,h,i)perylene	9.80 - 600	4 / 12	29.0	100	CAS004-4-SD02-01-1199	71.1	93.1	119	170	0 / 12	0.59	--	0.42	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	9.90 - 410	5 / 12	52.0	280	CAS004-4-SD02-01-1199	79.0	91.8	127	240	1 / 12	1.17	0.53	0.33	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Butylbenzylphthalate	380 - 600	1 / 12	140	140	CAS04-SD03-1209B	218	40.1	239	NSV	-- / --	NSV	NSV	NSV	29,040	0 / 12	0.005	--	--	--	-- / --	--	NO
Chrysene	24.0 - 24.0	11 / 12	3.30	330	CAS004-4-SD02-01-1199	112	115	171	166	3 / 12	1.99	1.03	0.67	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	**YES**
Dibenz(a,h)anthracene	6.40 - 600	2 / 12	45.0	84.0	CAS04-SD03-1209B	98.2	113	157	33.0	2 / 12	2.55	4.76	2.98	NSV	-- / --	NSV	NSV	NSV	8.60	2 / 12	9.77	**YES**
Di-n-butylphthalate	110 - 410	4 / 12	61.0	110	CAS04-SD03-1209B	81.0	41.8	103	110	1 / 12	1.00	0.93	0.74	29,040	0 / 12	0.004	0.004	0.003	--	-- / --	--	NO
Fluoranthene	-- - --	12 / 12	4.70	520	CAS004-4-SD02-01-1199	148	150	226	423	1 / 12	1.23	0.53	0.35	7,656	0 / 12	0.07	0.03	0.02	--	-- / --	--	NO
Fluorene	23.0 - 600	1 / 12	180	180	CAA03-SD02-1209B	104	117	165	77.4	1 / 12	2.33	2.13	1.35	1,426	0 / 12	0.13	0.12	0.07	--	-- / --	--	**YES**
Indeno(1,2,3-cd)pyrene	7.10 - 600	5 / 12	64.0	370	CAS04-SD03-1209B	107	123	171	200	1 / 12	1.85	0.86	0.54	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	-- - --	12 / 12	81.3	2,335	CAS004-4-SD02-01-1199	943	859	1,388	2,900	0 / 12	0.81	0.48	0.33	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	-- - --	12 / 12	91.1	2,430	CAS004-4-SED01-01-1199	890	980	1,398	786	5 / 12	3.09	1.78	1.13	NSV	-- / --	NSV	NSV	NSV	601	5 / 12	4.04	**YES**
PAH (total)	-- - --	12 / 12	172	4,740	CAS004-4-SD02-01-1199	1,833	1,717	2,723	3,553	2 / 12	1.33	0.77	0.52	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pentachlorophenol	110 - 1,500	0 / 12	--	--	--	247	276	390	NSV	-- / --	NSV	NSV	NSV	1,331	-- / --	1.13	0.29	0.19	--	-- / --	--	NO
Phenanthrene	410 - 410	11 / 12	2.40	240	CAS004-4-SD02-01-1199	84.8	90.6	132	204	2 / 12	1.18	0.65	0.42	2,244	0 / 12	0.11	0.06	0.04	--	-- / --	--	NO
Pyrene	-- - --	12 / 12	4.60	470	CAS004-4-SD02-01-1199	157	143	231	195	4 / 12	2.41	1.18	0.80	NSV	-- / --	NSV	NSV	NSV	16.0	10 / 12	29.4	**YES**
Volatile Organic Compounds (UG/KG)																						
1,2-Dichlorobenzene	6.00 - 600	1 / 12	2.00	2.00	CAS04-SD04-1209B	84.1	122	147	NSV	-- / --	NSV	NSV	NSV	898	0 / 12	0.002	--	--	--	-- / --	--	NO
1,4-Dichlorobenzene	6.00 - 600	1 / 12	6.00	6.00	CAS04-SD04-1209B	84.4	121	147	NSV	-- / --	NSV	NSV	NSV	924	0 / 12	0.006	--	--	--	-- / --	--	NO
2-Butanone	7.00 - 35.0	3 / 12	9.00	110	CAA03-SD02-1209B	19.7	28.8	34.7	NSV	-- / --	NSV	NSV	NSV	713	0 / 12	0.15	0.05	0.03	--	-- / --	--	NO
4-Methyl-2-pentanone	14.9 - 37.0	1 / 12	2.00	2.00	CAS004-4-SD03-01-1199	13.0	5.16	15.7	NSV	-- / --	NSV	NSV	NSV	87.1	0 / 12	0.02	--	--	--	-- / --	--	NO
Acetone	11.0 - 64.0	3 / 12	88.0	420	CAA03-SD02-1209B	69.3	123	133	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	1,400	0 / 12	0.30	NO
Carbon disulfide	6.00 - 16.9	0 / 12	--	--	--	4.65	2.29	5.84	NSV	-- / --	NSV	NSV	NSV	2.24	-- / --	7.53	2.60	2.07	--	-- / --	--	NO
Methyl acetate	11.0 - 13.0	1 / 8	4.00	4.00	CAA03-SD04-1209B	5.63	0.74	6.12	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	6.00 - 7.00	1 / 8	2.00	2.00	CAA03-SD02-1209B	2.94	0.42	3.22	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	13.9 - 16.9	8 / 12	8.00	42.0	CAA03-SD01-1209B	14.0	10.1	19.2	NSV	-- / --	NSV	NSV	NSV	1,399	0 / 12	0.030	0.014	0.010	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	8 / 8	6.10	8.20	CAS04-SD03-1209B	7.15	0.69	7.61	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	8 / 8	6,500	71,000	CAA03-SD02-1209B	26,350	21,044	40,446	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-71

Area-Specific Screening Statistics - Subsurface Sediment - Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	5 / 5	3,170	28,700	CAS04-SD07-1209B	11,180	10,223	20,927	25,500	1 / 5	1.13	0.82	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	5 / 5	2.30	13.2	CAS04-SD09-1209B	6.28	4.70	10.8	9.79	1 / 5	1.35	1.10	0.64	--	-- / --	--	--	--	51.1	0 / 5	0.26	NO
Barium	-- - --	5 / 5	9.60	68.4	CAS04-SD07-1209B	29.4	22.9	51.3	20.0	2 / 5	3.42	2.56	1.47	--	-- / --	--	--	--	98.1	0 / 5	0.70	NO
Beryllium	-- - --	5 / 5	0.21	1.80	CAS04-SD07-1209B	0.67	0.65	1.28	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.96	1 / 5	1.88	**YES**
Cadmium	-- - --	5 / 5	0.070	1.40	CAS04-SD07-1209B	0.42	0.55	0.95	0.99	1 / 5	1.41	0.96	0.43	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	5 / 5	10.6	71.8	CAS04-SD07-1209B	26.0	25.8	50.6	43.4	1 / 5	1.65	1.17	0.60	--	-- / --	--	--	--	25.8	1 / 5	2.78	**YES**
Copper	-- - --	5 / 5	2.50	5.90	CAS04-SD05-1209B	3.46	1.38	4.78	31.6	0 / 5	0.19	0.15	0.11	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.84 - 1.10	0 / 5	--	--	--	0.47	0.056	0.52	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	5 / 5	4,260	28,200	CAS04-SD07-1209B	11,610	9,755	20,911	20,000	1 / 5	1.41	1.05	0.58	--	-- / --	--	--	--	43,800	0 / 5	0.64	NO
Lead	-- - --	5 / 5	3.40	14.3	CAS04-SD07-1209B	8.54	4.97	13.3	35.8	0 / 5	0.40	0.37	0.24	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.040 - 0.040	4 / 5	0.010	0.050	CAS04-SD05-1209B	0.026	0.018	0.043	0.18	0 / 5	0.28	0.24	0.14	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	5 / 5	2.70	20.9	CAS04-SD07-1209B	7.54	7.61	14.8	22.7	0 / 5	0.92	0.65	0.33	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.080 - 3.40	0 / 5	--	--	--	0.63	0.68	1.28	1.00	-- / --	3.40	1.28	0.63	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	0.98 - 3.40	0 / 5	--	--	--	0.94	0.46	1.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	5 / 5	12.1	82.0	CAS04-SD07-1209B	30.8	28.9	58.4	57.0	1 / 5	1.44	1.02	0.54	--	-- / --	--	--	--	40.8	1 / 5	2.01	**YES**
Zinc	-- - --	5 / 5	11.1	54.1	CAS04-SD07-1209B	28.9	18.3	46.4	121	0 / 5	0.45	0.38	0.24	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	21.0 - 26.0	1 / 5	63.0	63.0	CAS04-SD05-1209B	21.8	23.1	43.8	59.8	1 / 5	1.05	0.73	0.36	1,118	0 / 5	0.056	0.039	0.020	--	-- / --	--	NO
Aroclor-1260	23.0 - 28.0	2 / 5	30.0	72.0	CAS04-SD05-1209B	27.9	25.8	52.5	59.8	1 / 5	1.20	0.88	0.47	1,118	0 / 5	0.064	0.047	0.025	--	-- / --	--	NO
Pesticides (UG/KG)																						
4,4'-DDD	4.30 - 5.00	3 / 5	4.70	14.0	CAS04-SD09-1209B	6.35	4.95	11.1	4.88	2 / 5	2.87	2.27	1.30	152	0 / 5	0.092	0.073	0.042	4.20	2 / 5	3.33	**YES**
4,4'-DDE	4.30 - 5.00	3 / 5	2.00	5.00	CAS04-SD09-1209B	2.99	1.23	4.16	3.16	2 / 5	1.58	1.32	0.95	469	0 / 5	0.011	0.009	0.006	14.0	0 / 5	0.36	NO
4,4'-DDT	4.30 - 5.00	3 / 5	1.30	120	CAS04-SD08-1209B	26.8	52.2	76.6	4.16	2 / 5	28.8	18.4	6.45	469	0 / 5	0.26	0.16	0.06	--	-- / --	--	**YES**
alpha-Chlordane	2.10 - 2.60	0 / 5	--	--	--	1.17	0.10	1.27	3.24	-- / --	0.80	0.39	0.36	3,864	-- / --	0.0007	0.0003	0.0003	--	-- / --	--	NO
Dieldrin	4.00 - 5.00	1 / 5	3.30	3.30	CAS04-SD09-1209B	2.47	0.50	2.95	1.90	1 / 5	1.74	1.55	1.30	71.8	0 / 5	0.046	0.041	0.034	--	-- / --	--	**YES**
Endosulfan I	2.10 - 2.60	2 / 5	0.63	2.70	CAS04-SD05-1209B	1.36	0.79	2.11	NSV	-- / --	NSV	NSV	NSV	4.00	0 / 5	0.67	0.53	0.34	--	-- / --	--	NO
Endosulfan II	4.00 - 5.00	1 / 5	2.20	2.20	CAS04-SD05-1209B	2.21	0.18	2.38	NSV	-- / --	NSV	NSV	NSV	19.3	0 / 5	0.11	--	--	--	-- / --	--	NO
Endosulfan sulfate	4.30 - 5.00	1 / 5	2.00	2.00	CAS04-SD08-1209B	2.25	0.20	2.44	NSV	-- / --	NSV	NSV	NSV	7.45	0 / 5	0.27	--	--	--	-- / --	--	NO
Endrin	4.00 - 5.00	0 / 5	--	--	--	2.25	0.20	2.44	2.22	-- / --	2.25	1.10	1.01	27.6	-- / --	0.18	0.09	0.08	--	-- / --	--	NO
Endrin aldehyde	4.00 - 5.00	1 / 5	3.60	3.60	CAS04-SD05-1209B	2.49	0.65	3.11	2.22	1 / 5	1.62	1.40	1.12	27.6	0 / 5	0.13	0.11	0.09	--	-- / --	--	**YES**
Endrin ketone	4.00 - 5.00	0 / 5	--	--	--	2.25	0.20	2.44	2.22	-- / --	2.25	1.10	1.01	27.6	-- / --	0.18	0.09	0.08	--	-- / --	--	NO
gamma-Chlordane	2.10 - 2.60	1 / 5	2.80	2.80	CAS04-SD05-1209B	1.48	0.74	2.19	3.24	0 / 5	0.86	0.68	0.46	3,864	0 / 5	0.0007	0.0006	0.0004	--	-- / --	--	NO
Heptachlor epoxide	2.10 - 2.60	0 / 5	--	--	--	1.17	0.10	1.27	2.47	-- / --	1.05	0.51	0.47	93.8	-- / --	0.028	0.014	0.012	--	-- / --	--	NO
Methoxychlor	21.0 - 26.0	0 / 5	--	--	--	11.7	1.04	12.7	NSV	-- / --	NSV	NSV	NSV	26.2	-- / --	0.99	0.48	0.45	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Anthracene	24.0 - 30.0	1 / 5	11.0	11.0	CAS04-SD05-1209B	12.9	1.52	14.3	57.2	0 / 5	0.19	--	--	304	0 / 5	0.04	--	--	--	-- / --	--	NO
Benzo(a)anthracene	12.0 - 26.0	1 / 5	130	130	CAS04-SD05-1209B	33.1	54.3	84.8	108	1 / 5	1.20	0.79	0.31	152	0 / 5	0.86	0.56	0.22	--	-- / --	--	NO
Benzo(a)pyrene	26.0 - 26.0	4 / 5	6.00	130	CAS04-SD05-1209B	33.0	54.3	84.8	150	0 / 5	0.87	0.57	0.22	193	0 / 5	0.67	0.44	0.17	--	-- / --	--	NO
Benzo(b)fluoranthene	14.0 - 30.0	1 / 5	220	220	CAS04-SD05-1209B	52.8	93.5	142	240	0 / 5	0.92	0.59	0.22	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(g,h,i)perylene	26.0 - 30.0	2 / 5	8.60	56.0	CAS04-SD05-1209B	21.2	19.6	39.9	170	0 / 5	0.33	0.23	0.12	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	26.0 - 27.0	3 / 5	4.20	46.0	CAS04-SD05-1209B	16.5	17.0	32.7	240	0 / 5	0.19	0.14	0.069	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Butylbenzylphthalate	400 - 500	0 / 5	--	--	--	226	23.0	248	NSV	-- / --	NSV	NSV	NSV	15,180	-- / --	0.033	0.016	0.015	--	-- / --	--	NO
Chrysene	24.0 - 27.0	2 / 5	5.50	130	CAS04-SD05-1209B	34.8	53.3	85.6	166	0 / 5	0.78	0.52	0.21	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Dibenz(a,h)anthracene	26.0 - 27.0	3 / 5	12.0	48.0	CAS04-SD05-1209B	20.1	15.6	35.0	33.0	1 / 5	1.45	1.06	0.61	NSV	-- / --	NSV	NSV	NSV	8.60	3 / 5	5.58	**YES**
Di-n-butylphthalate	120 - 150	0 / 5	--	--	--	68.0	6.71	74.4	110	-- / --	1.36	0.68	0.62	15,180	-- / --	0.010	0.005	0.004	--	-- / --	--	NO
Fluoranthene	26.0 - 26.0	4 / 5	10.0	250	CAS04-SD05-1209B	62.0	105	162	423	0 / 5	0.59	0.38	0.15	4,002	0 / 5	0.062	0.041	0.015	--	-- / --	--	NO
Fluorene	8.30 - 30.0	0 / 5	--	--	--	11.5	4.27	15.6	77.4	-- / --	0.39	0.20	0.15	745	-- / --	0.040	0.021	0.015	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	26.0 - 26.0	4 / 5	8.10	110	CAS04-SD05-1209B	31.4	44.0	73.4	200	0 / 5	0.55	0.37	0.16	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	117 - 117	4 / 5	75.5	1,060	CAS04-SD05-1209B	279	437	696	2,900	0 / 5	0.37	0.24	0.096	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	117 - 117	4 / 5	99.2	424	CAS04-SD05-1209B	167	146	306	786	0 / 5	0.54	0.39	0.21	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (total)	234 - 234	4 / 5	175	1,484	CAS04-SD05-1209B	446	582	1,001	3,553	0 / 5	0.42	0.28	0.13	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pentachlorophenol	130 - 150	1 / 5	19.0	19.0	CAS04-SD08-1209B	59.8	23.3	82.1	NSV	-- / --	NSV	NSV	NSV	696	0 / 5	0.027	0.118	0.086	--	-- / --	--	NO
Phenanthrene	26.0 - 26.0	4 / 5	5.20	100	CAS04-SD05-1209B	27.1	40.9	66.0	204	0 / 5	0.49	0.32	0.13	1,173	0 / 5	0.085	0.056	0.023	--	-- / --	--	NO
Pyrene	26.0 - 26.0	4 / 5	5.30	190	CAS04-SD05-1209B	47.7	79.7	124	195	0 / 5	0.97	0.63	0.24	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																						
1,2-Dichlorobenzene	6.00 - 7.00	0 / 5	--	--	--	3.30	0.27	3.56	NSV	-- / --	NSV	NSV	NSV	469	-- / --	0.015	0.008	0.007	--	-- / --	--	NO
1,4-Dichlorobenzene	6.00 - 7.00	0 / 5	--	--	--	3.30	0.27	3.56	NSV	-- / --	NSV	NSV	NSV	483	-- / --	0.014	0.007	0.007	--	-- / --	--	NO
2-Butanone	28.0 - 32.0	3 / 5	14.0	26.0	CAS04-SD06-1209B	17.6	4.98	22.3	NSV	-- / --	NSV	NSV	NSV	373	0 / 5	0.070	0.060	0.047	--	-- / --	--	NO
4-Methyl-2-pentanone	28.0 - 36.0	0 / 5	--	--	--	16.6	1.67	18.2	NSV	-- / --	NSV	NSV	NSV	45.5	-- / --	0.79	0.40	0.36	--	-- / --	--	NO
Acetone	8.00 - 22.0	3 / 5	87.0	130	CAS04-SD06-1209B	68.4	57.7	123	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	1,400	0 / 5	0.09	NO
Carbon disulfide	6.00 - 7.00	1 / 5	1.00	1.00	CAS04-SD06-1209B	2.80	1.04	3.79	NSV	-- / --	NSV	NSV	NSV	1.17	0 / 5	0.85	--	--	--	-- / --	--	NO
Methyl acetate	10.0 - 13.0	0 / 5	--	--	--	6.00	0.61	6.58	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	6.00 - 7.00	0 / 5	--	--	--	3.30	0.27	3.56	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	7.00 - 7.00	4 / 5	2.00	17.0	CAS04-SD06-1209B	8.10	7.70	15.4	NSV	-- / --	NSV	NSV	NSV	731	0 / 5	0.023	0.021	0.011	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	5 / 5	7.50	8.30	CAS04-SD08-1209B	7.90	0.29	8.18	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	5 / 5	2,400	34,000	CAS04-SD06-1209B	13,780	12,948	26,124	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-72

Area-Specific Screening Statistics - Subsurface Sediment - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	12 / 12	1,140	20,200	CAYP-SSD10-1012	9,780	6,274	13,033	25,500	0 / 12	0.79	0.51	0.38	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	12 / 12	0.98	126	CAYP-SSD05-1112	26.3	42.8	48.5	9.79	7 / 12	12.9	4.95	2.69	--	-- / --	--	--	--	51.1	2 / 2	2.47	**YES**
Barium	-- - --	12 / 12	9.86	116	CAYP-SSD09-1012	56.2	38.8	76.3	20.0	9 / 12	5.80	3.82	2.81	--	-- / --	--	--	--	98.1	2 / 12	1.18	NO
Beryllium	-- - --	12 / 12	0.14	1.35	CAYP-SSD10-1012	0.68	0.42	0.90	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.96	4 / 12	1.41	**YES**
Cadmium	0.12 - 0.12	11 / 12	0.14	1.04	CAYP-SSD05-1112	0.46	0.29	0.61	0.99	1 / 12	1.05	0.61	0.46	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	12 / 12	3.14	35.0	CAYP-SSD10-1012	16.9	9.51	21.9	43.4	0 / 12	0.81	0.50	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	12 / 12	2.25	12.6	CAYP-SSD03-1012	8.42	3.82	10.4	31.6	0 / 12	0.40	0.33	0.27	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.23 - 0.94	1 / 12	0.25	0.25	CAYP-SSD09-1012	0.22	0.10	0.28	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	**YES**
Iron	-- - --	12 / 12	2,060	36,300	CAYP-SSD09-1012	15,939	10,896	21,588	20,000	4 / 12	1.82	1.08	0.80	--	-- / --	--	--	--	43,800	0 / 12	0.83	NO
Lead	-- - --	12 / 12	4.21	54.4	CAYP-SSD13-1012	22.0	15.3	30.0	35.8	1 / 12	1.52	0.84	0.62	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	0.0065 - 0.0065	10 / 12	0.0052	0.44	CAYP-SSD05-1112	0.082	0.12	0.14	0.18	1 / 12	2.47	0.80	0.46	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	12 / 12	0.87	9.59	CAYP-SSD10-1012	4.86	2.82	6.32	22.7	0 / 12	0.42	0.28	0.21	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.37 - 1.97	1 / 12	0.18	0.18	CAYP-SSD05-1112	0.44	0.24	0.56	1.00	0 / 12	0.18	--	--	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	1.49 - 7.88	1 / 12	1.16	1.16	CAYP-SSD05-1112	1.78	0.91	2.25	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	**YES**
Vanadium	-- - --	12 / 12	3.51	52.0	CAYP-SSD10-1012	25.3	14.9	33.0	57.0	0 / 12	0.91	0.58	0.44	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	12 / 12	11.2	191	CAYP-SSD13-1012	80.0	57.0	110	121	2 / 12	1.58	0.91	0.66	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	51.0 - 210	0 / 12	--	--	--	48.7	22.5	60.4	59.8	-- / --	3.51	1.01	0.81	4,447	-- / --	0.047	0.014	0.011	--	-- / --	--	NO
Aroclor-1260	51.0 - 210	2 / 12	60.0	94.0	CAYP-SSD03-1012	56.5	23.9	68.9	59.8	2 / 12	1.57	1.15	0.95	4,447	0 / 12	0.021	0.015	0.013	--	-- / --	--	**YES**
Pesticides (UG/KG)																						
4,4'-DDD	13.0 - 51.0	2 / 12	8.10	20.0	CAYP-SSD05-1112	15.1	6.24	18.4	4.88	2 / 12	4.10	3.76	3.10	604	0 / 12	0.033	0.030	0.025	4.20	2 / 12	4.76	**YES**
4,4'-DDE	13.0 - 51.0	1 / 12	14.0	14.0	CAYP-SSD08-1012	15.0	5.73	18.0	3.16	1 / 12	4.43	--	--	1,867	0 / 12	0.008	--	--	14.0	1 / 12	1.00	NO
4,4'-DDT	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	4.16	-- / --	12.3	4.25	3.48	1,867	-- / --	0.027	0.009	0.008	--	-- / --	--	NO
alpha-Chlordane	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	3.24	-- / --	15.7	5.45	4.46	15,372	-- / --	0.003	0.001	0.001	--	-- / --	--	NO
Dieldrin	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	1.90	-- / --	26.8	9.30	7.61	285	-- / --	0.18	0.06	0.05	--	-- / --	--	NO
Endosulfan I	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	NSV	-- / --	NSV	NSV	NSV	15.9	-- / --	3.20	1.11	0.91	--	-- / --	--	NO
Endosulfan II	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	NSV	-- / --	NSV	NSV	NSV	76.9	-- / --	0.66	0.23	0.19	--	-- / --	--	NO
Endosulfan sulfate	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	NSV	-- / --	NSV	NSV	NSV	29.6	-- / --	1.72	0.60	0.49	--	-- / --	--	NO
Endrin	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	2.22	-- / --	23.0	7.96	6.51	110	-- / --	0.46	0.16	0.13	--	-- / --	--	NO
Endrin aldehyde	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	2.22	-- / --	23.0	7.96	6.51	110	-- / --	0.46	0.16	0.13	--	-- / --	--	NO
Endrin ketone	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	2.22	-- / --	23.0	7.96	6.51	110	-- / --	0.46	0.16	0.13	--	-- / --	--	NO
gamma-Chlordane	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	3.24	-- / --	15.7	5.45	4.46	15,372	-- / --	0.003	0.001	0.001	--	-- / --	--	NO
Heptachlor epoxide	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	2.47	-- / --	20.6	7.15	5.85	373	-- / --	0.14	0.05	0.04	--	-- / --	--	NO
Methoxychlor	13.0 - 51.0	0 / 12	--	--	--	14.5	6.18	17.7	NSV	-- / --	NSV	NSV	NSV	104	-- / --	0.49	0.17	0.14	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Anthracene	32.0 - 130	0 / 12	--	--	--	30.8	14.0	38.1	57.2	-- / --	2.27	0.67	0.54	1,208	-- / --	0.108	0.032	0.025	--	-- / --	--	NO
Benzo(a)anthracene	36.0 - 130	7 / 12	29.0	82.0	CAYP-SSD07-1012	45.5	20.8	56.3	108	0 / 12	0.76	0.52	0.42	604	0 / 12	0.14	0.09	0.08	--	-- / --	--	NO
Benzo(a)pyrene	36.0 - 130	6 / 12	19.0	68.0	CAYP-SSD13-1012	41.1	18.1	50.5	150	0 / 12	0.45	0.34	0.27	769	0 / 12	0.09	0.07	0.05	--	-- / --	--	NO
Benzo(b)fluoranthene	36.0 - 130	6 / 12	32.0	180	CAYP-SSD13-1012	62.9	46.9	87.2	240	0 / 12	0.75	0.36	0.26	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(g,h,i)perylene	36.0 - 130	5 / 12	16.0	53.0	CAYP-SSD07-1012	34.5	14.1	41.9	170	0 / 12	0.31	0.25	0.20	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Benzo(k)fluoranthene	33.0 - 130	4 / 12	29.0	53.0	CAYP-SSD13-1012	35.4	14.6	43.0	240	0 / 12	0.22	0.18	0.15	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Butylbenzylphthalate	250 - 1,000	0 / 12	--	--	--	242	108	298	NSV	-- / --	NSV	NSV	NSV	60,390	-- / --	0.017	0.005	0.004	--	-- / --	--	NO
Chrysene	33.0 - 130	5 / 12	32.0	160	CAYP-SSD13-1012	51.6	39.6	72.1	166	0 / 12	0.96	0.43	0.31	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Dibenz(a,h)anthracene	32.0 - 130	0 / 12	--	--	--	30.8	14.0	38.1	33.0	-- / --	3.94	1.15	0.93	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Di-n-butylphthalate	250 - 1,000	0 / 12	--	--	--	242	108	298	110	-- / --	9.09	2.71	2.20	60,390	-- / --	0.017	0.005	0.004	--	-- / --	--	NO
Fluoranthene	36.0 - 130	6 / 12	35.0	250	CAYP-SSD13-1012	81.0	70.9	118	423	0 / 12	0.59	0.28	0.19	15,921	0 / 12	0.02	0.01	0.01	--	-- / --	--	NO
Fluorene	32.0 - 130	0 / 12	--	--	--	30.8	14.0	38.1	77.4	-- / --	1.68	0.49	0.40	2,965	-- / --	0.044	0.013	0.010	--	-- / --	--	NO
Indeno(1,2,3-cd)pyrene	33.0 - 130	2 / 12	27.0	39.0	CAYP-SSD13-1012	32.3	13.5	39.3	200	0 / 12	0.20	0.20	0.16	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (HMW)	162 - 585	7 / 12	194	905	CAYP-SSD13-1012	342	245	469	2,900	0 / 12	0.31	0.16	0.12	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (LMW)	284 - 1,020	6 / 12	286	962	CAYP-SSD13-1012	431	240	556	786	1 / 12	1.22	0.71	0.55	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
PAH (total)	446 - 1,605	7 / 12	480	1,867	CAYP-SSD13-1012	798	483	1,049	3,553	0 / 12	0.53	0.30	0.22	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Pentachlorophenol	750 - 3,100	0 / 12	--	--	--	728	336	902	NSV	-- / --	NSV	NSV	NSV	2,767	-- / --	1.12	0.33	0.26	--	-- / --	--	NO
Phenanthrene	33.0 - 130	4 / 12	70.0	270	CAYP-SSD13-1012	65.3	70.1	102	204	1 / 12	1.32	0.50	0.32	4,667	0 / 12	0.06	0.02	0.01	--	-- / --	--	NO
Pyrene	36.0 - 130	6 / 12	32.0	260	CAYP-SSD13-1012	75.0	69.2	111	195	1 / 12	1.33	0.57	0.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Volatile Organic Compounds (UG/KG)																						
1,2-Dichlorobenzene	0.70 - 7.10	0 / 12	--	--	--	1.38	0.93	1.86	NSV	-- / --	NSV	NSV	NSV	1,867	-- / --	0.004	0.001	0.001	--	-- / --	--	NO
1,4-Dichlorobenzene	0.70 - 7.10	0 / 12	--	--	--	1.38	0.93	1.86	NSV	-- / --	NSV	NSV	NSV	1,922	-- / --	0.004	0.001	0.001	--	-- / --	--	NO
2-Butanone	-- - --	12 / 12	2.00	150	CAYP-SSD05-1112	80.8	61.0	112	NSV	-- / --	NSV	NSV	NSV	1,482	0 / 12	0.10	0.08	0.05	--	-- / --	--	NO
4-Methyl-2-pentanone	1.80 - 18.0	0 / 12	--	--	--	3.45	2.34	4.67	NSV	-- / --	NSV	NSV	NSV	181	-- / --	0.10	0.03	0.02	--	-- / --	--	NO
Acetone	-- - --	12 / 12	24.0	600	CAYP-SSD12-1012	311	234	433	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	1,400	0 / 12	0.43	NO
Carbon disulfide	3.50 - 36.0	0 / 12	--	--	--	6.98	4.75	9.44	NSV	-- / --	NSV	NSV	NSV	4.67	-- / --	7.71	2.02	1.49	--	-- / --	--	NO
Methyl acetate	3.50 - 36.0	0 / 12	--	--	--	6.98	4.75	9.44	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Methylcyclohexane	0.70 - 7.10	1 / 12	0.70	0.70	CAYP-SSD08-1012	1.39	0.92	1.86	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NO
Tetrachloroethene	0.70 - 7.10	0 / 12	--	--	--	1.38	0.93	1.86	NSV	-- / --	NSV	NSV	NSV	2,910	-- / --	0.0024	0.0006	0.0005	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	12 / 12	6.20	7.20	CAYP-SSD06-1112	6.58	0.31	6.74	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	12 / 12	3,200	140,000	CAYP-SSD12-1012	54,850	39,581	75,370	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-73

Area-Specific Screening Statistics - Subsurface Sediment - York River Ditch

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	SLC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	EqP ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	1 / 1	3,460	3,460	CAYP-SSD11-1012	3,460	--	--	25,500	0 / 1	0.14	--	0.14	--	-- / --	--	--	--	--	-- / --	--	NO
Arsenic	-- - --	1 / 1	4.96	4.96	CAYP-SSD11-1012	4.96	--	--	9.79	0 / 1	0.51	--	0.51	--	-- / --	--	--	--	--	-- / --	--	NO
Barium	-- - --	1 / 1	16.0	16.0	CAYP-SSD11-1012	16.0	--	--	20.0	0 / 1	0.80	--	0.80	--	-- / --	--	--	--	--	-- / --	--	NO
Beryllium	-- - --	1 / 1	0.26	0.26	CAYP-SSD11-1012	0.26	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	0.96	0 / 1	0.27	NO
Cadmium	-- - --	1 / 1	0.12	0.12	CAYP-SSD11-1012	0.12	--	--	0.99	0 / 1	0.12	--	0.12	--	-- / --	--	--	--	--	-- / --	--	NO
Chromium	-- - --	1 / 1	9.39	9.39	CAYP-SSD11-1012	9.39	--	--	43.4	0 / 1	0.22	--	0.22	--	-- / --	--	--	--	--	-- / --	--	NO
Copper	-- - --	1 / 1	8.49	8.49	CAYP-SSD11-1012	8.49	--	--	31.6	0 / 1	0.27	--	0.27	--	-- / --	--	--	--	--	-- / --	--	NO
Cyanide	0.24 - 0.24	0 / 1	--	--	--	0.12	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Iron	-- - --	1 / 1	9,000	9,000	CAYP-SSD11-1012	9,000	--	--	20,000	0 / 1	0.45	--	0.45	--	-- / --	--	--	--	--	-- / --	--	NO
Lead	-- - --	1 / 1	13.8	13.8	CAYP-SSD11-1012	13.8	--	--	35.8	0 / 1	0.39	--	0.39	--	-- / --	--	--	--	--	-- / --	--	NO
Mercury	-- - --	1 / 1	0.12	0.12	CAYP-SSD11-1012	0.12	--	--	0.18	0 / 1	0.65	--	0.65	--	-- / --	--	--	--	--	-- / --	--	NO
Nickel	-- - --	1 / 1	5.47	5.47	CAYP-SSD11-1012	5.47	--	--	22.7	0 / 1	0.24	--	0.24	--	-- / --	--	--	--	--	-- / --	--	NO
Silver	0.58 - 0.58	0 / 1	--	--	--	0.29	--	--	1.00	-- / --	0.58	--	0.29	--	-- / --	--	--	--	--	-- / --	--	NO
Thallium	2.30 - 2.30	0 / 1	--	--	--	1.15	--	--	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	--	--	--	-- / --	--	NO
Vanadium	-- - --	1 / 1	14.5	14.5	CAYP-SSD11-1012	14.5	--	--	57.0	0 / 1	0.25	--	0.25	--	-- / --	--	--	--	--	-- / --	--	NO
Zinc	-- - --	1 / 1	33.3	33.3	CAYP-SSD11-1012	33.3	--	--	121	0 / 1	0.28	--	0.28	--	-- / --	--	--	--	--	-- / --	--	NO
Polychlorinated Biphenyls (UG/KG)																						
Aroclor-1254	51.0 - 51.0	0 / 1	--	--	--	25.5	--	--	59.8	-- / --	0.85	--	0.43	713	-- / --	0.072	--	0.036	--	-- / --	--	NO
Aroclor-1260	51.0 - 51.0	0 / 1	--	--	--	25.5	--	--	59.8	-- / --	0.85	--	0.43	713	-- / --	0.072	--	0.036	--	-- / --	--	NO
Pesticides (UG/KG)																						
4,4'-DDD	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	4.88	-- / --	5.33	--	2.66	96.8	-- / --	0.27	--	0.13	--	-- / --	--	NO
4,4'-DDE	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	3.16	-- / --	8.23	--	4.11	299	-- / --	0.087	--	0.043	--	-- / --	--	NO
4,4'-DDT	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	4.16	-- / --	6.25	--	3.13	299	-- / --	0.087	--	0.043	--	-- / --	--	NO
alpha-Chlordane	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	3.24	-- / --	8.02	--	4.01	2,464	-- / --	0.011	--	0.005	--	-- / --	--	NO
Dieldrin	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	1.90	-- / --	13.7	--	6.84	45.8	-- / --	0.57	--	0.28	--	-- / --	--	NO
Endosulfan I	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	NSV	-- / --	NSV	NSV	NSV	2.55	-- / --	10.2	--	5.09	--	-- / --	--	NO
Endosulfan II	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	NSV	-- / --	NSV	NSV	NSV	12.3	-- / --	2.11	--	1.06	--	-- / --	--	NO
Endosulfan sulfate	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	NSV	-- / --	NSV	NSV	NSV	4.75	-- / --	5.47	--	2.74	--	-- / --	--	NO
Endrin	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	2.22	-- / --	11.7	--	5.86	17.6	-- / --	1.48	--	0.74	--	-- / --	--	NO
Endrin aldehyde	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	2.22	-- / --	11.7	--	5.86	17.6	-- / --	1.48	--	0.74	--	-- / --	--	NO
Endrin ketone	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	2.22	-- / --	11.7	--	5.86	17.6	-- / --	1.48	--	0.74	--	-- / --	--	NO
gamma-Chlordane	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	3.24	-- / --	8.02	--	4.01	2,464	-- / --	0.011	--	0.005	--	-- / --	--	NO
Heptachlor epoxide	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	2.47	-- / --	10.5	--	5.26	59.8	-- / --	0.43	--	0.22	--	-- / --	--	NO
Methoxychlor	26.0 - 26.0	0 / 1	--	--	--	13.0	--	--	NSV	-- / --	NSV	NSV	NSV	16.7	-- / --	1.56	--	0.78	--	-- / --	--	NO
Semivolatile Organic Compounds (UG/KG)																						
Anthracene	-- - --	1 / 1	450	450	CAYP-SSD11-1012	450	--	--	57.2	1 / 1	7.87	--	7.87	194	1 / 1	2.32	--	2.32	4.60	1 / 1	97.8	**YES**
Benzo(a)anthracene	-- - --	1 / 1	1,300	1,300	CAYP-SSD11-1012	1,300	--	--	108	1 / 1	12.0	--	12.0	96.8	1 / 1	13.4	--	13.4	14.0	1 / 1	92.9	**YES**
Benzo(a)pyrene	-- - --	1 / 1	1,400	1,400	CAYP-SSD11-1012	1,400	--	--	150	1 / 1	9.33	--	9.33	123	1 / 1	11.4	--	11.4	15.0	1 / 1	93.3	**YES**
Benzo(b)fluoranthene	-- - --	1 / 1	1,800	1,800	CAYP-SSD11-1012	1,800	--	--	240	1 / 1	7.50	--	7.50	NSV	-- / --	NSV	--	NSV	25.0	1 / 1	72.0	**YES**
Benzo(g,h,i)perylene	-- - --	1 / 1	710	710	CAYP-SSD11-1012	710	--	--	170	1 / 1	4.18	--	4.18	NSV	-- / --	NSV	--	NSV	12.0	1 / 1	59.2	**YES**
Benzo(k)fluoranthene	-- - --	1 / 1	490	490	CAYP-SSD11-1012	490	--	--	240	1 / 1	2.04	--	2.04	NSV	-- / --	NSV	--	NSV	16.0	1 / 1	30.6	**YES**
Butylbenzylphthalate	260 - 260	0 / 1	--	--	--	130	--	--	NSV	-- / --	NSV	NSV	NSV	9,680	-- / --	0.027	--	0.013	--	-- / --	--	NO
Chrysene	-- - --	1 / 1	1,300	1,300	CAYP-SSD11-1012	1,300	--	--	166	1 / 1	7.83	--	7.83	NSV	-- / --	NSV	--	NSV	--	-- / --	--	**YES**
Dibenz(a,h)anthracene	-- - --	1 / 1	170	170	CAYP-SSD11-1012	170	--	--	33.0	1 / 1	5.15	--	5.15	NSV	-- / --	NSV	--	NSV	8.60	1 / 1	19.8	**YES**
Di-n-butylphthalate	260 - 260	0 / 1	--	--	--	130	--	--	110	-- / --	2.36	--	1.18	9,680	-- / --	0.027	--	0.013	--	-- / --	--	NO
Fluoranthene	-- - --	1 / 1	2,600	2,600	CAYP-SSD11-1012	2,600	--	--	423	1 / 1	6.15	--	6.15	2,552	1 / 1	1.02	--	1.02	16.0	1 / 1	163	**YES**
Fluorene	-- - --	1 / 1	130	130	CAYP-SSD11-1012	130	--	--	77.4	1 / 1	1.68	--	1.68	475	0 / 1	0.27	--	0.27	--	-- / --	--	**YES**
Indeno(1,2,3-cd)pyrene	-- - --	1 / 1	660	660	CAYP-SSD11-1012	660	--	--	200	1 / 1	3.30	--	3.30	NSV	-- / --	NSV	--	NSV	8.40	1 / 1	78.6	**YES**
PAH (HMW)	-- - --	1 / 1	10,230	10,230	CAYP-SSD11-1012	10,230	--	--	2,900	1 / 1	3.53	--	3.53	NSV	-- / --	NSV	--	NSV	142	1 / 1	72.0	**YES**
PAH (LMW)	-- - --	1 / 1	5,347	5,347	CAYP-SSD11-1012	5,347	--	--	786	1 / 1	6.80	--	6.80	NSV	-- / --	NSV	--	NSV	601	1 / 1	8.90	**YES**
PAH (total)	-- - --	1 / 1	15,577	15,577	CAYP-SSD11-1012	15,577	--	--	3,553	1 / 1	4.38	--	4.38	NSV	-- / --	NSV	--	NSV	735	1 / 1	21.2	**YES**
Pentachlorophenol	780 - 780	0 / 1	--	--	--	390	--	--	NSV	-- / --	NSV	NSV	NSV	444	-- / --	1.76	--	0.88	--	-- / --	--	NO
Phenanthrene	-- - --	1 / 1	1,700	1,700	CAYP-SSD11-1012	1,700	--	--	204	1 / 1	8.33	--	8.33	748	1 / 1	2.27	--	2.27	10.0	1 / 1	170	**YES**
Pyrene	-- - --	1 / 1	2,400	2,400	CAYP-SSD11-1012	2,400	--	--	195	1 / 1	12.3	--	12.3	NSV	-- / --	NSV	--	NSV	16.0	1 / 1	150	**YES**
Volatile Organic Compounds (UG/KG)																						
1,2-Dichlorobenzene	1.00 - 1.00	0 / 1	--	--	--	0.50	--	--	NSV	-- / --	NSV	NSV	NSV	299	-- / --	0.0033	--	0.0017	--	-- / --	--	NO
1,4-Dichlorobenzene	1.00 - 1.00	0 / 1	--	--	--	0.50	--	--	NSV	-- / --	NSV	NSV	NSV	308	-- / --	0.0032	--	0.0016	--	-- / --	--	NO
2-Butanone	-- - --	1 / 1	13.0	13.0	CAYP-SSD11-1012	13.0	--	--	NSV	-- / --	NSV	NSV	NSV	238	0 / 1	0.055	--	0.055	--	-- / --	--	NO
4-Methyl-2-pentanone	2.50 - 2.50	0 / 1	--	--	--	1.25	--	--	NSV	-- / --	NSV	NSV	NSV	29.0	-- / --	0.086	--	0.043	--	-- / --	--	NO
Acetone	-- - --	1 / 1	57.0	57.0	CAYP-SSD11-1012	57.0	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	--	NSV	1,400	0 / 1	0.04	NO
Carbon disulfide	5.00 - 5.00	0 / 1	--	--	--	2.50	--	--	NSV	-- / --	NSV	NSV	NSV	0.75	-- / --	6.68	--	3.34	--	-- / --	--	NO
Methyl acetate	5.00 - 5.00	0 / 1	--	--	--	2.50	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	--	NSV	--	-- / --	--	NO
Methylcyclohexane	1.00 - 1.00	0 / 1	--	--	--	0.50	--	--	NSV	-- / --	NSV	NSV	NSV	NSV	-- / --	NSV	--	NSV	--	-- / --	--	NO
Tetrachloroethene	1.00 - 1.00	0 / 1	--	--	--	0.50	--	--	NSV	-- / --	NSV	NSV	NSV	466	-- / --	0.0021	--	0.0011	--	-- / --	--	NO
Other Parameters																						
pH	-- - --	1 / 1	7.50	7.50	CAYP-SSD11-1012	7.50	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--
Total organic carbon (MG/KG)	-- - --	1 / 1	8,800	8,800	CAYP-SSD11-1012	8,800	--	--	--	-- / --	--	--	--	--	-- / --	--	--	--	--	-- / --	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-74

Initial Screening Statistics - Site4/Youth Pond - Frog Tissue (wet weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Frog ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	-- - --	8 / 8	10.6	274	CAS04-TS06-1012	11.4	7 / 8	24.0	**YES**
Antimony	0.010 - 0.48	0 / 8	--	--	--	NSV	-- / --	NSV	NO
Arsenic	0.31 - 0.31	7 / 8	0.040	1.80	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Barium	-- - --	8 / 8	1.60	6.50	CAS04-TS06-1012	7.00	0 / 8	0.93	NO
Beryllium	0.0030 - 0.048	1 / 8	0.010	0.010	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Cadmium	-- - --	8 / 8	0.020	0.22	CAS04-TS03-1012	3.80	0 / 8	0.06	NO
Calcium [3]	-- - --	8 / 8	4,290	12,200	CAS04-TS02-1012	NSV	-- / --	NSV	NO
Chromium	0.26 - 0.37	5 / 8	0.13	0.80	CAS04-TS04-1012	NSV	-- / --	NSV	**YES**
Cobalt	0.020 - 0.050	5 / 8	0.020	0.13	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Copper	-- - --	8 / 8	1.10	4.50	CAS04-TS06-1012	13.0	0 / 8	0.35	NO
Iron	-- - --	8 / 8	52.9	1,590	CAS04-TS06-1012	3,800	0 / 8	0.42	NO
Lead	0.10 - 0.10	7 / 8	0.090	0.77	CAS04-TS06-1012	0.78	0 / 8	0.99	NO
Magnesium [3]	-- - --	8 / 8	199	350	CAS04-TS05-1012	NSV	-- / --	NSV	NO
Manganese	1.80 - 2.50	5 / 8	1.90	34.5	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Mercury	0.020 - 0.040	3 / 8	0.0060	0.020	CAS04-TS02-1012	NSV	-- / --	NSV	**YES**
Nickel	0.020 - 0.33	4 / 8	0.050	0.29	CAS04-TS06-1012	0.12	2 / 8	2.38	**YES**
Potassium [3]	-- - --	8 / 8	1,400	2,510	CAS04-TS02-1012	NSV	-- / --	NSV	NO
Selenium	0.41 - 0.49	4 / 8	0.22	0.54	CAS04-TS04-1012	NSV	-- / --	NSV	**YES**
Silver	0.0050 - 0.38	1 / 8	0.060	0.060	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Sodium [3]	-- - --	8 / 8	838	1,080	CAS04-TS06-1012	NSV	-- / --	NSV	NO
Thallium	0.021 - 0.48	0 / 8	--	--	--	NSV	-- / --	NSV	NO
Vanadium	0.31 - 0.31	7 / 8	0.060	0.97	CAS04-TS06-1012	NSV	-- / --	NSV	**YES**
Zinc	-- - --	8 / 8	16.8	25.2	CAYP-TS03-1012	9.80	8 / 8	2.57	**YES**
Dioxin-Like PCB Congeners (PG/G)									
3,3',4,4'-Tetrachlorobiphenyl (77)	97.0 - 98.0	6 / 8	8.20	310	CAS04-TS06-1012	TEQ	-- / --	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	95.0 - 100	4 / 8	5.40	33.0	CAS04-TS03-1012	TEQ	-- / --	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	8 / 8	81.0	4,200	CAS04-TS03-1012	TEQ	-- / --	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	8 / 8	12.0	500	CAS04-TS03-1012	TEQ	-- / --	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	8 / 8	460	31,000	CAS04-TS03-1012	TEQ	-- / --	--	--
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	8 / 8	13.0	760	CAS04-TS03-1012	TEQ	-- / --	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	8 / 8	19.0	93.0	CAS04-TS03-1012	TEQ	-- / --	--	--
Congeners (156/157)	-- - --	8 / 8	480	5,400	CAS04-TS03-1012	TEQ	-- / --	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	8 / 8	360	2,600	CAS04-TS03-1012	TEQ	-- / --	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	-- - --	8 / 8	8.80	50.0	CAS04-TS06-1012	TEQ	-- / --	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	8 / 8	160	440	CAS04-TS03-1012	TEQ	-- / --	--	--
TEQ (Fish)	-- - --	8 / 8	0.11	0.77	CAS04-TS03-1012	NSV	-- / --	NSV	**YES**
PCB Homologues (PG/G)									
Total Monochlorobiphenyls	3.60 - 100	1 / 8	61.0	61.0	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Dichlorobiphenyls	-- - --	8 / 8	30.0	2,800	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Trichlorobiphenyls	88.0 - 88.0	7 / 8	320	13,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--

TABLE L-74

Initial Screening Statistics - Site4/Youth Pond - Frog Tissue (wet weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Frog ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Total Tetrachlorobiphenyls	180 - 470	6 / 8	710	36,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Pentachlorobiphenyls	-- - --	8 / 8	970	53,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Hexachlorobiphenyls	-- - --	8 / 8	12,000	140,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Heptachlorobiphenyls	-- - --	8 / 8	21,000	120,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Octachlorobiphenyls	-- - --	8 / 8	4,400	30,000	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Total Nonachlorobiphenyls	-- - --	8 / 8	290	1,500	CAS04-TS06-1012	Total PCBs	-- / --	--	--
Decachlorobiphenyl (209)	-- - --	8 / 8	16.0	100	CAS04-TS06-1012	Total PCBs	-- / --	--	--
PCBs (total)	-- - --	8 / 8	38,731	396,461	CAS04-TS06-1012	22,800,000	0 / 8	0.02	NO
Other Parameters									
Percent Solids	-- - --	8 / 8	14.0	23.0	CAYP-TS01-1012	--	-- / --	--	--
Percent Lipids	-- - --	8 / 8	0.26	1.20	CAYP-TS01-1012	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-75

Exceedances - Site 4/Youth Pond - Frog Tissue (wet weight)

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Frog Tissue ESV	Maximum Background Value	CAS04-TS02	CAS04-TS03	CAS04-TS04	CAS04-TS05	CAS04-TS06	CAYP-TS01	CAYP-TS02	CAYP-TS03
			CAS04-TS02-1012	CAS04-TS03-1012	CAS04-TS04-1012	CAS04-TS05-1012	CAS04-TS06-1012	CAYP-TS01-1012	CAYP-TS02-1012	CAYP-TS03-1012
			Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Youth Pond	Youth Pond	Youth Pond
			Adult	Adult	Adult	Adult	Tadpole	Adult	Adult	Adult
			10/04/12	10/24/12	10/26/12	10/26/12	10/11/12	10/05/12	10/26/12	10/26/12
Inorganics (MG/KG)										
Aluminum	11.4	34.4	**24.5**	**51.8**	**121**	**60.3**	**274**	**10.6 J**	**58.4**	**91.8**
Arsenic	NSV	--	**0.04 J**	**0.08 J**	**0.18 J**	**0.12 J**	**1.8**	0.31 U	**0.12 J**	**0.2 J**
Barium	7.00	2.90	**1.6**	**2.4**	**2.5**	**3.2**	**6.5**	**2.6**	**2.9**	**4.5**
Beryllium	NSV	--	0.028 U	0.026 U	0.048 U	0.042 U	**0.01 J**	0.015 U	0.003 B	0.005 B
Cadmium	3.80	0.07	**0.02 J**	**0.22 J**	**0.22 J**	**0.1 J**	**0.11 J**	**0.04 J**	**0.17**	**0.2**
Chromium	NSV	0.14	0.26 B	0.35 B	**0.8 J**	0.37 B	**0.7**	**0.13 J**	**0.34 J**	**0.32**
Cobalt	NSV	0.03	**0.02 J**	**0.05 J**	**0.08 J**	**0.04 J**	**0.13 J**	0.02 B	0.04 B	0.05 B
Copper	13.0	2.00	**1.1 J**	**4.1**	**2.3 J**	**2 J**	**4.5**	**1.5**	**2.3**	**2.4**
Iron	3,800	135	**52.9**	**108**	**225**	**116**	**1,590**	**57.3**	**81.8**	**123**
Lead	0.78	--	**0.09 J**	**0.4**	**0.2 J**	**0.18 J**	**0.77**	0.1 B	**0.18**	**0.4**
Manganese	NSV	--	**1.9**	**2.4**	**2.1**	**2.8**	**34.5**	1.8 B	2.2 B	2.5 B
Mercury	NSV	--	**0.02 J**	0.028 B	0.02 B	0.02 B	**0.006 J**	**0.01 J**	0.03 B	0.04 B
Nickel	0.122	--	0.23 U	**0.08 J**	**0.22 J**	**0.05 J**	**0.29 J**	0.02 B	0.33 B	0.09 B
Selenium	NSV	0.24	0.41 B	0.44 B	**0.54**	0.49 B	0.42 B	**0.22 J**	**0.26 J**	**0.36**
Silver	NSV	0.007	0.23 U	0.21 U	0.38 U	0.33 U	**0.06 J**	0.031 U	0.005 B	0.005 B
Vanadium	NSV	--	**0.06 J**	**0.15 J**	**0.35 J**	**0.19 J**	**0.97**	0.31 U	**0.1 J**	**0.17 J**
Zinc	9.80	17.5	**16.9**	**17.4**	**17.6**	**16.8**	**24.3**	**17.9**	**19.2**	**25.2**
Dioxin-Like PCB Congeners (PG/G)										
3,3',4,4'-Tetrachlorobiphenyl (77)	TEQ	--	**37 J**	**140**	**13 X**	**17 X**	**310**	97 U	98 U	**8.2 X**
3,4,4',5-Tetrachlorobiphenyl (81)	TEQ	--	**24 X**	**33 X**	**5.4 X**	95 U	**8.3 X**	97 U	98 U	100 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	TEQ	--	**1,500**	**4,200**	**200**	**390**	**2,100**	**300**	**150**	**81 J**
2,3,4,4',5-Pentachlorobiphenyl (114)	TEQ	--	**110 X**	**500 X**	**12 X**	**51 X**	**62 X**	**21 X**	**62 J**	**12 X**
2,3',4,4',5-Pentachlorobiphenyl (118)	TEQ	--	**7,000**	**31,000**	**1,300**	**2,500**	**6,200**	**1,700**	**3,300**	**460**
2,3',4,4',5'-Pentachlorobiphenyl (123)	TEQ	--	**150 X**	**760**	**31 J**	**68 X**	**97 J**	**27 J**	**46 J**	**13 X**
3,3',4,4',5-Pentachlorobiphenyl (126)	TEQ	--	**49 X**	**93 J**	**43 J**	**48 J**	**62 X**	**57 X**	**31 X**	**19 X**
Congeners (156/157)	TEQ	--	**1,500**	**5,400**	**960**	**1,100**	**1,400**	**1,100**	**1,400**	**480**
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	TEQ	--	**1,600**	**2,600**	**860**	**740**	**890**	**900**	**830**	**360**
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	TEQ	--	**46 X**	**46 X**	**24 X**	**19 X**	**50 X**	**10 X**	**43 X**	**8.8 X**
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	TEQ	--	**420**	**440**	**360**	**260**	**420**	**350**	**330**	**160**
TEQ (Fish)	NSV	0.44	**0.330**	**0.765**	**0.242**	**0.275**	**0.524**	**0.307**	**0.188**	**0.107**
PCB Homologues (PG/G)										
Total Monochlorobiphenyls	Total PCBs	--	97 U	3.6 B	97 U	95 U	**61 J**	97 U	98 U	100 U
Total Dichlorobiphenyls	Total PCBs	--	**350 J**	**300 J**	**200 J**	**180 J**	**2,800 J**	**210 J**	**95 J**	**30 J**
Total Trichlorobiphenyls	Total PCBs	--	**4,300 J**	**2,000 J**	**520 J**	**940 J**	**13,000 J**	**510 J**	**320 J**	88 B
Total Tetrachlorobiphenyls	Total PCBs	--	**8,000 J**	**7,700 J**	**740 J**	**1,500 J**	**36,000 J**	470 B	**710 J**	180 B
Total Pentachlorobiphenyls	Total PCBs	--	**18,000 J**	**49,000 J**	**2,400 J**	**4,300 J**	**53,000 J**	**3,100 J**	**4,200 J**	**970 J**
Total Hexachlorobiphenyls	Total PCBs	--	**81,000 J**	**110,000 J**	**28,000 J**	**26,000 J**	**140,000 J**	**42,000 J**	**32,000 J**	**12,000 J**
Total Heptachlorobiphenyls	Total PCBs	--	**83,000 J**	**67,000 J**	**43,000 J**	**38,000 J**	**120,000 J**	**60,000 J**	**44,000 J**	**21,000 J**
Total Octachlorobiphenyls	Total PCBs	--	**18,000**	**12,000 J**	**9,200 J**	**8,700 J**	**30,000 J**	**14,000 J**	**10,000 J**	**4,400 J**
Total Nonachlorobiphenyls	Total PCBs	--	**850**	**740 J**	**520 J**	**490 J**	**1,500**	**600 J**	**620 J**	**290 J**
Decachlorobiphenyl (209)	Total PCBs	--	**49 J**	**81 X**	**26 X**	**33 X**	**100 X**	**16 J**	**29 X**	**41 X**
PCBs (total)	22,800,000	310,798	**213,549 J**	**248,821 J**	**84,606 J**	**80,143 J**	**396,461 J**	**120,436 J**	**91,974 J**	**38,731 J**
Other Parameters										
Percent Solids	--	--	**20**	**22**	**21**	**20**	**14**	**23**	**22**	**21**
Percent Lipids	--	--	**0.67**	**0.87**	**0.46**	**0.26**	**0.59**	**1.20**	**0.76**	**0.60**

Notes:

Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-76

Area-Specific Screening Statistics - Frog Tissue (wet weight) - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	5 / 5	24.5	274	CAS04-TS06-1012	106	100	202	11.4	5 / 5	24.0	17.7	9.33	34.4	4 / 5	7.97	57.0	3 / 5	4.81	3.54	1.87	**YES**
Arsenic	-- - --	5 / 5	0.040	1.80	CAS04-TS06-1012	0.44	0.76	1.17	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Beryllium	0.026 - 0.048	1 / 5	0.010	0.010	CAS04-TS06-1012	0.016	0.0059	0.022	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Chromium	0.26 - 0.37	2 / 5	0.70	0.80	CAS04-TS04-1012	0.40	0.32	0.71	NSV	-- / --	NSV	NSV	NSV	0.14	2 / 5	5.71	NSV	-- / --	NSV	NSV	NSV	**YES**
Cobalt	-- - --	5 / 5	0.020	0.13	CAS04-TS06-1012	0.064	0.043	0.10	NSV	-- / --	NSV	NSV	NSV	0.03	4 / 5	4.33	NSV	-- / --	NSV	NSV	NSV	**YES**
Manganese	-- - --	5 / 5	1.90	34.5	CAS04-TS06-1012	8.74	14.4	22.5	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Mercury	0.020 - 0.028	2 / 5	0.0060	0.020	CAS04-TS02-1012	0.012	0.0053	0.017	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Nickel	0.23 - 0.23	4 / 5	0.050	0.29	CAS04-TS06-1012	0.15	0.10	0.25	0.122	2 / 5	2.38	2.03	1.24	--	-- / --	--	0.61	0 / 5	0.48	0.41	0.25	NO
Selenium	0.41 - 0.49	1 / 5	0.54	0.54	CAS04-TS04-1012	0.28	0.14	0.42	NSV	-- / --	NSV	NSV	NSV	0.24	1 / 5	2.25	NSV	-- / --	NSV	NSV	NSV	**YES**
Silver	0.21 - 0.38	1 / 5	0.060	0.060	CAS04-TS06-1012	0.13	0.051	0.18	NSV	-- / --	NSV	NSV	NSV	0.007	1 / 5	8.57	NSV	-- / --	NSV	NSV	NSV	**YES**
Vanadium	-- - --	5 / 5	0.060	0.97	CAS04-TS06-1012	0.34	0.37	0.69	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Zinc	-- - --	5 / 5	16.8	24.3	CAS04-TS06-1012	18.6	3.20	21.7	9.80	5 / 5	2.48	2.21	1.90	17.5	2 / 5	1.39	49.0	0 / 5	0.50	0.44	0.38	NO
Dioxin-Like PCB Congeners (PG/G)																						
TEQ (Fish)	-- - --	5 / 5	0.24	0.77	CAS04-TS03-1012	0.43	0.22	0.64	NSV	-- / --	NSV	NSV	NSV	0.44	2 / 5	1.74	NSV	-- / --	NSV	NSV	NSV	**YES**
Other Parameters																						
Percent Solids	-- - --	5 / 5	14.0	22.0	CAS04-TS03-1012	19.4	3.13	22.4	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	5 / 5	0.26	0.87	CAS04-TS03-1012	0.57	0.23	0.79	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-77

Area-Specific Screening Statistics - Frog Tissue (wet weight) - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	3 / 3	10.6	91.8	CAYP-TS03-1012	53.6	40.8	122	11.4	2 / 3	8.05	10.7	4.70	34.4	2 / 3	2.67	57.0	2 / 3	1.61	2.15	0.94	**YES**
Arsenic	0.31 - 0.31	2 / 3	0.12	0.20	CAYP-TS03-1012	0.16	0.040	0.23	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Beryllium	0.0030 - 0.015	0 / 3	--	--	--	0.0038	0.0032	0.0093	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	NO
Chromium	-- - --	3 / 3	0.13	0.34	CAYP-TS02-1012	0.26	0.12	0.46	NSV	-- / --	NSV	NSV	NSV	0.14	2 / 3	2.43	NSV	-- / --	NSV	NSV	NSV	**YES**
Cobalt	0.020 - 0.050	0 / 3	--	--	--	0.018	0.0076	0.031	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	NO
Manganese	1.80 - 2.50	0 / 3	--	--	--	1.08	0.18	1.38	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	NO
Mercury	0.030 - 0.040	1 / 3	0.010	0.010	CAYP-TS01-1012	0.015	0.0050	0.023	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Nickel	0.020 - 0.33	0 / 3	--	--	--	0.073	0.081	0.21	0.122	-- / --	2.70	1.72	0.60	--	-- / --	--	0.61	-- / --	0.54	0.34	0.12	NO
Selenium	-- - --	3 / 3	0.22	0.36	CAYP-TS03-1012	0.28	0.072	0.40	NSV	-- / --	NSV	NSV	NSV	0.24	2 / 3	1.50	NSV	-- / --	NSV	NSV	NSV	**YES**
Silver	0.0050 - 0.031	0 / 3	--	--	--	0.0068	0.0075	0.019	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	NO
Vanadium	0.31 - 0.31	2 / 3	0.10	0.17	CAYP-TS03-1012	0.14	0.037	0.20	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	**YES**
Zinc	-- - --	3 / 3	17.9	25.2	CAYP-TS03-1012	20.8	3.89	27.3	9.80	3 / 3	2.57	2.79	2.12	17.5	3 / 3	1.44	49.0	0 / 3	0.51	0.56	0.42	NO
Dioxin-Like PCB Congeners (PG/G)																						
TEQ (Fish)	-- - --	3 / 3	0.11	0.31	CAYP-TS01-1012	0.20	0.10	0.37	NSV	-- / --	NSV	NSV	NSV	0.44	0 / 3	0.70	NSV	-- / --	NSV	NSV	NSV	NO
Other Parameters																						
Percent Solids	-- - --	3 / 3	21.0	23.0	CAYP-TS01-1012	22.0	1.00	23.7	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	3 / 3	0.60	1.20	CAYP-TS01-1012	0.85	0.31	1.38	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-78

Initial Screening Statistics - Site4/Youth Pond - Fish Tissue (wet weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Fish ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
Inorganics (MG/KG)									
Aluminum	1.87 - 7.20	8 / 12	3.46	53.7	CAS04-TS12-WB-1012	8.53	5 / 12	6.30	**YES**
Antimony	0.026 - 0.47	0 / 12	--	--	--	5.00	-- / --	0.09	NO
Arsenic	0.21 - 0.39	6 / 12	0.060	0.20	CAS04-TS12-WB-1012	1.80	0 / 12	0.11	NO
Barium	-- - --	12 / 12	0.38	4.40	CAS04-TS09-WB-1012	NSV	-- / --	NSV	**YES**
Beryllium	0.004 - 0.047	0 / 12	--	--	--	5.13	-- / --	0.01	NO
Cadmium	0.010 - 0.28	5 / 12	0.0060	0.030	CAYP-TS05-WB-1012	0.036	0 / 12	0.83	NO
Calcium [3]	-- - --	12 / 12	5,260	23,200	CAS04-TS11-WB-1012	NSV	-- / --	NSV	NO
Chromium	0.15 - 0.37	5 / 12	0.11	0.18	CAYP-TS07-WB-1012	0.26	0 / 12	0.68	NO
Cobalt	0.020 - 0.040	7 / 12	0.020	0.11	CAS04-TS13-WB-1012	NSV	-- / --	NSV	**YES**
Copper	-- - --	12 / 12	0.29	1.40	CAS04-TS08-WB-1012	1.51	0 / 12	0.93	NO
Iron	-- - --	12 / 12	14.9	183	CAS04-TS12-WB-1012	NSV	-- / --	NSV	**YES**
Lead	0.033 - 0.37	1 / 12	0.17	0.17	CAS04-TS12-WB-1012	2.50	0 / 12	0.07	NO
Magnesium [3]	-- - --	12 / 12	272	602	CAS04-TS11-WB-1012	NSV	-- / --	NSV	NO
Manganese	1.30 - 1.90	10 / 12	0.87	11.0	CAYP-TS06-WB-1012	NSV	-- / --	NSV	**YES**
Mercury	-- - --	12 / 12	0.0090	0.066	CAYP-TS08-WB-1012	0.21	0 / 12	0.31	NO
Nickel	0.062 - 0.37	0 / 12	--	--	--	0.82	-- / --	0.45	NO
Potassium [3]	-- - --	12 / 12	2,210	2,938	CAS04-TS13-WB-1012	NSV	-- / --	NSV	NO
Selenium	0.36 - 0.61	5 / 12	0.19	0.26	CAYP-TS05-WB-1012	0.80	0 / 12	0.33	NO
Silver	0.021 - 0.37	0 / 12	--	--	--	0.12	-- / --	3.08	**YES**
Sodium [3]	-- - --	12 / 12	708	1,360	CAS04-TS11-WB-1012	NSV	-- / --	NSV	NO
Thallium	0.021 - 0.47	0 / 12	--	--	--	2.72	-- / --	0.17	NO
Vanadium	0.21 - 0.39	6 / 12	0.030	0.17	CAS04-TS12-WB-1012	5.74	0 / 12	0.03	NO
Zinc	-- - --	12 / 12	13.3	67.8	CAYP-TS06-WB-1012	60.0	2 / 12	1.13	**YES**
Polychlorinated Biphenyls (UG/KG)									
Aroclor-1016	23.5 - 25.7	0 / 2	--	--	--	110,000	-- / --	0.0002	NO
Aroclor-1221	23.5 - 25.7	0 / 2	--	--	--	NSV	-- / --	NSV	NO
Aroclor-1232	27.5 - 29.7	0 / 2	--	--	--	NSV	-- / --	NSV	NO
Aroclor-1242	23.5 - 25.7	0 / 2	--	--	--	14,300	-- / --	0.002	NO
Aroclor-1248	23.5 - 25.7	0 / 2	--	--	--	2,800	-- / --	0.01	NO
Aroclor-1254	23.5 - 23.5	1 / 2	146	146	CAS04-TS13-WB-1012	21,000	0 / 2	0.01	NO
Aroclor-1260	-- - --	2 / 2	150	788	CAS04-TS13-WB-1012	32,000	0 / 2	0.02	NO
Dioxin-Like PCB Congeners (PG/G)									
3,3',4,4'-Tetrachlorobiphenyl (77)	99.0 - 99.0	11 / 12	50.4	1,600	CAS04-TS07-WB-1012	TEQ	-- / --	--	--
3,4,4',5-Tetrachlorobiphenyl (81)	96.0 - 100	8 / 12	5.60	59.0	CAS04-TS08-WB-1012	TEQ	-- / --	--	--
2,3,3',4,4'-Pentachlorobiphenyl (105)	-- - --	12 / 12	975	20,000	CAS04-TS10-WB-1012	TEQ	-- / --	--	--
2,3,4,4',5-Pentachlorobiphenyl (114)	-- - --	12 / 12	23.0	630	CAS04-TS11-WB-1012	TEQ	-- / --	--	--
2,3',4,4',5-Pentachlorobiphenyl (118)	-- - --	12 / 12	3,700	56,000	CAS04-TS10-WB-1012	TEQ	-- / --	--	--

TABLE L-78

Initial Screening Statistics - Site4/Youth Pond - Fish Tissue (wet weight)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Fish ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?
2,3',4,4',5'-Pentachlorobiphenyl (123)	-- - --	12 / 12	39.0	1,000	CAS04-TS09-WB-1012	TEQ	-- / --	--	--
3,3',4,4',5-Pentachlorobiphenyl (126)	-- - --	12 / 12	15.0	380	CAS04-TS07-WB-1012	TEQ	-- / --	--	--
Congeners (156/157)	-- - --	12 / 12	270	11,000	CAS04-TS11-WB-1012	TEQ	-- / --	--	--
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	-- - --	12 / 12	930	8,500	CAS04-TS10-WB-1012	TEQ	-- / --	--	--
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	96.0 - 100	9 / 12	24.0	170	CAS04-TS07-WB-1012	TEQ	-- / --	--	--
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	-- - --	12 / 12	63.0	2,700	CAS04-TS11-WB-1012	TEQ	-- / --	--	--
TEQ (Fish)	-- - --	12 / 12	0.14	2.98	CAS04-TS07-WB-1012	23,500	0 / 12	0.0001	NO
PCB Homologues (PG/G)									
Total Monochlorobiphenyls	53.5 - 100	7 / 12	99.0	720	CAS04-TS08-WB-1012	Total PCBs	-- / --	--	--
Total Dichlorobiphenyls	-- - --	12 / 12	418	34,000	CAS04-TS09-WB-1012	Total PCBs	-- / --	--	--
Total Trichlorobiphenyls	-- - --	12 / 12	1,947	120,000	CAS04-TS07-WB-1012	Total PCBs	-- / --	--	--
Total Tetrachlorobiphenyls	-- - --	12 / 12	5,276	330,000	CAS04-TS09-WB-1012	Total PCBs	-- / --	--	--
Total Pentachlorobiphenyls	-- - --	12 / 12	23,766	480,000	CAS04-TS09-WB-1012	Total PCBs	-- / --	--	--
Total Hexachlorobiphenyls	-- - --	12 / 12	120,000	1,100,000	CAS04-TS10-WB-1012	Total PCBs	-- / --	--	--
Total Heptachlorobiphenyls	-- - --	12 / 12	95,000	780,000	CAS04-TS10-WB-1012	Total PCBs	-- / --	--	--
Total Octachlorobiphenyls	-- - --	12 / 12	15,000	160,000	CAS04-TS11-WB-1012	Total PCBs	-- / --	--	--
Total Nonachlorobiphenyls	-- - --	12 / 12	240	6,500	CAS04-TS11-WB-1012	Total PCBs	-- / --	--	--
Decachlorobiphenyl (209)	100 - 100	11 / 12	6.70	390	CAS04-TS11-WB-1012	Total PCBs	-- / --	--	--
PCBs (total)	-- - --	12 / 12	272,887	2,677,380	CAS04-TS09-WB-1012	2,800,000	0 / 12	0.96	NO
Other Parameters									
Percent Solids	-- - --	12 / 12	22.0	30.0	CAS04-TS10-WB-1012	--	-- / --	--	--
Percent Lipids	-- - --	11 / 11	0.95	11.0	CAYP-TS07-WB-1012	--	-- / --	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC

TABLE L-79

Exceedances - Site 4/Youth Pond - Fish Tissue (wet weight)

Site4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Fish Tissue ESV	Maximum Background Value	CAS04-TS07	CAS04-TS08	CAS04-TS09	CAS04-TS10	CAS04-TS11	CAS04-TS12	CAS04-TS13	CAYP-TS04	CAYP-TS05	CAYP-TS06	CAYP-TS07	CAYP-TS08
			CAS04-TS07-WB-1012	CAS04-TS08-WB-1012	CAS04-TS09-WB-1012	CAS04-TS10-WB-1012	CAS04-TS11-WB-1012	CAS04-TS12-WB-1012	CAS04-TS13-WB-1012	CAYP-TS04-WB-1012	CAYP-TS05-WB-1012	CAYP-TS06-WB-1012	CAYP-TS07-WB-1012	CAYP-TS08-WB-1012
			Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Upstream Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond	Youth Pond
			Golden shiner	Mosquitofish	Mosquitofish	American eel	Bluegill	Brown bullhead	Largemouth bass	Bluegill	Largemouth bass	Mosquitofish	American eel	Largemouth bass
			10/04/12	10/05/12	10/05/12	10/04/12	10/04/12	10/04/12	10/04/12	10/05/12	10/05/12	10/09/12	10/05/12	10/05/12
Inorganics (MG/KG)														
Aluminum	8.53	6.23	**36.4**	**11.4 J**	**15.2 J**	**7.4 J**	**8.5 J**	**53.7**	**3.46 J**	**9.4 J**	3.3 B	3.4 B	7.2 B	1.87 B
Arsenic	1.80	0.20	**0.09 J**	**0.06 J**	**0.11 J**	0.27 U	**0.12 J**	**0.2 J**	0.281 U	0.21 U	0.28 U	**0.16 J**	0.39 U	0.323 U
Barium	NSV	1.20	**1.6**	**3.7**	**4.4**	**0.38**	**0.71**	**1.1**	**0.460**	**0.8**	**0.49**	**3.1**	**0.54**	**0.492 J**
Cadmium	0.036	--	0.02 B	0.24 U	0.28 U	**0.02 J**	**0.006 J**	**0.007 J**	0.164 U	0.01 U	**0.03 J**	0.018 U	**0.02 J**	0.0161 U
Chromium	0.263	0.15	0.27 B	0.28 B	0.27 B	0.15 B	0.33 B	0.37 B	0.254 B	**0.14 J**	**0.14 J**	**0.11 J**	**0.18 J**	**0.174 J**
Cobalt	NSV	0.18	**0.06 J**	**0.02 J**	**0.03 J**	**0.03 J**	**0.05 J**	**0.05 J**	**0.106 J**	0.02 B	0.04 B	0.02 B	0.03 B	0.0272 B
Copper	1.51	0.85	**1 J**	**1.4 J**	**1.4 J**	**0.66 J**	**0.62 J**	**1.2 J**	**0.712 J**	**0.46**	**0.72**	**1.2**	**0.55**	**0.287 J**
Iron	NSV	91.4	**119**	**43.5**	**110**	**79.1**	**56.3**	**183**	**14.9 J**	**67.8**	**50.1 L**	**86.2**	**37.7**	**63.6**
Lead	2.50	--	0.29 U	0.31 U	0.37 U	0.22 U	0.25 U	**0.17 J**	0.224 U	0.05 B	0.05 B	0.05 B	0.05 B	0.0330 B
Manganese	NSV	5.30	**3.5**	**5.7**	**7.9**	**0.87**	**6.9**	**2.3**	**1.53**	**3.7**	1.3 B	**11**	1.9 B	**1.37**
Mercury	0.21	0.098	**0.01 J**	**0.02 J**	**0.01 J**	**0.03**	**0.03**	**0.01 J**	**0.03**	**0.009 J**	**0.02 J**	**0.009 J**	**0.01 J**	**0.0660**
Selenium	0.80	0.18	0.61 B	0.36 B	0.56 B	0.59 B	0.48 B	0.57 B	0.454 B	**0.19 J**	**0.26 J**	**0.19 J**	**0.19 J**	**0.198 J**
Vanadium	5.74	0.18	**0.11 J**	0.31 U	**0.06 J**	**0.03 J**	**0.05 J**	**0.17 J**	**0.119 J**	0.21 U	0.28 U	0.36 U	0.39 U	0.323 U
Zinc	60.0	28.8	**30.9**	**57.8**	**65.1**	**23**	**27.3**	**19.7**	**13.3**	**25.8**	**16.9**	**67.8**	**23.3**	**18.4**
Pesticide/Polychlorinated Biphenyls (UG/KG)														
Aroclor-1254	21,000	--	NA	NA	NA	NA	NA	NA	**146 L**	NA	NA	NA	NA	23.5 UL
Aroclor-1260	32,000	68.5	NA	NA	NA	NA	NA	NA	**788 L**	NA	NA	NA	NA	**150 L**
Dioxin-Like PCB Congeners (PG/G)														
3,3',4,4'-Tetrachlorobiphenyl (77)	TEQ	--	**1,600**	**690**	**930**	**53 J**	**800**	**270**	**1,264 X**	**84 J**	**95 J**	**62 J**	99 U	**50.4 X**
3,4,4',5-Tetrachlorobiphenyl (81)	TEQ	--	**53 X**	**59 X**	**52 X**	**18 X**	**31 X**	**18 X**	**56.8 X**	96 U	**5.6 J**	100 U	99 U	99.5 U
2,3,3',4,4'-Pentachlorobiphenyl (105)	TEQ	--	**10,000**	**15,000 K**	**18,000**	**20,000**	**15,000**	**5,400**	**15,543**	**1,000**	**1,900 K**	**1,200**	**2,400**	**975**
2,3,4,4',5-Pentachlorobiphenyl (114)	TEQ	--	**440**	**350 X**	**590**	**570 X**	**630**	**240**	**589 X**	**54 J**	**91 X**	**23 X**	**110 X**	**67.4 X**
2,3',4,4',5-Pentachlorobiphenyl (118)	TEQ	--	**29,000**	**49,000 K**	**55,000**	**56,000**	**48,000**	**18,000**	**48,079**	**3,700**	**7,200 K**	**4,800**	**8,200**	**4,006**
2,3',4,4',5'-Pentachlorobiphenyl (123)	TEQ	--	**640**	**820 X**	**1,000**	**830**	**910**	**330**	**905 X**	**45 X**	**86 J**	**39 X**	**74 X**	**50.9 J**
3,3',4,4',5-Pentachlorobiphenyl (126)	TEQ	--	**380**	**140**	**190**	**230**	**210 X**	**170 X**	**370 J**	**70 X**	**110**	**15 X**	**84 X**	**104 X**
Congeners (156/157)	TEQ	--	**6,400**	**1,900**	**2,500**	**6,700**	**11,000**	**4,000**	**6,946**	**1,700**	**2,200 K**	**270**	**2,700**	**2,535**
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	TEQ	--	**4,200**	**6,500 K**	**7,400**	**8,500**	**8,100**	**2,800**	**7,046**	**930**	**2,500 K**	**1,300**	**1,500**	**1,854**
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	TEQ	--	**170**	**140**	98 U	**49 X**	96 U	**110**	**55.1 X**	**24 X**	**150 X**	100 U	**67 X**	**72.4 X**
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	TEQ	--	**1,800**	**410**	**490**	**1,800**	**2,700**	**920**	**1,834**	**390**	**580 K**	**63 J**	**610**	**847**
TEQ (Fish)	23,500	0.27	**2.98**	**1.43**	**1.85**	**1.65**	**1.88**	**1.15**	**2.89**	**0.432**	**0.678**	**0.144**	**0.501**	**0.603**
PCB Homologues (PG/G)														
Total Monochlorobiphenyls	Total PCBs	--	**310**	**720 J**	**720**	**99**	**140**	**370**	**576 J**	96 U	96 U	100 U	99 U	53.5 U
Total Dichlorobiphenyls	Total PCBs	--	**17,000 J**	**33,000 J**	**34,000 J**	**4,200 J**	**6,600 J**	**20,000 J**	**30,635 J**	**1,300 J**	**650 J**	**920 J**	**650 J**	**418 J**
Total Trichlorobiphenyls	Total PCBs	--	**120,000 J**	**100,000 J**	**120,000 J**	**46,000 J**	**32,000 J**	**45,000 J**	**92,219 J**	**4,100 J**	**3,800 J**	**4,600 J**	**4,600 J**	**1,947 J**
Total Tetrachlorobiphenyls	Total PCBs	--	**200,000 J**	**280,000 J**	**330,000 J**	**190,000 J**	**150,000 J**	**110,000 J**	**254,901 J**	**8,900 J**	**11,000 J**	**12,000 J**	**15,000 J**	**5,276 J**
Total Pentachlorobiphenyls	Total PCBs	--	**300,000 J**	**380,000 J**	**480,000 J**	**350,000 J**	**340,000 J**	**150,000 J**	**389,947 J**	**26,000 J**	**41,000 J**	**33,000 J**	**47,000 J**	**23,766 J**
Total Hexachlorobiphenyls	Total PCBs	--	**670,000 J**	**870,000**	**980,000 J**	**1,100,000 J**	**1,000,000 J**	**370,000 J**	**991,281 J**	**120,000 J**	**240,000 J**	**140,000 J**	**190,000 J**	**164,631 J**
Total Heptachlorobiphenyls	Total PCBs	--	**530,000 J**	**590,000 J**	**620,000 J**	**780,000**	**770,000 J**	**260,000 J**	**704,624 J**	**95,000 J**	**220,000 J**	**110,000 J**	**150,000 J**	**164,112 J**
Total Octachlorobiphenyls	Total PCBs	--	**110,000**	**93,000**	**110,000**	**150,000**	**160,000 J**	**46,000 J**	**154,055**	**17,000 J**	**37,000**	**15,000**	**25,000 J**	**34,265 J**
Total Nonachlorobiphenyls	Total PCBs	--	**5,200**	**2,100**	**2,500**	**5,000**	**6,500**	**1,900**	**5,761 J**	**580 J**	**1,000 J**	**240**	**970 J**	**1,225 J**
Decachlorobiphenyl (209)	Total PCBs	--	**310**	**130 X**	**160 X**	**320**	**390 X**	**100 J**	**341 J**	**6.7 X**	**25 X**	100 U	**34 X**	**84.1 X**
PCBs (total)	2,800,000	90,258	**1,952,820 J**	**2,348,950 J**	**2,677,380 J**	**2,625,619 J**	**2,465,630 J**	**1,003,370 J**	**2,624,342 J**	**272,887 J**	**554,475 J**	**315,760 J**	**433,254 J**	**395,723 J**
Other Parameters														
Percent Solids	--	--	**25**	**25**	**26**	**30**	**24**	**22**	**24.6**	**27**	**24**	**25**	**29**	**22.4**
Percent Lipids	--	--	**1.6**	**4.1**	**3.6**	**8.8**	**0.95**	NA	**2.50**	**3.9**	**2.2**	**4.2**	**11**	**1.11**

Notes:

Grey highlighting indicates value greater than ESV

Yellow highlighting indicates value equal to ESV

Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL

Bold indicates detections

NA - Not analyzed

TABLE L-80

Area-Specific Screening Statistics - Fish Tissue (wet weight) - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	-- - --	7 / 7	3.46	53.7	CAS04-TS12-WB-1012	19.4	18.5	33.1	8.53	4 / 7	6.30	3.88	2.28	6.23	6 / 7	8.62	42.7	1 / 7	1.26	0.77	0.46	**YES**
Barium	-- - --	7 / 7	0.38	4.40	CAS04-TS09-WB-1012	1.76	1.63	2.96	NSV	-- / --	NSV	NSV	NSV	1.20	3 / 7	3.67	NSV	-- / --	NSV	NSV	NSV	**YES**
Cobalt	-- - --	7 / 7	0.020	0.11	CAS04-TS13-WB-1012	0.049	0.029	0.070	NSV	-- / --	NSV	NSV	NSV	0.18	0 / 7	0.59	NSV	-- / --	NSV	NSV	NSV	NO
Iron	-- - --	7 / 7	14.9	183	CAS04-TS12-WB-1012	86.5	56.1	128	NSV	-- / --	NSV	NSV	NSV	91.4	3 / 7	2.00	NSV	-- / --	NSV	NSV	NSV	**YES**
Manganese	-- - --	7 / 7	0.87	7.90	CAS04-TS09-WB-1012	4.10	2.75	6.12	NSV	-- / --	NSV	NSV	NSV	5.30	3 / 7	1.49	NSV	-- / --	NSV	NSV	NSV	**YES**
Zinc	-- - --	7 / 7	13.3	65.1	CAS04-TS09-WB-1012	33.9	19.8	48.4	60.0	1 / 7	1.09	0.81	0.56	28.8	3 / 7	2.26	300	0 / 7	0.22	0.16	0.11	NO
Other Parameters																						
Percent Solids	-- - --	7 / 7	22.0	30.0	CAS04-TS10-WB-1012	25.2	2.44	27.0	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	6 / 6	0.95	8.80	CAS04-TS10-WB-1012	3.59	2.81	5.90	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-81

Area-Specific Screening Statistics - Fish Tissue (wet weight) - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	NOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	Maximum Background Value	Frequency of UTL Exceedance	Maximum Ratio	LOEC ESV	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Inorganics (MG/KG)																						
Aluminum	1.87 - 7.20	1 / 5	9.40	9.40	CAYP-TS04-WB-1012	3.46	3.47	6.76	8.53	1 / 5	1.10	0.79	0.41	6.23	1 / 5	1.51	42.7	0 / 5	0.22	0.16	0.08	NO
Barium	-- - --	5 / 5	0.49	3.10	CAYP-TS06-WB-1012	1.08	1.13	2.17	NSV	-- / --	NSV	NSV	NSV	1.20	1 / 5	2.58	NSV	-- / --	NSV	NSV	NSV	**YES**
Cobalt	0.020 - 0.040	0 / 5	--	--	--	0.014	0.0041	0.018	NSV	-- / --	NSV	NSV	NSV	--	-- / --	--	NSV	-- / --	NSV	NSV	NSV	NO
Iron	-- - --	5 / 5	37.7	86.2	CAYP-TS06-WB-1012	61.1	18.4	78.6	NSV	-- / --	NSV	NSV	NSV	91.4	0 / 5	0.94	NSV	-- / --	NSV	NSV	NSV	NO
Manganese	1.30 - 1.90	3 / 5	1.37	11.0	CAYP-TS06-WB-1012	3.53	4.34	7.67	NSV	-- / --	NSV	NSV	NSV	5.30	1 / 5	2.08	NSV	-- / --	NSV	NSV	NSV	**YES**
Zinc	-- - --	5 / 5	16.9	67.8	CAYP-TS06-WB-1012	30.4	21.2	50.6	60.0	1 / 5	1.13	0.84	0.51	28.8	1 / 5	2.35	300	0 / 5	0.23	0.17	0.10	NO
Other Parameters																						
Percent Solids	-- - --	5 / 5	22.4	29.0	CAYP-TS07-WB-1012	25.5	2.59	27.9	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--
Percent Lipids	-- - --	5 / 5	1.11	11.0	CAYP-TS07-WB-1012	4.48	3.86	8.16	--	-- / --	--	--	--	--	-- / --	--	--	-- / --	--	--	--	--

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

2 - Shaded cells indicate hazard quotient based on reporting limits

TABLE L-82

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Site-Wide

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.59E-01	2.27E-01	1.44E-01	8.71E-02	5.51E-02	3.49E-02	3.42E-01	2.16E-01	1.37E-01	2.17E-02	1.37E-02	8.67E-03	**1.07E+00**	6.19E-01	3.57E-01	1.82E-01	1.44E-01	1.14E-01	**1.13E+01**	**5.05E+00**	**2.26E+00**	**1.24E+00**	9.85E-01	7.79E-01
Cadmium	7.80E-02	3.49E-02	1.56E-02	2.58E-02	1.15E-02	5.16E-03	1.85E-01	8.28E-02	3.70E-02	3.37E-02	1.51E-02	6.74E-03	8.06E-02	3.61E-02	1.61E-02	2.23E-02	7.04E-03	2.23E-03	3.76E-01	1.19E-01	3.76E-02	9.94E-02	3.14E-02	9.94E-03
Chromium	2.03E-01	9.08E-02	4.06E-02	6.84E-02	3.06E-02	1.37E-02	2.97E-01	1.33E-01	5.94E-02	2.19E-02	9.78E-03	4.38E-03	2.04E-01	9.13E-02	4.08E-02	3.45E-02	1.54E-02	6.90E-03	4.12E-01	1.84E-01	8.25E-02	1.36E-01	6.09E-02	2.72E-02
Copper	**1.35E+01**	**7.81E+00**	**4.52E+00**	3.01E-01	1.74E-01	1.01E-01	**5.11E+00**	**2.96E+00**	**1.71E+00**	5.36E-02	3.10E-02	1.79E-02	**2.96E+01**	**1.71E+01**	**9.89E+00**	5.04E-02	4.43E-02	3.90E-02	5.96E-01	4.62E-01	3.58E-01	**1.87E+00**	**1.65E+00**	**1.45E+00**
Lead	2.26E-01	1.01E-01	4.53E-02	5.27E-02	2.36E-02	1.05E-02	**1.59E+00**	**1.12E+00**	7.95E-01	1.77E-02	7.90E-03	3.53E-03	3.12E-01	1.40E-01	6.24E-02	2.01E-02	1.46E-02	1.06E-02	**1.00E+00**	7.30E-01	5.31E-01	3.25E-01	2.36E-01	1.72E-01
Mercury	**3.71E+00**	**2.14E+00**	**1.24E+00**	2.80E-01	1.62E-01	9.33E-02	**2.40E+00**	**1.39E+00**	8.00E-01	4.48E-02	2.86E-02	1.83E-02	**6.63E+00**	**3.83E+00**	**2.21E+00**	3.81E-02	2.97E-02	2.32E-02	**1.17E+00**	5.25E-01	2.35E-01	2.46E-01	1.92E-01	1.50E-01
Nickel	5.97E-02	2.67E-02	1.19E-02	1.68E-02	7.53E-03	3.37E-03	4.14E-02	1.85E-02	8.28E-03	1.01E-02	4.52E-03	2.02E-03	4.12E-02	1.84E-02	8.24E-03	4.50E-02	3.18E-02	2.25E-02	2.23E-01	1.58E-01	1.12E-01	8.69E-02	6.14E-02	4.34E-02
Selenium	2.63E-01	1.18E-01	5.26E-02	6.56E-02	2.93E-02	1.31E-02	**1.27E+00**	8.96E-01	6.33E-01	3.67E-02	1.64E-02	7.33E-03	**1.24E+00**	8.75E-01	6.19E-01	3.50E-01	2.73E-01	2.12E-01	**2.16E+00**	**1.68E+00**	**1.31E+00**	7.98E-01	6.21E-01	4.84E-01
Silver	6.03E-02	2.70E-02	1.21E-02	1.48E-02	6.62E-03	2.96E-03	1.46E-02	6.55E-03	2.93E-03	1.67E-02	7.48E-03	3.35E-03	2.08E-02	9.28E-03	4.15E-03	4.69E-03	2.10E-03	9.39E-04	6.58E-03	2.94E-03	1.32E-03	3.10E-03	1.38E-03	6.19E-04
Zinc	7.46E-01	3.34E-01	1.49E-01	2.17E-01	9.72E-02	4.35E-02	3.32E-01	1.49E-01	6.65E-02	9.29E-02	4.15E-02	1.86E-02	2.02E-01	9.04E-02	4.04E-02	1.58E-01	7.05E-02	3.15E-02	2.91E-01	1.30E-01	5.82E-02	9.01E-02	4.03E-02	1.80E-02
Polychlorinated Biphenyls																								
Aroclor-1016	1.91E-01	8.55E-02	3.82E-02	6.24E-02	2.79E-02	1.25E-02	1.43E-02	6.39E-03	2.86E-03	1.92E-02	8.58E-03	3.84E-03	6.13E-01	2.74E-01	1.23E-01	5.09E-02	3.22E-02	2.03E-02	8.21E-02	3.67E-02	1.64E-02	1.31E-02	8.26E-03	5.22E-03
Aroclor-1221	4.56E-01	2.04E-01	9.11E-02	1.47E-01	6.58E-02	2.94E-02	5.44E-02	2.43E-02	1.09E-02	1.92E-02	8.60E-03	3.85E-03	**1.37E+00**	6.14E-01	2.74E-01	**1.20E+00**	5.37E-01	2.40E-01	3.84E-01	1.72E-01	7.67E-02	3.55E-01	1.59E-01	7.09E-02
Aroclor-1232	3.02E-01	1.35E-01	6.04E-02	9.81E-02	4.39E-02	1.96E-02	2.88E-02	1.29E-02	5.75E-03	2.24E-02	1.00E-02	4.49E-03	9.38E-01	4.19E-01	1.88E-01	8.00E-01	3.58E-01	1.60E-01	1.86E-01	8.32E-02	3.72E-02	2.20E-01	9.85E-02	4.40E-02
Aroclor-1242	3.49E-02	1.56E-02	6.98E-03	1.16E-02	5.19E-03	2.32E-03	2.49E-03	1.11E-03	4.97E-04	1.92E-02	8.59E-03	3.84E-03	1.26E-01	5.65E-02	2.53E-02	9.47E-02	4.24E-02	1.89E-02	1.62E-02	7.24E-03	3.24E-03	2.21E-02	9.87E-03	4.41E-03
Aroclor-1248	1.27E-02	5.68E-03	2.54E-03	4.27E-03	1.91E-03	8.53E-04	7.45E-04	3.33E-04	1.49E-04	1.92E-02	8.60E-03	3.85E-03	4.92E-02	2.20E-02	9.85E-03	3.48E-02	1.56E-02	6.96E-03	5.02E-03	2.24E-03	1.00E-03	7.95E-03	3.55E-03	1.59E-03
Aroclor-1254	**1.53E+01**	**6.84E+00**	**3.06E+00**	**4.68E+00**	**2.09E+00**	9.36E-01	**1.14E+00**	5.12E-01	2.29E-01	1.08E-01	4.83E-02	2.16E-02	**3.53E+01**	**1.58E+01**	**7.07E+00**	**3.82E+01**	**1.71E+01**	**7.63E+00**	**3.47E+00**	**1.55E+00**	6.94E-01	**1.37E+01**	**6.11E+00**	**2.73E+00**
Aroclor-1260	**1.69E+00**	7.54E-01	3.37E-01	5.35E-01	2.39E-01	1.07E-01	1.04E-01	4.63E-02	2.07E-02	5.80E-01	2.60E-01	1.16E-01	**4.61E+00**	**2.06E+00**	9.22E-01	**4.36E+00**	**1.95E+00**	8.72E-01	3.42E-01	1.53E-01	6.84E-02	**1.28E+00**	5.73E-01	2.56E-01
PCB (total)	**3.54E+00**	**1.58E+00**	7.08E-01	2.83E-01	1.26E-01	5.65E-02	**1.14E+00**	5.12E-01	2.29E-01	**1.93E+00**	8.65E-01	3.87E-01	**3.53E+01**	**1.58E+01**	**7.07E+00**	**2.96E+00**	**1.32E+00**	5.92E-01	**3.47E+00**	**1.55E+00**	6.94E-01	**1.20E+01**	**5.38E+00**	**2.41E+00**
Pesticides																								
4,4'-DDD	**1.04E+00**	3.28E-01	1.04E-01	3.52E-01	1.11E-01	3.52E-02	1.15E-01	5.16E-02	2.31E-02	4.05E-01	1.28E-01	4.05E-02	4.55E-01	2.04E-01	9.10E-02	5.35E-01	2.39E-01	1.07E-01	4.96E-02	2.22E-02	9.92E-03	1.00E-01	4.49E-02	2.01E-02
4,4'-DDE	**1.71E+01**	**5.42E+00**	**1.71E+00**	**6.24E+00**	**1.97E+00**	6.24E-01	1.76E-01	7.89E-02	3.53E-02	**7.19E+00**	**2.27E+00**	7.19E-01	7.18E-01	3.21E-01	1.44E-01	**9.49E+00**	**4.24E+00**	**1.90E+00**	7.40E-02	3.31E-02	1.48E-02	5.46E-01	2.44E-01	1.09E-01
4,4'-DDT	**9.59E+00**	**3.03E+00**	9.59E-01	**3.47E+00**	**1.10E+00**	3.47E-01	7.71E-02	4.87E-02	3.08E-02	**4.00E+00**	**1.27E+00**	4.00E-01	1.44E-01	9.11E-02	5.76E-02	**5.28E+00**	**2.36E+00**	**1.06E+00**	3.41E-01	1.52E-01	6.81E-02	4.23E-01	1.89E-01	8.46E-02
Aldrin	5.90E-03	2.64E-03	1.18E-03	2.12E-03	9.48E-04	4.24E-04	2.15E-04	9.63E-05	4.31E-05	2.45E-03	1.09E-03	4.89E-04	3.94E-04	1.76E-04	7.89E-05	1.22E-03	5.48E-04	2.45E-04	1.76E-04	7.87E-05	3.52E-05	1.61E-04	7.18E-05	3.21E-05
alpha-BHC	1.08E-01	5.39E-02	2.69E-02	3.83E-02	1.91E-02	9.54E-03	2.25E-02	1.12E-02	5.60E-03	4.42E-02	2.20E-02	1.10E-02	8.24E-03	4.11E-03	2.05E-03	1.00E-02	7.07E-03	5.00E-03	7.02E-03	4.96E-03	3.51E-03	1.97E-03	1.39E-03	9.83E-04
alpha-Chlordane	2.87E-02	1.28E-02	5.73E-03	1.00E-02	4.49E-03	2.01E-03	9.17E-04	4.10E-04	1.83E-04	1.16E-02	5.17E-03	2.31E-03	1.15E-03	5.15E-04	2.30E-04	1.31E-03	9.23E-04	6.53E-04	9.49E-05	6.71E-05	4.75E-05	1.73E-04	1.22E-04	8.66E-05
beta-BHC	1.08E-01	5.39E-02	2.69E-02	3.83E-02	1.91E-02	9.54E-03	2.23E-02	1.11E-02	5.55E-03	4.42E-02	2.20E-02	1.10E-02	8.24E-03	4.11E-03	2.05E-03	1.00E-02	7.07E-03	5.00E-03	6.96E-03	4.92E-03	3.48E-03	1.96E-03	1.38E-03	9.79E-04
delta-BHC	1.08E-01	5.39E-02	2.69E-02	3.83E-02	1.91E-02	9.54E-03	1.74E-02	8.69E-03	4.34E-03	4.42E-02	2.20E-02	1.10E-02	8.24E-03	4.11E-03	2.05E-03	1.00E-02	7.07E-03	5.00E-03	5.40E-03	3.82E-03	2.70E-03	1.75E-03	1.24E-03	8.75E-04
Dieldrin	**5.57E+01**	**7.63E+00**	**1.05E+00**	**1.93E+01**	**2.64E+00**	3.61E-01	**4.22E+00**	5.78E-01	7.92E-02	**2.22E+01**	**3.04E+00**	4.16E-01	**7.42E+00**	**1.02E+00**	1.39E-01	**6.78E+01**	**4.80E+01**	**3.39E+01**	**1.38E+01**	**9.78E+00**	**6.92E+00**	**1.12E+01**	**7.95E+00**	**5.62E+00**
Endosulfan I	5.15E-03	2.31E-03	1.03E-03	1.89E-03	8.44E-04	3.77E-04	1.02E-03	4.57E-04	2.04E-04	2.17E-03	9.72E-04	4.35E-04	3.44E-05	1.54E-05	6.87E-06	9.37E-02	4.19E-02	1.87E-02	6.41E-02	2.87E-02	1.28E-02	1.38E-02	6.19E-03	2.77E-03
Endosulfan II	7.37E-02	3.30E-02	1.47E-02	2.70E-02	1.21E-02	5.40E-03	7.86E-03	3.51E-03	1.57E-03	3.11E-02	1.39E-02	6.22E-03	4.65E-04	2.08E-04	9.30E-05	**1.34E+00**	6.00E-01	2.68E-01	5.06E-01	2.26E-01	1.01E-01	1.42E-01	6.37E-02	2.85E-02
Endrin	**3.62E+00**	**1.62E+00**	7.25E-01	**1.30E+00**	5.82E-01	2.60E-01	2.61E-01	1.17E-01	5.22E-02	**2.16E+01**	**9.66E+00**	**4.32E+00**	1.83E-01	8.20E-02	3.67E-02	**1.58E+00**	7.07E-01	3.16E-01	3.85E-01	1.72E-01	7.70E-02	1.86E-01	8.31E-02	3.72E-02
gamma-BHC (Lindane)	1.88E-04	8.42E-05	3.77E-05	6.43E-05	2.88E-05	1.29E-05	4.42E-05	1.98E-05	8.84E-06	7.42E-05	3.32E-05	1.48E-05	3.45E-05	1.54E-05	6.90E-06	2.40E-05	1.07E-05	4.79E-06	1.92E-05	8.59E-06	3.84E-06	7.35E-06	3.29E-06	1.47E-06
gamma-Chlordane	**1.05E+00**	4.69E-01	2.10E-01	3.53E-01	1.58E-01	7.06E-02	5.04E-02	2.25E-02	1.01E-02	4.06E-01	1.82E-01	8.13E-02	7.38E-02	3.30E-02	1.48E-02	4.59E-02	3.25E-02	2.30E-02	4.23E-03	2.99E-03	2.11E-03	8.99E-03	6.36E-03	4.49E-03
Heptachlor	3.17E-03	1.42E-03	6.34E-04	1.16E-03	5.18E-04	2.32E-04	9.89E-05	4.42E-05	1.98E-05	1.34E-03	5.98E-04	2.67E-04	6.54E-05	2.92E-05	1.31E-05	2.07E-03	9.27E-04	4.15E-04	2.82E-04	1.26E-04	5.64E-05	1.92E-04	8.60E-05	3.85E-05
Heptachlor epoxide	**1.01E+00**	4.52E-01	2.02E-01	3.66E-01	1.64E-01	7.32E-02	7.39E-02	3.30E-02	1.48E-02	4.21E-01	1.88E-01	8.43E-02	3.20E-02	1.43E-02	6.40E-03	6.54E-01	2.93E-01	1.31E-01	1.67E-01	7.47E-02	3.34E-02	6.97E-02	3.12E-02	1.39E-02
Methoxychlor	1.35E-03	6.03E-04	2.69E-04	4.76E-04	2.13E-04	9.53E-05	1.01E-04	4.52E-05	2.02E-05	5.49E-04	2.45E-04	1.10E-04	1.12E-04	5.03E-05	2.25E-05	3.15E-02	2.23E-02	1.58E-02	7.58E-03	5.36E-03	3.79E-03	4.41E-03	3.12E-03	2.21E-03
Toxaphene	**1.20E+00**	5.35E-01	2.39E-01	4.23E-01	1.89E-01	8.46E-02	6.72E-02	3.01E-02	1.34E-02	4.87E-01	2.18E-01	9.74E-02	9.97E-02	4.46E-02	1.99E-02	3.94E-02	1.76E-02	7.88E-03	6.91E-03	3.09E-03	1.38E-03	5.17E-03	2.31E-03	1.03E-03
Volatile/Semivolatile Organics																								
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.78E-05	7.94E-06	3.55E-06	4.04E-05	1.81E-05	8.09E-06	1.45E-05	6.49E-06	2.90E-06
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.04E-03	9.12E-04	4.08E-04	6.31E-04	2.82E-04	1.26E-04	3.07E-03	1.37E-03	6.15E-04	7.26E-04	3.25E-04	1.45E-04	7.41E-04	3.31E-04	1.48E-04	7.13E-04	5.04E-04	3.56E-04	4.28E-03	3.02E-03	2.14E-03	8.53E-04	6.03E-04	4.27E-04
1,2-Dichlorobenzene	1.77E-03	7.90E-04	3.53E-04	4.03E-04	1.80E-04	8.07E-05	5.27E-03	2.35E-03	1.05E-03	4.65E-04	2.08E-04	9.29E-05	1.52E-03	6.81E-04	3.05E-04	2.82E-04	1.26E-04	5.64E-05	4.41E-03	1.97E-03	8.82E-04	8.86E-04	3.96E-04	1.77E-04
1,3-Dichlorobenzene	8.65E-04	3.87E-04	1.73E-04	7.26E-05	3.24E-05	1.45E-05	4.95E-03	2.21E-03	9.90E-04	8.37E-05	3.74E-05	1.67E-05	1.52E-03	6.81E-04	3.05E-04	5.07E-05	2.27E-05	1.01E-05	4.14E-03	1.85E-03	8.29E-04	8.39E-04	3.75E-04	1.68E-04
1,4-Dichlorobenzene	8.06E-04	3.61E-04	1.61E-04	5.10E-05	2.28E-05	1.02E-05	5.31E-03	2.38E-03	1.06E-03	5.88E-05	2.63E-05	1.18E-05	1.52E-03	6.81E-04	3.05E-04	1.02E-04	5.88E-05	3.39E-05	1.27E-02	7.34E-03	4.24E-03	2.51E-03	1.45E-03	8.38E-04
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	2.22E-03	9.94E-04	4.44E-04	3.28E-04	1.47E-04	6.55E-05	7.83E-04	3.50E-04	1.57E-04	3.77E-04	1.69E-04	7.55E-05	3.03E-03	1.36E-03	6.06E-04	2.64E-05	1.18E-05	5.28E-06	5.92E-05	2.65E-05	1.18E-05	7.45E-05	3.33E-05	1.49E-05
Acenaphthylene	9.57E-04	4.28E-04	1.91E-04	8.26E-05	3.69E-05	1.65E-05	1.18E-03	5.26E-04	2.35E-04	9.54E-05	4.27E-05	1.91E-05	1.67E-03	7.49E-04	3.35E-04	6.66E-06	2.98E-06	1.33E-06	1.02E-04	4.56E-05	2.04E-05	4.90E-05	2.19E-05	9.81E-06
Anthracene	1.86E-03	8.32E-04	3.72E-04	8.83E-05	3.95E-05	1.77E-05	2.58E-03	1.15E-03	5.15E-04	1.02E-04	4.56E-05	2.04E-05	3.70E-03	1.65E-03	7.40E-04	7.12E-06	3.18E-06	1.42E-06	2.22E-04	9.94E-05	4.45E-05	1.07E-04	4.80E-05	2.15E-05
Benzo(a)anthracene	6.41E-03	2.87E-03	1.28E-03	1.19E-03	5.31E-04	2.37E-04	3.15E-03	1.41E-03	6.29E-04	1.37E-03	6.12E-04	2.74E-04	7.25E-03	3.24E-03	1.45E-03	1.02E-02	4.57E-03	2.05E-03	3.62E-02	1.62E-02	7.26E-03	2.41E-02	1.08E-02	4.82E-03
Benzo(a)pyrene	1.55E-02	6.94E-03	3.10E-03	1.91E-04	8.52E-05	3.81E-05	1.01E-02	4.53E-03	2.03E-03	2.20E-04	9.83E-05	4.40E-05	3.42E-02	1.53E-02	6.84E-03	1.64E-03	7.34E-04	3.28E-04	7.22E-02	3.23E-02	1.45E-02	8.49E-02	3.80E-02	1.70E-02
Benzo(b)fluoranthene	1.10E-02	4.90E-03	2.19E-03	3.96E-04	1.77E-04	7.92E-05	3.24E-02	1.45E-02	6.47E-03	4.57E-04	2.04E-04	9.14E-05	2.25E-02	1.01E-02	4.51E-03	3.41E-03	1.52E-03	6.82E-04	3.42E-01	1.53E-01	6.86E-02	1.02E-01	4.57E-02	2.05E-02
Benzo(g,h,i)perylene	1.04E-02	4.64E-03	2.08E-03	2.74E-03	1.23E-03	5.49E-04	1.41E-02	6.30E-03	2.82E-03	3.16E-03	1.41E-03	6.32E-04	6.64E-03	2.97E-03	1.33E-03	2.36E-02	1.06E-02	4.73E-03	1.56E-01	6.99E-02	3.13E-02	4.05E-02	1.81E-02	8.11E-03
Benzo(k)fluoranthene	3.88E-03	1.73E-03	7.75E-04	1.49E-04	6.68E-05	2.99E-05	4.56E-03	2.04E-03	9.12E-04	1.72E-04	7.70E-05	3.44E-05	7.91E-03	3.54E-03	1.58E-03	1.28E-03	5.75E-04	2.57E-04	5.10E-02	2.28E-02	1.02E-02	2.72E-02	1.22E-02	5.45E-03
Chrysene	1.10E-02	4.92E-03	2.20E-03	1.54E-03	6.87E-04	3.07E-04	5.57E-03	2.49E-03	1.11E-03	1.77E-03	7.91E-04	3.54E-04	1.55E-02	6.95E-03	3.11E-03	1.32E-02	5.91E-03	2.64E-03	6.02E-02	2.69E-02	1.21E-02	4.74E-02	2.12E-02	9.50E-03

TABLE L-82

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Site-Wide

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Dibenz(a,h)anthracene	8.91E-04	3.99E-04	1.78E-04	6.25E-05	2.79E-05	1.25E-05	2.79E-03	1.25E-03	5.57E-04	7.22E-05	3.23E-05	1.44E-05	1.65E-03	7.38E-04	3.30E-04	5.37E-04	2.41E-04	1.08E-04	3.32E-02	1.48E-02	6.64E-03	9.58E-03	4.29E-03	1.92E-03
Fluoranthene	4.35E-03	1.95E-03	8.70E-04	4.43E-04	1.98E-04	8.86E-05	1.23E-01	5.50E-02	2.46E-02	5.11E-04	2.28E-04	1.02E-04	7.17E-03	3.21E-03	1.43E-03	3.57E-05	1.60E-05	7.14E-06	1.22E-02	5.45E-03	2.44E-03	1.81E-03	8.10E-04	3.62E-04
Fluorene	7.39E-03	3.31E-03	1.48E-03	1.33E-03	5.95E-04	2.66E-04	1.66E-03	7.44E-04	3.33E-04	1.53E-03	6.86E-04	3.07E-04	8.59E-03	3.84E-03	1.72E-03	1.07E-04	4.80E-05	2.15E-05	7.33E-05	3.28E-05	1.47E-05	1.89E-04	8.46E-05	3.78E-05
Hexachlorobenzene	**1.04E+00**	4.64E-01	2.08E-01	2.32E-01	1.04E-01	4.63E-02	5.55E-01	2.48E-01	1.11E-01	2.67E-01	1.19E-01	5.34E-02	9.35E-01	4.18E-01	1.87E-01	9.75E-03	6.89E-03	4.88E-03	2.62E-02	1.85E-02	1.31E-02	1.46E-02	1.04E-02	7.32E-03
Hexachlorobutadiene	1.85E-02	8.29E-03	3.71E-03	3.22E-03	1.44E-03	6.45E-04	3.80E-02	1.70E-02	7.60E-03	3.74E-03	1.67E-03	7.48E-04	2.30E-02	1.03E-02	4.60E-03	4.07E-03	1.29E-03	4.07E-04	5.86E-02	1.85E-02	5.86E-03	1.65E-02	5.21E-03	1.65E-03
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.03E-03	4.61E-04	2.06E-04	1.00E-03	4.49E-04	2.01E-04	5.18E-04	2.32E-04	1.04E-04
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.71E-04	3.45E-04	1.54E-04	2.29E-03	1.02E-03	4.57E-04	5.85E-04	2.62E-04	1.17E-04
Indeno(1,2,3-cd)pyrene	1.12E-02	5.02E-03	2.24E-03	2.85E-03	1.27E-03	5.70E-04	8.74E-03	3.91E-03	1.75E-03	3.28E-03	1.47E-03	6.56E-04	7.88E-03	3.53E-03	1.58E-03	2.45E-02	1.10E-02	4.91E-03	1.07E-01	4.78E-02	2.14E-02	3.88E-02	1.74E-02	7.78E-03
Pentachlorophenol	4.07E-03	1.29E-03	4.07E-04	1.28E-03	4.05E-04	1.28E-04	5.04E-02	1.59E-02	5.04E-03	1.49E-03	4.70E-04	1.49E-04	1.68E-03	5.31E-04	1.68E-04	7.63E-04	3.41E-04	1.53E-04	3.67E-02	1.64E-02	7.33E-03	5.26E-03	2.35E-03	1.05E-03
Phenanthrene	4.26E-03	1.90E-03	8.52E-04	9.38E-04	4.20E-04	1.88E-04	9.65E-03	4.31E-03	1.93E-03	1.08E-03	4.83E-04	2.16E-04	3.88E-03	1.74E-03	7.76E-04	7.57E-05	3.38E-05	1.51E-05	9.46E-04	4.23E-04	1.89E-04	2.19E-04	9.78E-05	4.37E-05
Pyrene	7.09E-02	3.17E-02	1.42E-02	4.47E-03	2.00E-03	8.94E-04	1.53E-01	6.84E-02	3.06E-02	5.15E-03	2.30E-03	1.03E-03	1.34E-01	5.98E-02	2.68E-02	3.85E-02	1.72E-02	7.70E-03	**1.43E+00**	6.40E-01	2.86E-01	4.75E-01	2.13E-01	9.52E-02
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**5.25E+00**	**1.66E+00**	5.25E-01	**1.54E+00**	4.86E-01	1.54E-01	--	--	--	**2.35E+00**	7.42E-01	2.35E-01	--	--	--	**7.17E+00**	**2.27E+00**	7.17E-01	--	--	--	2.56E-01	8.10E-02	2.56E-02

Shaded cells indicate HQ ≥ 1

TABLE L-83

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - 95% UCL - Site-Wide

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	6.44E-02	4.07E-02	2.58E-02	3.11E-02	1.97E-02	1.24E-02	2.75E-02	1.74E-02	1.10E-02	1.16E-02	7.33E-03	4.64E-03	1.50E-01	8.68E-02	5.01E-02	5.73E-02	4.53E-02	3.59E-02	9.09E-01	4.07E-01	1.82E-01	1.27E-01	1.00E-01	7.95E-02
Copper	4.08E-01	2.36E-01	1.37E-01	1.64E-01	9.46E-02	5.47E-02	1.64E-01	9.47E-02	5.48E-02	3.76E-02	2.17E-02	1.26E-02	4.85E-01	2.81E-01	1.62E-01	2.39E-02	2.10E-02	1.85E-02	1.19E-01	9.24E-02	7.16E-02	4.09E-02	3.59E-02	3.16E-02
Lead	5.30E-02	2.37E-02	1.06E-02	2.39E-02	1.07E-02	4.77E-03	1.49E-01	1.06E-01	7.47E-02	2.00E-02	8.94E-03	4.00E-03	5.76E-02	2.58E-02	1.15E-02	7.98E-03	5.80E-03	4.22E-03	9.50E-02	6.91E-02	5.02E-02	3.52E-02	2.56E-02	1.86E-02
Mercury	4.33E-01	2.50E-01	1.44E-01	1.73E-01	9.99E-02	5.77E-02	2.32E-01	1.34E-01	7.73E-02	3.16E-02	2.02E-02	1.29E-02	2.81E-01	1.62E-01	9.35E-02	1.84E-02	1.43E-02	1.11E-02	1.96E-01	8.78E-02	3.93E-02	1.56E-02	1.22E-02	9.47E-03
Selenium	8.56E-02	3.83E-02	1.71E-02	4.44E-02	1.99E-02	8.89E-03	9.36E-02	6.62E-02	4.68E-02	2.59E-02	1.16E-02	5.17E-03	1.57E-01	1.11E-01	7.83E-02	2.14E-01	1.67E-01	1.30E-01	1.93E-01	1.50E-01	1.17E-01	9.44E-02	7.35E-02	5.72E-02
Polychlorinated Biphenyls																								
Aroclor-1221	2.20E-02	9.85E-03	4.41E-03	1.10E-02	4.90E-03	2.19E-03	1.76E-03	7.85E-04	3.51E-04	6.94E-03	3.11E-03	1.39E-03	8.38E-02	3.75E-02	1.68E-02	7.31E-02	3.27E-02	1.46E-02	1.66E-02	7.43E-03	3.32E-03	1.45E-02	6.47E-03	2.89E-03
Aroclor-1254	5.77E-01	2.58E-01	1.15E-01	2.76E-01	1.24E-01	5.52E-02	2.54E-02	1.14E-02	5.08E-03	7.61E-02	3.40E-02	1.52E-02	**1.73E+00**	7.75E-01	3.47E-01	**1.84E+00**	8.24E-01	3.68E-01	1.18E-01	5.27E-02	2.35E-02	4.10E-01	1.84E-01	8.21E-02
Aroclor-1260	2.45E-01	1.10E-01	4.90E-02	1.19E-01	5.31E-02	2.37E-02	9.64E-03	4.31E-03	1.93E-03	4.10E-01	1.83E-01	8.19E-02	7.84E-01	3.51E-01	1.57E-01	7.91E-01	3.54E-01	1.58E-01	4.36E-02	1.95E-02	8.73E-03	1.63E-01	7.30E-02	3.27E-02
PCB (total)	5.35E-01	2.39E-01	1.07E-01	1.77E-01	7.94E-02	3.55E-02	3.36E-02	1.50E-02	6.72E-03	**1.36E+00**	6.10E-01	2.73E-01	**2.21E+00**	9.89E-01	4.42E-01	**1.59E+00**	7.13E-01	3.19E-01	1.53E-01	6.82E-02	3.05E-02	5.01E-01	2.24E-01	1.00E-01
Pesticides																								
4,4'-DDD	6.23E-02	1.97E-02	6.23E-03	2.92E-02	9.24E-03	2.92E-03	1.07E-02	4.78E-03	2.14E-03	2.73E-02	8.62E-03	2.73E-03	5.55E-02	2.48E-02	1.11E-02	3.63E-02	1.62E-02	7.26E-03	6.14E-03	2.74E-03	1.23E-03	1.00E-02	4.47E-03	2.00E-03
4,4'-DDE	9.90E-02	3.13E-02	9.90E-03	4.92E-02	1.56E-02	4.92E-03	1.09E-02	4.89E-03	2.19E-03	4.59E-02	1.45E-02	4.59E-03	5.68E-02	2.54E-02	1.14E-02	6.12E-02	2.74E-02	1.22E-02	6.26E-03	2.80E-03	1.25E-03	1.11E-02	4.96E-03	2.22E-03
4,4'-DDT	3.19E-01	1.01E-01	3.19E-02	1.72E-01	5.43E-02	1.72E-02	4.78E-03	3.02E-03	1.91E-03	1.60E-01	5.06E-02	1.60E-02	7.98E-03	5.05E-03	3.19E-03	2.13E-01	9.54E-02	4.26E-02	2.65E-02	1.18E-02	5.30E-03	1.94E-02	8.65E-03	3.87E-03
Dieldrin	6.48E-01	8.88E-02	1.22E-02	2.48E-01	3.40E-02	4.65E-03	8.68E-02	1.19E-02	1.63E-03	2.32E-01	3.17E-02	4.34E-03	4.74E-01	6.50E-02	8.90E-03	7.14E-01	5.05E-01	3.57E-01	2.31E-01	1.63E-01	1.15E-01	4.31E-01	3.04E-01	2.15E-01
Endosulfan II	4.81E-03	2.15E-03	9.62E-04	2.64E-03	1.18E-03	5.28E-04	3.61E-04	1.62E-04	7.22E-05	2.46E-03	1.10E-03	4.93E-04	3.28E-05	1.47E-05	6.56E-06	1.07E-01	4.79E-02	2.14E-02	2.84E-02	1.27E-02	5.68E-03	9.00E-03	4.02E-03	1.80E-03
Endrin	2.21E-01	9.87E-02	4.41E-02	1.19E-01	5.31E-02	2.37E-02	1.12E-02	5.00E-03	2.24E-03	**1.60E+00**	7.14E-01	3.19E-01	1.18E-02	5.29E-03	2.36E-03	1.18E-01	5.27E-02	2.36E-02	2.02E-02	9.02E-03	4.04E-03	1.09E-02	4.90E-03	2.19E-03
gamma-Chlordane	4.00E-02	1.79E-02	8.01E-03	1.90E-02	8.50E-03	3.80E-03	2.24E-03	1.00E-03	4.49E-04	1.77E-02	7.93E-03	3.55E-03	4.93E-03	2.21E-03	9.87E-04	2.02E-03	1.43E-03	1.01E-03	2.30E-04	1.63E-04	1.15E-04	4.95E-04	3.50E-04	2.48E-04
Heptachlor epoxide	6.59E-02	2.95E-02	1.32E-02	3.58E-02	1.60E-02	7.15E-03	3.40E-03	1.52E-03	6.79E-04	3.34E-02	1.49E-02	6.67E-03	2.21E-03	9.91E-04	4.43E-04	5.22E-02	2.34E-02	1.04E-02	9.38E-03	4.20E-03	1.88E-03	4.40E-03	1.97E-03	8.80E-04
Toxaphene	1.39E-01	6.22E-02	2.78E-02	7.37E-02	3.29E-02	1.47E-02	5.52E-03	2.47E-03	1.10E-03	6.88E-02	3.08E-02	1.38E-02	1.23E-02	5.50E-03	2.46E-03	5.61E-03	2.51E-03	1.12E-03	6.94E-04	3.11E-04	1.39E-04	5.83E-04	2.61E-04	1.17E-04
Volatile/Semivolatile Organics																								
Hexachlorobenzene	8.71E-02	3.90E-02	1.74E-02	3.45E-02	1.54E-02	6.91E-03	3.49E-02	1.56E-02	6.97E-03	3.23E-02	1.44E-02	6.46E-03	5.95E-02	2.66E-02	1.19E-02	1.19E-03	8.40E-04	5.94E-04	2.25E-03	1.59E-03	1.12E-03	1.06E-03	7.49E-04	5.30E-04
Pyrene	1.00E-03	4.48E-04	2.00E-04	4.19E-05	1.88E-05	8.39E-06	2.63E-03	1.17E-03	5.25E-04	3.93E-05	1.76E-05	7.87E-06	2.23E-03	9.96E-04	4.46E-04	2.95E-04	1.32E-04	5.91E-05	3.35E-02	1.50E-02	6.71E-03	1.00E-02	4.47E-03	2.00E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**1.58E+00**	5.01E-01	1.58E-01	6.98E-01	2.21E-01	6.98E-02	--	--	--	**1.66E+00**	5.24E-01	1.66E-01	--	--	--	**3.06E+00**	9.67E-01	3.06E-01	--	--	--	8.97E-02	2.84E-02	8.97E-03

Shaded cells indicate HQ ≥ 1

TABLE L-84

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - Mean - Site-Wide

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.01E-02	2.54E-02	1.61E-02	1.45E-02	9.20E-03	5.82E-03	1.97E-02	1.25E-02	7.90E-03	6.65E-03	4.20E-03	2.66E-03	1.10E-01	6.33E-02	3.66E-02	3.04E-02	2.41E-02	1.91E-02	6.24E-01	2.79E-01	1.25E-01	8.79E-02	6.96E-02	5.51E-02
Copper	3.11E-01	1.80E-01	1.04E-01	1.17E-01	6.78E-02	3.92E-02	1.40E-01	8.10E-02	4.68E-02	2.71E-02	1.57E-02	9.08E-03	3.80E-01	2.20E-01	1.27E-01	1.77E-02	1.56E-02	1.37E-02	1.03E-01	7.97E-02	6.17E-02	3.26E-02	2.87E-02	2.52E-02
Lead	3.76E-02	1.68E-02	7.52E-03	1.44E-02	6.43E-03	2.87E-03	1.17E-01	8.24E-02	5.83E-02	3.61E-03	1.62E-03	7.23E-04	4.64E-02	2.08E-02	9.29E-03	5.03E-03	3.65E-03	2.66E-03	7.14E-02	5.19E-02	3.77E-02	2.64E-02	1.92E-02	1.39E-02
Mercury	3.28E-01	1.89E-01	1.09E-01	1.36E-01	7.84E-02	4.53E-02	1.89E-01	1.09E-01	6.29E-02	2.23E-02	1.43E-02	9.12E-03	2.00E-01	1.15E-01	6.67E-02	1.42E-02	1.11E-02	8.63E-03	1.61E-01	7.20E-02	3.22E-02	1.18E-02	9.23E-03	7.19E-03
Selenium	7.14E-02	3.19E-02	1.43E-02	3.67E-02	1.64E-02	7.34E-03	7.00E-02	4.95E-02	3.50E-02	2.59E-02	1.16E-02	5.17E-03	1.20E-01	8.47E-02	5.99E-02	1.82E-01	1.42E-01	1.10E-01	1.44E-01	1.12E-01	8.74E-02	7.23E-02	5.63E-02	4.38E-02
Polychlorinated Biphenyls																								
Aroclor-1221	1.66E-02	7.44E-03	3.33E-03	8.31E-03	3.72E-03	1.66E-03	1.32E-03	5.90E-04	2.64E-04	6.74E-03	3.02E-03	1.35E-03	6.46E-02	2.89E-02	1.29E-02	5.54E-02	2.48E-02	1.11E-02	1.26E-02	5.64E-03	2.52E-03	1.08E-02	4.83E-03	2.16E-03
Aroclor-1254	2.34E-01	1.05E-01	4.68E-02	1.13E-01	5.07E-02	2.27E-02	9.73E-03	4.35E-03	1.95E-03	4.14E-02	1.85E-02	8.29E-03	7.52E-01	3.36E-01	1.50E-01	7.56E-01	3.38E-01	1.51E-01	4.84E-02	2.17E-02	9.69E-03	1.56E-01	7.00E-02	3.13E-02
Aroclor-1260	1.76E-01	7.86E-02	3.51E-02	8.54E-02	3.82E-02	1.71E-02	6.76E-03	3.02E-03	1.35E-03	2.48E-01	1.11E-01	4.96E-02	5.76E-01	2.58E-01	1.15E-01	5.69E-01	2.55E-01	1.14E-01	3.15E-02	1.41E-02	6.29E-03	1.14E-01	5.11E-02	2.29E-02
PCB (total)	3.58E-01	1.60E-01	7.16E-02	1.24E-01	5.52E-02	2.47E-02	1.73E-02	7.75E-03	3.47E-03	7.96E-01	3.56E-01	1.59E-01	**1.24E+00**	5.56E-01	2.49E-01	**1.13E+00**	5.04E-01	2.25E-01	8.27E-02	3.70E-02	1.65E-02	2.63E-01	1.18E-01	5.26E-02
Pesticides																								
4,4'-DDD	3.86E-02	1.22E-02	3.86E-03	1.81E-02	5.72E-03	1.81E-03	6.95E-03	3.11E-03	1.39E-03	1.69E-02	5.34E-03	1.69E-03	3.44E-02	1.54E-02	6.88E-03	2.25E-02	1.01E-02	4.50E-03	4.09E-03	1.83E-03	8.19E-04	6.24E-03	2.79E-03	1.25E-03
4,4'-DDE	5.17E-02	1.64E-02	5.17E-03	2.57E-02	8.13E-03	2.57E-03	6.09E-03	2.72E-03	1.22E-03	2.40E-02	7.59E-03	2.40E-03	2.97E-02	1.33E-02	5.94E-03	3.20E-02	1.43E-02	6.39E-03	3.62E-03	1.62E-03	7.24E-04	5.85E-03	2.62E-03	1.17E-03
4,4'-DDT	1.49E-01	4.72E-02	1.49E-02	8.03E-02	2.54E-02	8.03E-03	2.52E-03	1.59E-03	1.01E-03	7.50E-02	2.37E-02	7.50E-03	3.74E-03	2.37E-03	1.50E-03	9.98E-02	4.46E-02	2.00E-02	1.37E-02	6.11E-03	2.73E-03	9.26E-03	4.14E-03	1.85E-03
Dieldrin	2.72E-01	3.73E-02	5.10E-03	1.04E-01	1.43E-02	1.95E-03	3.64E-02	4.99E-03	6.83E-04	9.72E-02	1.33E-02	1.82E-03	1.99E-01	2.73E-02	3.73E-03	3.00E-01	2.12E-01	1.50E-01	9.70E-02	6.86E-02	4.85E-02	1.81E-01	1.28E-01	9.04E-02
Endosulfan II	2.22E-03	9.94E-04	4.45E-04	1.22E-03	5.45E-04	2.44E-04	1.67E-04	7.47E-05	3.34E-05	1.14E-03	5.09E-04	2.28E-04	1.56E-05	6.98E-06	3.12E-06	4.95E-02	2.21E-02	9.90E-03	1.31E-02	5.88E-03	2.63E-03	4.17E-03	1.86E-03	8.34E-04
Endrin	9.35E-02	4.18E-02	1.87E-02	5.03E-02	2.25E-02	1.01E-02	4.75E-03	2.12E-03	9.49E-04	6.77E-01	3.03E-01	1.35E-01	5.03E-03	2.25E-03	1.01E-03	4.99E-02	2.23E-02	9.98E-03	8.56E-03	3.83E-03	1.71E-03	4.65E-03	2.08E-03	9.30E-04
gamma-Chlordane	1.79E-02	8.00E-03	3.58E-03	8.49E-03	3.80E-03	1.70E-03	1.00E-03	4.49E-04	2.01E-04	7.92E-03	3.54E-03	1.58E-03	2.21E-03	9.86E-04	4.41E-04	9.03E-04	6.38E-04	4.51E-04	1.03E-04	7.30E-05	5.16E-05	2.21E-04	1.57E-04	1.11E-04
Heptachlor epoxide	3.06E-02	1.37E-02	6.12E-03	1.66E-02	7.42E-03	3.32E-03	1.58E-03	7.06E-04	3.16E-04	1.55E-02	6.93E-03	3.10E-03	1.03E-03	4.62E-04	2.07E-04	2.43E-02	1.08E-02	4.85E-03	4.36E-03	1.95E-03	8.72E-04	2.05E-03	9.16E-04	4.10E-04
Toxaphene	1.04E-01	4.67E-02	2.09E-02	5.53E-02	2.47E-02	1.11E-02	4.15E-03	1.85E-03	8.29E-04	5.16E-02	2.31E-02	1.03E-02	9.25E-03	4.14E-03	1.85E-03	4.21E-03	1.88E-03	8.42E-04	5.22E-04	2.34E-04	1.04E-04	4.38E-04	1.96E-04	8.77E-05
Volatile/Semivolatile Organics																								
Hexachlorobenzene	6.53E-02	2.92E-02	1.31E-02	2.59E-02	1.16E-02	5.18E-03	2.61E-02	1.17E-02	5.23E-03	2.42E-02	1.08E-02	4.84E-03	4.46E-02	1.99E-02	8.91E-03	8.91E-04	6.30E-04	4.45E-04	1.68E-03	1.19E-03	8.42E-04	7.93E-04	5.61E-04	3.96E-04
Pyrene	7.08E-04	3.17E-04	1.42E-04	2.97E-05	1.33E-05	5.94E-06	1.86E-03	8.31E-04	3.71E-04	2.79E-05	1.25E-05	5.57E-06	1.58E-03	7.05E-04	3.15E-04	2.09E-04	9.35E-05	4.18E-05	2.37E-02	1.06E-02	4.74E-03	7.07E-03	3.16E-03	1.42E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**1.03E+00**	3.27E-01	1.03E-01	4.49E-01	1.42E-01	4.49E-02	--	--	--	9.41E-01	2.98E-01	9.41E-02	--	--	--	**2.26E+00**	7.13E-01	2.26E-01	--	--	--	6.63E-02	2.10E-02	6.63E-03

Shaded cells indicate HQ ≥ 1

TABLE L-85

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.51E-01	1.59E-01	1.01E-01	8.71E-02	5.51E-02	3.49E-02	1.64E-01	1.04E-01	6.56E-02	1.73E-02	1.09E-02	6.92E-03	5.60E-01	3.23E-01	1.87E-01	1.82E-01	1.44E-01	1.14E-01	**4.98E+00**	**2.23E+00**	9.96E-01	5.86E-01	4.64E-01	3.67E-01
Cadmium	7.27E-02	3.25E-02	1.45E-02	2.45E-02	1.10E-02	4.90E-03	1.85E-01	8.28E-02	3.70E-02	3.37E-02	1.51E-02	6.74E-03	8.06E-02	3.61E-02	1.61E-02	1.95E-02	6.18E-03	1.95E-03	3.76E-01	1.19E-01	3.76E-02	9.93E-02	3.14E-02	9.93E-03
Chromium	2.56E-01	1.14E-01	5.12E-02	8.13E-02	3.63E-02	1.63E-02	2.97E-01	1.33E-01	5.94E-02	2.90E-02	1.30E-02	5.80E-03	2.04E-01	9.13E-02	4.08E-02	5.05E-02	2.26E-02	1.01E-02	4.12E-01	1.84E-01	8.25E-02	1.37E-01	6.11E-02	2.73E-02
Copper	**1.35E+01**	**7.81E+00**	**4.52E+00**	3.01E-01	1.74E-01	1.01E-01	**5.11E+00**	**2.96E+00**	**1.71E+00**	5.36E-02	3.10E-02	1.79E-02	**2.96E+01**	**1.71E+01**	**9.89E+00**	5.04E-02	4.43E-02	3.90E-02	5.96E-01	4.62E-01	3.58E-01	**1.87E+00**	**1.65E+00**	**1.45E+00**
Lead	2.26E-01	1.01E-01	4.53E-02	5.27E-02	2.36E-02	1.05E-02	**1.59E+00**	**1.12E+00**	7.95E-01	1.77E-02	7.90E-03	3.53E-03	3.12E-01	1.40E-01	6.24E-02	2.01E-02	1.46E-02	1.06E-02	**1.00E+00**	7.30E-01	5.31E-01	3.25E-01	2.36E-01	1.72E-01
Mercury	**3.10E+00**	**1.79E+00**	**1.03E+00**	2.80E-01	1.62E-01	9.33E-02	**2.01E+00**	**1.16E+00**	6.69E-01	1.85E-02	1.18E-02	7.56E-03	**5.22E+00**	**3.02E+00**	**1.74E+00**	3.81E-02	2.97E-02	2.32E-02	**1.01E+00**	4.51E-01	2.02E-01	1.97E-01	1.53E-01	1.20E-01
Nickel	5.97E-02	2.67E-02	1.19E-02	1.68E-02	7.53E-03	3.37E-03	4.14E-02	1.85E-02	8.28E-03	1.01E-02	4.52E-03	2.02E-03	4.12E-02	1.84E-02	8.24E-03	4.50E-02	3.18E-02	2.25E-02	2.23E-01	1.58E-01	1.12E-01	8.69E-02	6.14E-02	4.34E-02
Selenium	2.79E-01	1.25E-01	5.58E-02	9.27E-02	4.14E-02	1.85E-02	2.42E-01	1.71E-01	1.21E-01	7.63E-02	3.41E-02	1.53E-02	2.68E-01	1.90E-01	1.34E-01	6.22E-01	4.85E-01	3.77E-01	4.08E-01	3.18E-01	2.48E-01	1.89E-01	1.47E-01	1.15E-01
Silver	6.03E-02	2.70E-02	1.21E-02	1.48E-02	6.62E-03	2.96E-03	1.46E-02	6.55E-03	2.93E-03	1.67E-02	7.48E-03	3.35E-03	2.08E-02	9.28E-03	4.15E-03	4.69E-03	2.10E-03	9.39E-04	6.58E-03	2.94E-03	1.32E-03	3.10E-03	1.38E-03	6.19E-04
Zinc	7.04E-01	3.15E-01	1.41E-01	2.07E-01	9.27E-02	4.14E-02	3.32E-01	1.49E-01	6.65E-02	6.07E-02	2.71E-02	1.21E-02	2.02E-01	9.04E-02	4.04E-02	1.48E-01	6.60E-02	2.95E-02	2.91E-01	1.30E-01	5.82E-02	8.98E-02	4.01E-02	1.80E-02
Polychlorinated Biphenyls																								
Aroclor-1016	2.16E-01	9.65E-02	4.31E-02	7.14E-02	3.19E-02	1.43E-02	1.43E-02	6.39E-03	2.86E-03	1.90E-02	8.50E-03	3.80E-03	6.13E-01	2.74E-01	1.23E-01	5.82E-02	3.68E-02	2.33E-02	8.21E-02	3.67E-02	1.64E-02	1.34E-02	8.47E-03	5.35E-03
Aroclor-1221	5.13E-01	2.30E-01	1.03E-01	1.68E-01	7.53E-02	3.37E-02	5.44E-02	2.43E-02	1.09E-02	1.91E-02	8.52E-03	3.81E-03	**1.37E+00**	6.14E-01	2.74E-01	**1.37E+00**	6.14E-01	2.75E-01	3.84E-01	1.72E-01	7.67E-02	3.62E-01	1.62E-01	7.25E-02
Aroclor-1232	3.41E-01	1.52E-01	6.81E-02	1.12E-01	5.02E-02	2.24E-02	2.88E-02	1.29E-02	5.75E-03	2.20E-02	9.82E-03	4.39E-03	9.38E-01	4.19E-01	1.88E-01	9.15E-01	4.09E-01	1.83E-01	1.86E-01	8.32E-02	3.72E-02	2.25E-01	1.01E-01	4.51E-02
Aroclor-1242	3.95E-02	1.77E-02	7.89E-03	1.33E-02	5.94E-03	2.66E-03	2.49E-03	1.11E-03	4.97E-04	1.90E-02	8.51E-03	3.81E-03	1.26E-01	5.65E-02	2.53E-02	1.08E-01	4.85E-02	2.17E-02	1.62E-02	7.24E-03	3.24E-03	2.27E-02	1.01E-02	4.54E-03
Aroclor-1248	1.44E-02	6.43E-03	2.87E-03	4.88E-03	2.18E-03	9.75E-04	7.45E-04	3.33E-04	1.49E-04	1.91E-02	8.52E-03	3.81E-03	4.92E-02	2.20E-02	9.85E-03	3.98E-02	1.78E-02	7.95E-03	5.02E-03	2.24E-03	1.00E-03	8.17E-03	3.65E-03	1.63E-03
Aroclor-1254	**1.71E+01**	**7.66E+00**	**3.43E+00**	**5.35E+00**	**2.39E+00**	**1.07E+00**	**1.14E+00**	5.12E-01	2.29E-01	1.08E-01	4.83E-02	2.16E-02	**3.53E+01**	**1.58E+01**	**7.07E+00**	**4.37E+01**	**1.95E+01**	**8.73E+00**	**3.47E+00**	**1.55E+00**	6.94E-01	**1.39E+01**	**6.22E+00**	**2.78E+00**
Aroclor-1260	**1.90E+00**	8.48E-01	3.79E-01	6.12E-01	2.74E-01	1.22E-01	1.04E-01	4.63E-02	2.07E-02	5.80E-01	2.60E-01	1.16E-01	**4.61E+00**	**2.06E+00**	9.22E-01	**4.99E+00**	**2.23E+00**	9.98E-01	3.42E-01	1.53E-01	6.84E-02	**1.31E+00**	5.86E-01	2.62E-01
PCB (total)	**3.54E+00**	**1.58E+00**	7.08E-01	2.83E-01	1.26E-01	5.65E-02	**1.14E+00**	5.12E-01	2.29E-01	**1.93E+00**	8.65E-01	3.87E-01	**3.53E+01**	**1.58E+01**	**7.07E+00**	**2.96E+00**	**1.32E+00**	5.92E-01	**3.47E+00**	**1.55E+00**	6.94E-01	**1.20E+01**	**5.38E+00**	**2.41E+00**
Pesticides																								
4,4'-DDD	**1.19E+00**	3.76E-01	1.19E-01	4.02E-01	1.27E-01	4.02E-02	1.25E-01	5.61E-02	2.51E-02	4.64E-01	1.47E-01	4.64E-02	5.21E-01	2.33E-01	1.04E-01	6.12E-01	2.74E-01	1.22E-01	4.96E-02	2.22E-02	9.92E-03	1.13E-01	5.07E-02	2.27E-02
4,4'-DDE	**1.96E+01**	**6.20E+00**	**1.96E+00**	**7.14E+00**	**2.26E+00**	7.14E-01	1.92E-01	8.60E-02	3.84E-02	**8.22E+00**	**2.60E+00**	8.22E-01	8.22E-01	3.68E-01	1.64E-01	**1.09E+01**	**4.85E+00**	**2.17E+00**	7.40E-02	3.31E-02	1.48E-02	6.23E-01	2.78E-01	1.25E-01
4,4'-DDT	**5.32E+00**	**1.68E+00**	5.32E-01	**1.93E+00**	6.09E-01	1.93E-01	4.21E-02	2.66E-02	1.69E-02	**2.22E+00**	7.02E-01	2.22E-01	7.99E-02	5.06E-02	3.20E-02	**2.93E+00**	**1.31E+00**	5.86E-01	1.77E-01	7.92E-02	3.54E-02	2.31E-01	1.03E-01	4.61E-02
Aldrin	6.74E-03	3.01E-03	1.35E-03	2.42E-03	1.08E-03	4.85E-04	2.21E-04	9.88E-05	4.42E-05	2.79E-03	1.25E-03	5.59E-04	4.31E-04	1.93E-04	8.62E-05	1.40E-03	6.26E-04	2.80E-04	1.76E-04	7.87E-05	3.52E-05	1.74E-04	7.76E-05	3.47E-05
alpha-BHC	1.33E-02	6.64E-03	3.31E-03	4.72E-03	2.36E-03	1.18E-03	2.45E-03	1.22E-03	6.11E-04	5.44E-03	2.71E-03	1.35E-03	1.05E-03	5.23E-04	2.61E-04	1.23E-03	8.71E-04	6.16E-04	7.62E-04	5.39E-04	3.81E-04	2.32E-04	1.64E-04	1.16E-04
alpha-Chlordane	3.28E-02	1.47E-02	6.56E-03	1.15E-02	5.13E-03	2.29E-03	9.85E-04	4.40E-04	1.97E-04	1.32E-02	5.91E-03	2.64E-03	1.32E-03	5.88E-04	2.63E-04	1.49E-03	1.06E-03	7.47E-04	9.49E-05	6.71E-05	4.75E-05	1.95E-04	1.38E-04	9.75E-05
beta-BHC	1.33E-02	6.64E-03	3.31E-03	4.72E-03	2.36E-03	1.18E-03	2.43E-03	1.21E-03	6.06E-04	5.44E-03	2.71E-03	1.35E-03	1.05E-03	5.23E-04	2.61E-04	1.23E-03	8.71E-04	6.16E-04	7.55E-04	5.34E-04	3.78E-04	2.31E-04	1.63E-04	1.15E-04
delta-BHC	1.33E-02	6.64E-03	3.31E-03	4.72E-03	2.36E-03	1.18E-03	1.91E-03	9.52E-04	4.75E-04	5.44E-03	2.71E-03	1.35E-03	1.05E-03	5.23E-04	2.61E-04	1.23E-03	8.71E-04	6.16E-04	5.88E-04	4.16E-04	2.94E-04	2.08E-04	1.47E-04	1.04E-04
Dieldrin	**6.33E+01**	**8.67E+00**	**1.19E+00**	**2.20E+01**	**3.02E+00**	4.13E-01	**4.22E+00**	5.78E-01	7.92E-02	**2.54E+01**	**3.48E+00**	4.76E-01	**7.42E+00**	**1.02E+00**	1.39E-01	**7.76E+01**	**5.49E+01**	**3.88E+01**	**1.38E+01**	**9.78E+00**	**6.92E+00**	**1.17E+01**	**8.26E+00**	**5.84E+00**
Endosulfan I	5.90E-03	2.64E-03	1.18E-03	2.16E-03	9.65E-04	4.32E-04	1.02E-03	4.57E-04	2.05E-04	2.49E-03	1.11E-03	4.97E-04	3.90E-05	1.74E-05	7.80E-06	1.07E-01	4.79E-02	2.14E-02	6.41E-02	2.87E-02	1.28E-02	1.45E-02	6.48E-03	2.90E-03
Endosulfan II	8.44E-02	3.77E-02	1.69E-02	3.09E-02	1.38E-02	6.18E-03	7.87E-03	3.52E-03	1.57E-03	3.56E-02	1.59E-02	7.11E-03	5.31E-04	2.38E-04	1.06E-04	**1.53E+00**	6.86E-01	3.07E-01	5.06E-01	2.26E-01	1.01E-01	1.52E-01	6.79E-02	3.04E-02
Endrin	**4.15E+00**	**1.85E+00**	8.29E-01	**1.49E+00**	6.66E-01	2.98E-01	2.65E-01	1.18E-01	5.30E-02	**2.47E+01**	**1.11E+01**	**4.94E+00**	2.10E-01	9.38E-02	4.20E-02	**1.81E+00**	8.08E-01	3.62E-01	3.85E-01	1.72E-01	7.70E-02	2.04E-01	9.11E-02	4.07E-02
gamma-BHC (Lindane)	2.15E-04	9.62E-05	4.30E-05	7.34E-05	3.28E-05	1.47E-05	4.49E-05	2.01E-05	8.97E-06	8.47E-05	3.79E-05	1.69E-05	3.87E-05	1.73E-05	7.74E-06	2.74E-05	1.22E-05	5.47E-06	1.92E-05	8.59E-06	3.84E-06	7.87E-06	3.52E-06	1.57E-06
gamma-Chlordane	**1.20E+00**	5.36E-01	2.40E-01	4.04E-01	1.80E-01	8.07E-02	5.47E-02	2.45E-02	1.09E-02	4.65E-01	2.08E-01	9.30E-02	8.45E-02	3.78E-02	1.69E-02	5.25E-02	3.71E-02	2.63E-02	4.23E-03	2.99E-03	2.11E-03	1.02E-02	7.19E-03	5.08E-03
Heptachlor	3.62E-03	1.62E-03	7.25E-04	1.32E-03	5.93E-04	2.65E-04	9.93E-05	4.44E-05	1.99E-05	1.53E-03	6.83E-04	3.05E-04	6.83E-05	3.05E-05	1.37E-05	2.37E-03	1.06E-03	4.74E-04	2.82E-04	1.26E-04	5.64E-05	2.07E-04	9.25E-05	4.14E-05
Heptachlor epoxide	**1.16E+00**	5.17E-01	2.31E-01	4.19E-01	1.87E-01	8.37E-02	7.46E-02	3.34E-02	1.49E-02	4.82E-01	2.16E-01	9.64E-02	3.66E-02	1.64E-02	7.32E-03	7.48E-01	3.35E-01	1.50E-01	1.67E-01	7.47E-02	3.34E-02	7.59E-02	3.39E-02	1.52E-02
Methoxychlor	1.53E-03	6.86E-04	3.07E-04	5.45E-04	2.44E-04	1.09E-04	1.01E-04	4.52E-05	2.02E-05	6.28E-04	2.81E-04	1.26E-04	1.12E-04	5.03E-05	2.25E-05	3.60E-02	2.55E-02	1.80E-02	7.58E-03	5.36E-03	3.79E-03	4.61E-03	3.26E-03	2.31E-03
Toxaphene	4.19E-01	1.87E-01	8.38E-02	1.49E-01	6.66E-02	2.98E-02	2.08E-02	9.31E-03	4.16E-03	1.71E-01	7.67E-02	3.43E-02	3.10E-02	1.38E-02	6.19E-03	1.39E-02	6.20E-03	2.77E-03	2.15E-03	9.61E-04	4.30E-04	1.68E-03	7.53E-04	3.37E-04
Volatile/Semivolatile Organics																								
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.78E-05	7.94E-06	3.55E-06	4.04E-05	1.81E-05	8.09E-06	1.45E-05	6.49E-06	2.90E-06
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.29E-03	1.02E-03	4.57E-04	7.21E-04	3.23E-04	1.44E-04	3.07E-03	1.37E-03	6.15E-04	8.31E-04	3.72E-04	1.66E-04	7.41E-04	3.31E-04	1.48E-04	8.15E-04	5.76E-04	4.07E-04	4.28E-03	3.02E-03	2.14E-03	8.58E-04	6.06E-04	4.29E-04
1,2-Dichlorobenzene	1.92E-03	8.61E-04	3.85E-04	4.61E-04	2.06E-04	9.23E-05	5.27E-03	2.35E-03	1.05E-03	5.31E-04	2.38E-04	1.06E-04	1.52E-03	6.81E-04	3.05E-04	3.22E-04	1.44E-04	6.45E-05	4.41E-03	1.97E-03	8.82E-04	8.87E-04	3.97E-04	1.77E-04
1,3-Dichlorobenzene	8.93E-04	3.99E-04	1.79E-04	8.29E-05	3.71E-05	1.66E-05	4.95E-03	2.21E-03	9.90E-04	9.56E-05	4.28E-05	1.91E-05	1.52E-03	6.81E-04	3.05E-04	5.80E-05	2.59E-05	1.16E-05	4.14E-03	1.85E-03	8.29E-04	8.40E-04	3.76E-04	1.68E-04
1,4-Dichlorobenzene	8.26E-04	3.69E-04	1.65E-04	5.82E-05	2.60E-05	1.16E-05	5.31E-03	2.38E-03	1.06E-03	6.72E-05	3.00E-05	1.34E-05	1.52E-03	6.81E-04	3.05E-04	1.16E-04	6.71E-05	3.88E-05	1.27E-02	7.34E-03	4.24E-03	2.51E-03	1.45E-03	8.38E-04
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	2.54E-03	1.14E-03	5.08E-04	3.75E-04	1.68E-04	7.49E-05	8.50E-04	3.80E-04	1.70E-04	4.32E-04	1.93E-04	8.63E-05	3.47E-03	1.55E-03	6.94E-04	3.02E-05	1.35E-05	6.04E-06	5.92E-05	2.65E-05	1.18E-05	8.30E-05	3.71E-05	1.66E-05
Acenaphthylene	1.09E-03	4.89E-04	2.19E-04	9.43E-05	4.22E-05	1.89E-05	1.21E-03	5.42E-04	2.43E-04	1.09E-04	4.87E-05	2.18E-05	1.91E-03	8.56E-04	3.83E-04	7.60E-06	3.40E-06	1.52E-06	1.02E-04	4.56E-05	2.04E-05	5.37E-05	2.40E-05	1.07E-05
Anthracene	2.13E-03	9.52E-04	4.26E-04	1.01E-04	4.51E-05	2.02E-05	2.66E-03	1.19E-03	5.32E-04	1.16E-04	5.20E-05	2.33E-05	4.23E-03	1.89E-03	8.46E-04	8.13E-06	3.63E-06	1.63E-06	2.22E-04	9.94E-05	4.45E-05	1.17E-04	5.25E-05	2.35E-05
Benzo(a)anthracene	7.33E-03	3.28E-03	1.47E-03	1.36E-03	6.07E-04	2.72E-04	3.31E-03	1.48E-03	6.61E-04	1.56E-03	6.99E-04	3.13E-04	8.29E-03	3.71E-03	1.66E-03	1.17E-02	5.23E-03	2.34E-03	3.62E-02	1.62E-02	7.26E-03	2.62E-02	1.17E-02	5.26E-03
Benzo(a)pyrene	1.78E-02	7.94E-03	3.55E-03	2.18E-04	9.74E-05	4.36E-05	1.09E-02	4.87E-03	2.18E-03	2.51E-04	1.12E-04	5.02E-05	3.91E-02	1.75E-02	7.82E-03	1.87E-03	8.39E-04	3.75E-04	7.22E-02	3.23E-02	1.45E-02	9.49E-02	4.25E-02	1.90E-02
Benzo(b)fluoranthene	1.25E-02	5.61E-03	2.51E-03	4.52E-04	2.02E-04	9.05E-05	3.29E-02	1.47E-02	6.57E-03	5.22E-04	2.33E-04	1.04E-04	2.58E-02	1.15E-02	5.16E-03	3.89E-03	1.74E-03	7.79E-04	3.42E-01	1.53E-01	6.86E-02	1.09E-01	4.87E-02	2.18E-02
Benzo(g,h,i)perylene	1.19E-02	5.31E-03	2.38E-03	3.14E-03	1.40E-03	6.28E-04	1.42E-02	6.37E-03	2.85E-03	3.61E-03	1.62E-03	7.23E-04	7.59E-03	3.40E-03	1.52E-03	2.70E-02	1.21E-02	5.41E-03	1.56E-01	6.99E-02	3.13E-02	4.26E-02	1.91E-02	8.53E-03
Benzo(k)fluoranthene	4.43E-03	1.98E-03	8.87E-04	1.71E-04	7.63E-05	3.41E-05	4.74E-03	2.12E-03	9.47E-04	1.97E-04	8.80E-05	3.93E-05	9.05E-03	4.05E-03	1.81E-03	1.47E-03	6.57E-04	2.94E-04	5.10E-02	2.28E-02	1.02E-02	2.95E-02	1.32E-02	5.92E-03
Chrysene	1.26E-02	5.63E-03	2.52E-03	1.76E-03	7.85E-04	3.51E-04	5.92E-03	2.65E-03	1.18E-03	2.02E-03	9.05E-04	4.05E-04	1.78E-02	7.95E-03	3.55E-03	1.51E-02	6.76E-03	3.03E-03	6.02E-02	2.69E-02	1.21E-02	5.20E-02	2.33E-02	1.04E-02

TABLE L-85

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Dibenz(a,h)anthracene	1.02E-03	4.56E-04	2.04E-04	7.13E-05	3.19E-05	1.43E-05	2.82E-03	1.26E-03	5.64E-04	8.23E-05	3.68E-05	1.65E-05	1.89E-03	8.44E-04	3.77E-04	6.13E-04	2.74E-04	1.23E-04	3.32E-02	1.48E-02	6.64E-03	1.01E-02	4.50E-03	2.02E-03
Fluoranthene	4.98E-03	2.23E-03	9.95E-04	5.06E-04	2.26E-04	1.01E-04	1.23E-01	5.51E-02	2.46E-02	5.84E-04	2.61E-04	1.17E-04	8.21E-03	3.67E-03	1.64E-03	4.08E-05	1.83E-05	8.17E-06	1.22E-02	5.45E-03	2.44E-03	1.83E-03	8.19E-04	3.66E-04
Fluorene	8.46E-03	3.78E-03	1.69E-03	1.52E-03	6.81E-04	3.05E-04	1.85E-03	8.29E-04	3.71E-04	1.75E-03	7.84E-04	3.51E-04	9.83E-03	4.40E-03	1.97E-03	1.23E-04	5.49E-05	2.46E-05	7.33E-05	3.28E-05	1.47E-05	2.14E-04	9.55E-05	4.27E-05
Hexachlorobenzene	**1.12E+00**	5.03E-01	2.25E-01	2.63E-01	1.18E-01	5.27E-02	5.51E-01	2.46E-01	1.10E-01	3.03E-01	1.36E-01	6.07E-02	9.27E-01	4.15E-01	1.85E-01	1.11E-02	7.84E-03	5.55E-03	2.59E-02	1.83E-02	1.29E-02	1.45E-02	1.03E-02	7.25E-03
Hexachlorobutadiene	1.97E-02	8.83E-03	3.95E-03	3.67E-03	1.64E-03	7.33E-04	3.80E-02	1.70E-02	7.60E-03	4.25E-03	1.90E-03	8.50E-04	2.30E-02	1.03E-02	4.60E-03	4.63E-03	1.46E-03	4.63E-04	5.86E-02	1.85E-02	5.86E-03	1.65E-02	5.22E-03	1.65E-03
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.03E-03	4.61E-04	2.06E-04	1.00E-03	4.49E-04	2.01E-04	5.18E-04	2.32E-04	1.04E-04
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.70E-04	3.44E-04	1.54E-04	2.28E-03	1.02E-03	4.56E-04	5.81E-04	2.60E-04	1.16E-04
Indeno(1,2,3-cd)pyrene	1.28E-02	5.74E-03	2.57E-03	3.26E-03	1.46E-03	6.52E-04	8.92E-03	3.99E-03	1.78E-03	3.75E-03	1.68E-03	7.51E-04	9.02E-03	4.03E-03	1.80E-03	2.80E-02	1.25E-02	5.62E-03	1.07E-01	4.78E-02	2.14E-02	4.13E-02	1.85E-02	8.28E-03
Pentachlorophenol	4.35E-03	1.37E-03	4.35E-04	1.39E-03	4.40E-04	1.39E-04	5.02E-02	1.59E-02	5.02E-03	1.61E-03	5.08E-04	1.61E-04	1.30E-03	4.10E-04	1.30E-04	8.29E-04	3.71E-04	1.66E-04	3.65E-02	1.63E-02	7.30E-03	5.13E-03	2.29E-03	1.03E-03
Phenanthrene	4.87E-03	2.18E-03	9.74E-04	1.07E-03	4.80E-04	2.15E-04	9.73E-03	4.35E-03	1.95E-03	1.24E-03	5.53E-04	2.47E-04	4.44E-03	1.99E-03	8.88E-04	8.66E-05	3.87E-05	1.73E-05	9.46E-04	4.23E-04	1.89E-04	2.30E-04	1.03E-04	4.60E-05
Pyrene	8.11E-02	3.63E-02	1.62E-02	5.11E-03	2.29E-03	1.02E-03	1.56E-01	6.98E-02	3.12E-02	5.89E-03	2.63E-03	1.18E-03	1.53E-01	6.85E-02	3.06E-02	4.40E-02	1.97E-02	8.81E-03	**1.43E+00**	6.40E-01	2.86E-01	5.15E-01	2.30E-01	1.03E-01
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**5.25E+00**	**1.66E+00**	5.25E-01	**1.54E+00**	4.86E-01	1.54E-01	--	--	--	**2.35E+00**	7.42E-01	2.35E-01	--	--	--	**7.17E+00**	**2.27E+00**	7.17E-01	--	--	--	2.56E-01	8.10E-02	2.56E-02

Shaded cells indicate HQ ≥ 1

TABLE L-86

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	7.07E-02	4.47E-02	2.83E-02	4.89E-02	3.09E-02	1.96E-02	1.76E-02	1.11E-02	7.05E-03	1.18E-02	7.46E-03	4.72E-03	9.86E-02	5.69E-02	3.29E-02	8.48E-02	6.71E-02	5.31E-02	5.49E-01	2.45E-01	1.10E-01	8.19E-02	6.48E-02	5.13E-02
Copper	5.06E-01	2.93E-01	1.69E-01	2.15E-01	1.24E-01	7.18E-02	1.85E-01	1.07E-01	6.18E-02	3.76E-02	2.18E-02	1.26E-02	5.83E-01	3.37E-01	1.95E-01	3.06E-02	2.69E-02	2.37E-02	1.34E-01	1.04E-01	8.02E-02	4.85E-02	4.27E-02	3.75E-02
Lead	6.70E-02	3.00E-02	1.34E-02	3.36E-02	1.50E-02	6.73E-03	1.71E-01	1.21E-01	8.56E-02	1.24E-02	5.55E-03	2.48E-03	6.48E-02	2.90E-02	1.30E-02	1.10E-02	7.99E-03	5.81E-03	1.11E-01	8.08E-02	5.87E-02	4.12E-02	3.00E-02	2.18E-02
Mercury	4.86E-01	2.81E-01	1.62E-01	1.99E-01	1.15E-01	6.64E-02	2.19E-01	1.26E-01	7.29E-02	1.31E-02	8.35E-03	5.33E-03	2.55E-01	1.47E-01	8.50E-02	2.21E-02	1.72E-02	1.34E-02	1.85E-01	8.29E-02	3.71E-02	1.46E-02	1.13E-02	8.84E-03
Polychlorinated Biphenyls																								
Aroclor-1221	2.39E-02	1.07E-02	4.79E-03	1.21E-02	5.39E-03	2.41E-03	1.69E-03	7.55E-04	3.37E-04	1.34E-02	5.99E-03	2.68E-03	8.08E-02	3.61E-02	1.62E-02	8.04E-02	3.60E-02	1.61E-02	1.60E-02	7.16E-03	3.20E-03	1.43E-02	6.38E-03	2.85E-03
Aroclor-1254	8.78E-01	3.93E-01	1.76E-01	4.25E-01	1.90E-01	8.51E-02	3.50E-02	1.57E-02	7.00E-03	7.61E-02	3.40E-02	1.52E-02	**2.29E+00**	**1.03E+00**	4.58E-01	**2.84E+00**	**1.27E+00**	5.67E-01	1.58E-01	7.09E-02	3.17E-02	5.79E-01	2.59E-01	1.16E-01
Aroclor-1260	3.58E-01	1.60E-01	7.16E-02	1.76E-01	7.85E-02	3.51E-02	1.27E-02	5.69E-03	2.55E-03	4.10E-01	1.83E-01	8.19E-02	9.98E-01	4.46E-01	2.00E-01	**1.17E+00**	5.23E-01	2.34E-01	5.64E-02	2.52E-02	1.13E-02	2.21E-01	9.88E-02	4.42E-02
PCB (total)	7.00E-01	3.13E-01	1.40E-01	2.33E-01	1.04E-01	4.65E-02	4.61E-02	2.06E-02	9.21E-03	**1.36E+00**	6.10E-01	2.73E-01	**2.91E+00**	**1.30E+00**	5.82E-01	**2.06E+00**	9.22E-01	4.12E-01	2.04E-01	9.13E-02	4.08E-02	6.88E-01	3.08E-01	1.38E-01
Pesticides																								
4,4'-DDD	9.71E-02	3.07E-02	9.71E-03	4.55E-02	1.44E-02	4.55E-03	1.53E-02	6.83E-03	3.05E-03	4.24E-02	1.34E-02	4.24E-03	8.64E-02	3.86E-02	1.73E-02	5.65E-02	2.53E-02	1.13E-02	7.98E-03	3.57E-03	1.60E-03	1.52E-02	6.81E-03	3.05E-03
4,4'-DDE	1.63E-01	5.17E-02	1.63E-02	8.13E-02	2.57E-02	8.13E-03	1.65E-02	7.36E-03	3.29E-03	7.59E-02	2.40E-02	7.59E-03	9.38E-02	4.19E-02	1.88E-02	1.01E-01	4.52E-02	2.02E-02	8.56E-03	3.83E-03	1.71E-03	1.79E-02	8.02E-03	3.58E-03
4,4'-DDT	2.43E-01	7.67E-02	2.43E-02	1.31E-01	4.13E-02	1.31E-02	3.46E-03	2.19E-03	1.39E-03	1.22E-01	3.86E-02	1.22E-02	6.08E-03	3.85E-03	2.43E-03	1.62E-01	7.26E-02	3.25E-02	1.86E-02	8.30E-03	3.71E-03	1.43E-02	6.38E-03	2.85E-03
Dieldrin	**1.13E+00**	1.55E-01	2.12E-02	4.50E-01	6.16E-02	8.43E-03	1.37E-01	1.88E-02	2.58E-03	4.20E-01	5.75E-02	7.87E-03	7.51E-01	1.03E-01	1.41E-02	**1.29E+00**	9.15E-01	6.47E-01	3.66E-01	2.59E-01	1.83E-01	6.88E-01	4.86E-01	3.44E-01
Endosulfan II	8.43E-03	3.77E-03	1.69E-03	4.62E-03	2.07E-03	9.25E-04	5.54E-04	2.48E-04	1.11E-04	4.32E-03	1.93E-03	8.63E-04	5.68E-05	2.54E-05	1.14E-05	1.88E-01	8.39E-02	3.75E-02	4.35E-02	1.95E-02	8.70E-03	1.47E-02	6.57E-03	2.94E-03
Endrin	3.97E-01	1.77E-01	7.93E-02	2.13E-01	9.53E-02	4.26E-02	1.78E-02	7.98E-03	3.57E-03	**2.87E+00**	**1.28E+00**	5.74E-01	2.12E-02	9.49E-03	4.24E-03	2.12E-01	9.46E-02	4.23E-02	3.17E-02	1.42E-02	6.33E-03	1.88E-02	8.42E-03	3.77E-03
gamma-Chlordane	6.97E-02	3.12E-02	1.39E-02	3.31E-02	1.48E-02	6.61E-03	3.71E-03	1.66E-03	7.41E-04	3.08E-02	1.38E-02	6.17E-03	8.58E-03	3.84E-03	1.72E-03	3.52E-03	2.49E-03	1.76E-03	3.50E-04	2.48E-04	1.75E-04	8.50E-04	6.01E-04	4.25E-04
Heptachlor epoxide	1.10E-01	4.93E-02	2.20E-02	5.97E-02	2.67E-02	1.19E-02	5.00E-03	2.24E-03	1.00E-03	5.57E-02	2.49E-02	1.11E-02	3.69E-03	1.65E-03	7.38E-04	8.73E-02	3.90E-02	1.75E-02	1.37E-02	6.12E-03	2.74E-03	6.99E-03	3.13E-03	1.40E-03
Volatile/Semivolatile Organics																								
Hexachlorobenzene	7.90E-02	3.53E-02	1.58E-02	3.24E-02	1.45E-02	6.49E-03	2.86E-02	1.28E-02	5.72E-03	3.03E-02	1.35E-02	6.06E-03	4.82E-02	2.16E-02	9.64E-03	1.12E-03	7.89E-04	5.58E-04	1.83E-03	1.30E-03	9.16E-04	8.59E-04	6.07E-04	4.29E-04
Pyrene	1.46E-03	6.51E-04	2.91E-04	6.08E-05	2.72E-05	1.22E-05	3.38E-03	1.51E-03	6.76E-04	5.70E-05	2.55E-05	1.14E-05	3.24E-03	1.45E-03	6.48E-04	4.28E-04	1.91E-04	8.57E-05	4.26E-02	1.90E-02	8.53E-03	1.35E-02	6.03E-03	2.70E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**2.28E+00**	7.20E-01	2.28E-01	**1.01E+00**	3.18E-01	1.01E-01	--	--	--	**1.66E+00**	5.24E-01	1.66E-01	--	--	--	**3.95E+00**	**1.25E+00**	3.95E-01	--	--	--	1.15E-01	3.65E-02	1.15E-02

Shaded cells indicate HQ ≥ 1

TABLE L-87

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	3.69E-02	2.34E-02	1.48E-02	1.90E-02	1.20E-02	7.59E-03	1.34E-02	8.45E-03	5.35E-03	1.17E-02	7.41E-03	4.69E-03	7.51E-02	4.34E-02	2.50E-02	3.65E-02	2.89E-02	2.29E-02	4.00E-01	1.79E-01	8.00E-02	5.85E-02	4.63E-02	3.66E-02
Copper	3.62E-01	2.10E-01	1.21E-01	1.37E-01	7.90E-02	4.57E-02	1.55E-01	8.96E-02	5.18E-02	3.76E-02	2.17E-02	1.26E-02	4.45E-01	2.58E-01	1.49E-01	2.05E-02	1.81E-02	1.59E-02	1.13E-01	8.77E-02	6.79E-02	3.76E-02	3.31E-02	2.91E-02
Lead	4.55E-02	2.03E-02	9.10E-03	1.84E-02	8.24E-03	3.68E-03	1.27E-01	8.99E-02	6.36E-02	1.24E-02	5.55E-03	2.48E-03	5.01E-02	2.24E-02	1.00E-02	6.77E-03	4.92E-03	3.57E-03	7.89E-02	5.74E-02	4.17E-02	2.92E-02	2.12E-02	1.54E-02
Mercury	3.46E-01	2.00E-01	1.15E-01	1.43E-01	8.27E-02	4.78E-02	1.77E-01	1.02E-01	5.91E-02	1.31E-02	8.35E-03	5.33E-03	1.81E-01	1.04E-01	6.03E-02	1.57E-02	1.23E-02	9.55E-03	1.52E-01	6.78E-02	3.03E-02	1.10E-02	8.56E-03	6.67E-03
Polychlorinated Biphenyls																								
Aroclor-1221	1.60E-02	7.16E-03	3.20E-03	8.10E-03	3.62E-03	1.62E-03	1.12E-03	5.02E-04	2.24E-04	1.34E-02	5.99E-03	2.68E-03	5.55E-02	2.48E-02	1.11E-02	5.40E-02	2.41E-02	1.08E-02	1.08E-02	4.84E-03	2.16E-03	9.39E-03	4.20E-03	1.88E-03
Aroclor-1254	3.49E-01	1.56E-01	6.98E-02	1.71E-01	7.65E-02	3.42E-02	1.31E-02	5.86E-03	2.62E-03	7.61E-02	3.40E-02	1.52E-02	9.74E-01	4.36E-01	1.95E-01	**1.14E+00**	5.10E-01	2.28E-01	6.38E-02	2.85E-02	1.28E-02	2.16E-01	9.66E-02	4.32E-02
Aroclor-1260	2.57E-01	1.15E-01	5.13E-02	1.26E-01	5.65E-02	2.52E-02	8.91E-03	3.99E-03	1.78E-03	4.10E-01	1.83E-01	8.19E-02	7.33E-01	3.28E-01	1.47E-01	8.42E-01	3.76E-01	1.68E-01	4.06E-02	1.82E-02	8.12E-03	1.55E-01	6.92E-02	3.09E-02
PCB (total)	5.25E-01	2.35E-01	1.05E-01	1.82E-01	8.12E-02	3.63E-02	2.35E-02	1.05E-02	4.71E-03	**1.36E+00**	6.10E-01	2.73E-01	**1.62E+00**	7.25E-01	3.24E-01	**1.67E+00**	7.47E-01	3.34E-01	1.10E-01	4.91E-02	2.19E-02	3.62E-01	1.62E-01	7.24E-02
Pesticides																								
4,4'-DDD	5.20E-02	1.64E-02	5.20E-03	2.43E-02	7.70E-03	2.43E-03	8.63E-03	3.86E-03	1.73E-03	2.27E-02	7.19E-03	2.27E-03	4.63E-02	2.07E-02	9.26E-03	3.03E-02	1.35E-02	6.05E-03	4.70E-03	2.10E-03	9.40E-04	8.22E-03	3.68E-03	1.64E-03
4,4'-DDE	7.22E-02	2.28E-02	7.22E-03	3.59E-02	1.14E-02	3.59E-03	7.82E-03	3.50E-03	1.56E-03	3.35E-02	1.06E-02	3.35E-03	4.15E-02	1.86E-02	8.30E-03	4.46E-02	2.00E-02	8.93E-03	4.29E-03	1.92E-03	8.57E-04	8.01E-03	3.58E-03	1.60E-03
4,4'-DDT	9.80E-02	3.10E-02	9.80E-03	5.28E-02	1.67E-02	5.28E-03	1.62E-03	1.02E-03	6.47E-04	4.93E-02	1.56E-02	4.93E-03	2.47E-03	1.56E-03	9.87E-04	6.56E-02	2.93E-02	1.31E-02	8.49E-03	3.80E-03	1.70E-03	5.92E-03	2.65E-03	1.18E-03
Dieldrin	4.28E-01	5.87E-02	8.04E-03	1.70E-01	2.33E-02	3.20E-03	5.21E-02	7.14E-03	9.78E-04	1.59E-01	2.18E-02	2.98E-03	2.85E-01	3.90E-02	5.35E-03	4.91E-01	3.47E-01	2.45E-01	1.39E-01	9.82E-02	6.94E-02	2.61E-01	1.85E-01	1.31E-01
Endosulfan II	3.41E-03	1.53E-03	6.82E-04	1.87E-03	8.36E-04	3.74E-04	2.24E-04	1.00E-04	4.48E-05	1.75E-03	7.81E-04	3.49E-04	2.36E-05	1.06E-05	4.72E-06	7.59E-02	3.39E-02	1.52E-02	1.76E-02	7.88E-03	3.52E-03	5.96E-03	2.66E-03	1.19E-03
Endrin	1.50E-01	6.70E-02	3.00E-02	8.05E-02	3.60E-02	1.61E-02	6.74E-03	3.02E-03	1.35E-03	**1.08E+00**	4.85E-01	2.17E-01	8.04E-03	3.59E-03	1.61E-03	7.99E-02	3.57E-02	1.60E-02	1.20E-02	5.36E-03	2.40E-03	7.13E-03	3.19E-03	1.43E-03
gamma-Chlordane	2.66E-02	1.19E-02	5.32E-03	1.26E-02	5.64E-03	2.52E-03	1.42E-03	6.33E-04	2.83E-04	1.18E-02	5.27E-03	2.36E-03	3.28E-03	1.47E-03	6.55E-04	1.34E-03	9.49E-04	6.71E-04	1.34E-04	9.47E-05	6.70E-05	3.25E-04	2.30E-04	1.62E-04
Heptachlor epoxide	4.13E-02	1.85E-02	8.26E-03	2.24E-02	1.00E-02	4.48E-03	1.88E-03	8.39E-04	3.75E-04	2.09E-02	9.34E-03	4.18E-03	1.39E-03	6.22E-04	2.78E-04	3.27E-02	1.46E-02	6.54E-03	5.14E-03	2.30E-03	1.03E-03	2.63E-03	1.17E-03	5.25E-04
Volatile/Semivolatile Organics																								
Hexachlorobenzene	4.44E-02	1.98E-02	8.87E-03	1.82E-02	8.15E-03	3.64E-03	1.61E-02	7.19E-03	3.21E-03	1.70E-02	7.61E-03	3.40E-03	2.71E-02	1.21E-02	5.43E-03	6.27E-04	4.43E-04	3.13E-04	1.03E-03	7.29E-04	5.15E-04	4.84E-04	3.42E-04	2.42E-04
Pyrene	1.00E-03	4.47E-04	2.00E-04	4.19E-05	1.87E-05	8.38E-06	2.32E-03	1.04E-03	4.64E-04	3.93E-05	1.76E-05	7.85E-06	2.23E-03	9.95E-04	4.45E-04	2.95E-04	1.32E-04	5.90E-05	2.92E-02	1.31E-02	5.86E-03	9.25E-03	4.14E-03	1.85E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	**1.55E+00**	4.89E-01	1.55E-01	6.65E-01	2.10E-01	6.65E-02	--	--	--	**1.66E+00**	5.24E-01	1.66E-01	--	--	--	**3.04E+00**	9.62E-01	3.04E-01	--	--	--	8.79E-02	2.78E-02	8.79E-03

Shaded cells indicate HQ ≥ 1

TABLE L-88

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	2.48E-01	1.57E-01	9.94E-02	1.00E-02	6.34E-03	4.01E-03	3.40E-01	2.15E-01	1.36E-01	2.09E-02	1.32E-02	8.37E-03	**1.06E+00**	6.15E-01	3.55E-01	3.33E-02	2.63E-02	2.09E-02	**1.12E+01**	**5.03E+00**	**2.25E+00**	**1.22E+00**	9.68E-01	7.67E-01
Copper	**6.02E+00**	**3.48E+00**	**2.02E+00**	1.29E-01	7.49E-02	4.33E-02	**2.37E+00**	**1.37E+00**	7.95E-01	2.36E-02	1.37E-02	7.90E-03	**1.31E+01**	**7.57E+00**	**4.38E+00**	2.65E-02	2.33E-02	2.05E-02	3.37E-01	2.61E-01	2.02E-01	8.33E-01	7.33E-01	6.44E-01
Lead	7.44E-02	3.33E-02	1.49E-02	1.77E-02	7.93E-03	3.55E-03	4.10E-01	2.90E-01	2.05E-01	2.87E-03	1.28E-03	5.73E-04	1.04E-01	4.63E-02	2.07E-02	6.48E-03	4.71E-03	3.42E-03	2.17E-01	1.58E-01	1.15E-01	7.11E-02	5.17E-02	3.76E-02
Mercury	**3.41E+00**	**1.97E+00**	**1.14E+00**	1.58E-01	9.10E-02	5.26E-02	**2.40E+00**	**1.39E+00**	8.00E-01	4.48E-02	2.86E-02	1.83E-02	**6.63E+00**	**3.83E+00**	**2.21E+00**	2.36E-02	1.84E-02	1.43E-02	**1.17E+00**	5.24E-01	2.35E-01	2.46E-01	1.91E-01	1.49E-01
Nickel	2.74E-02	1.23E-02	5.49E-03	9.35E-03	4.18E-03	1.87E-03	1.79E-02	7.99E-03	3.57E-03	4.41E-03	1.97E-03	8.81E-04	2.03E-02	9.10E-03	4.07E-03	2.00E-02	1.41E-02	1.00E-02	8.83E-02	6.24E-02	4.41E-02	3.67E-02	2.59E-02	1.83E-02
Selenium	2.42E-01	1.08E-01	4.84E-02	5.03E-02	2.25E-02	1.01E-02	**1.27E+00**	8.96E-01	6.34E-01	3.67E-02	1.64E-02	7.34E-03	**1.24E+00**	8.76E-01	6.20E-01	2.99E-01	2.33E-01	1.81E-01	**2.16E+00**	**1.68E+00**	**1.31E+00**	7.94E-01	6.18E-01	4.81E-01
Silver	6.42E-03	2.87E-03	1.28E-03	2.23E-03	9.97E-04	4.46E-04	4.05E-04	1.81E-04	8.10E-05	2.66E-03	1.19E-03	5.31E-04	5.75E-04	2.57E-04	1.15E-04	5.66E-04	2.53E-04	1.13E-04	1.82E-04	8.13E-05	3.64E-05	1.06E-04	4.75E-05	2.12E-05
Zinc	7.07E-01	3.16E-01	1.41E-01	1.91E-01	8.55E-02	3.82E-02	2.83E-01	1.27E-01	5.66E-02	9.28E-02	4.15E-02	1.86E-02	1.95E-01	8.71E-02	3.90E-02	1.49E-01	6.66E-02	2.98E-02	2.40E-01	1.07E-01	4.80E-02	7.79E-02	3.48E-02	1.56E-02
Polychlorinated Biphenyls																								
Aroclor-1016	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	1.21E-02	5.43E-03	2.43E-03	1.92E-02	8.57E-03	3.83E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-02	2.15E-02	1.36E-02	7.03E-02	3.14E-02	1.41E-02	1.06E-02	6.72E-03	4.25E-03
Aroclor-1221	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	1.91E-02	8.52E-03	3.81E-03	1.92E-02	8.57E-03	3.83E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-01	1.52E-01	6.79E-02	1.40E-01	6.25E-02	2.79E-02	1.16E-01	5.17E-02	2.31E-02
Aroclor-1232	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	1.53E-02	6.83E-03	3.05E-03	2.24E-02	1.00E-02	4.48E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-01	1.52E-01	6.79E-02	1.02E-01	4.54E-02	2.03E-02	1.10E-01	4.94E-02	2.21E-02
Aroclor-1242	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	1.21E-02	5.43E-03	2.43E-03	1.92E-02	8.57E-03	3.83E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-01	1.52E-01	6.79E-02	7.03E-02	3.14E-02	1.41E-02	1.06E-01	4.75E-02	2.13E-02
Aroclor-1248	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	9.89E-03	4.42E-03	1.98E-03	1.92E-02	8.57E-03	3.83E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-01	1.52E-01	6.79E-02	4.77E-02	2.13E-02	9.54E-03	1.03E-01	4.62E-02	2.07E-02
Aroclor-1254	1.31E-01	5.87E-02	2.63E-02	4.16E-02	1.86E-02	8.33E-03	9.16E-03	4.10E-03	1.83E-03	1.92E-02	8.57E-03	3.83E-03	5.31E-01	2.37E-01	1.06E-01	3.40E-01	1.52E-01	6.79E-02	4.03E-02	1.80E-02	8.07E-03	1.02E-01	4.58E-02	2.05E-02
Aroclor-1260	7.60E-02	3.40E-02	1.52E-02	2.43E-02	1.09E-02	4.86E-03	4.83E-03	2.16E-03	9.66E-04	1.22E-01	5.46E-02	2.44E-02	3.20E-01	1.43E-01	6.40E-02	1.98E-01	8.86E-02	3.96E-02	2.06E-02	9.20E-03	4.12E-03	5.69E-02	2.54E-02	1.14E-02
PCB (total)	2.28E-01	1.02E-01	4.57E-02	6.10E-02	2.73E-02	1.22E-02	5.15E-03	2.30E-03	1.03E-03	3.21E-01	1.44E-01	6.42E-02	3.20E-01	1.43E-01	6.40E-02	6.55E-01	2.93E-01	1.31E-01	2.38E-02	1.07E-02	4.76E-03	7.08E-02	3.16E-02	1.42E-02
Pesticides																								
4,4'-DDD	2.34E-01	7.40E-02	2.34E-02	7.93E-02	2.51E-02	7.93E-03	3.24E-02	1.45E-02	6.47E-03	9.13E-02	2.89E-02	9.13E-03	1.03E-01	4.59E-02	2.05E-02	1.20E-01	5.39E-02	2.41E-02	1.69E-02	7.57E-03	3.39E-03	2.37E-02	1.06E-02	4.74E-03
4,4'-DDE	**2.07E+00**	6.53E-01	2.07E-01	7.53E-01	2.38E-01	7.53E-02	2.78E-02	1.24E-02	5.57E-03	8.67E-01	2.74E-01	8.67E-02	8.68E-02	3.88E-02	1.74E-02	**1.14E+00**	5.12E-01	2.29E-01	1.47E-02	6.56E-03	2.93E-03	6.69E-02	2.99E-02	1.34E-02
4,4'-DDT	**7.46E+00**	**2.36E+00**	7.46E-01	**2.70E+00**	8.55E-01	2.70E-01	7.22E-02	4.56E-02	2.89E-02	**3.11E+00**	9.85E-01	3.11E-01	1.12E-01	7.09E-02	4.48E-02	**4.11E+00**	**1.84E+00**	8.22E-01	3.41E-01	1.52E-01	6.81E-02	3.47E-01	1.55E-01	6.95E-02
Aldrin	2.99E-01	1.34E-01	5.99E-02	1.08E-01	4.82E-02	2.16E-02	9.72E-03	4.35E-03	1.94E-03	1.24E-01	5.55E-02	2.48E-02	1.32E-02	5.90E-03	2.64E-03	6.22E-02	2.78E-02	1.24E-02	7.46E-03	3.34E-03	1.49E-03	6.15E-03	2.75E-03	1.23E-03
alpha-BHC	8.41E-02	4.19E-02	2.09E-02	2.98E-02	1.49E-02	7.43E-03	2.22E-02	1.11E-02	5.53E-03	3.44E-02	1.71E-02	8.55E-03	6.41E-03	3.20E-03	1.60E-03	7.78E-03	5.50E-03	3.89E-03	7.02E-03	4.96E-03	3.51E-03	1.75E-03	1.24E-03	8.76E-04
alpha-Chlordane	8.66E-02	3.87E-02	1.73E-02	3.03E-02	1.35E-02	6.06E-03	3.12E-03	1.40E-03	6.25E-04	3.49E-02	1.56E-02	6.98E-03	3.45E-03	1.55E-03	6.91E-04	3.94E-03	2.79E-03	1.97E-03	3.60E-04	2.54E-04	1.80E-04	5.34E-04	3.78E-04	2.67E-04
beta-BHC	8.41E-02	4.19E-02	2.09E-02	2.98E-02	1.49E-02	7.43E-03	2.20E-02	1.10E-02	5.48E-03	3.44E-02	1.71E-02	8.55E-03	6.41E-03	3.20E-03	1.60E-03	7.78E-03	5.50E-03	3.89E-03	6.95E-03	4.92E-03	3.48E-03	1.74E-03	1.23E-03	8.72E-04
delta-BHC	8.41E-02	4.19E-02	2.09E-02	2.98E-02	1.49E-02	7.43E-03	1.71E-02	8.55E-03	4.27E-03	3.44E-02	1.71E-02	8.55E-03	6.41E-03	3.20E-03	1.60E-03	7.78E-03	5.50E-03	3.89E-03	5.40E-03	3.82E-03	2.70E-03	1.54E-03	1.09E-03	7.68E-04
Dieldrin	**2.08E+00**	2.85E-01	3.90E-02	7.07E-01	9.68E-02	1.33E-02	1.99E-01	2.73E-02	3.73E-03	8.14E-01	1.12E-01	1.53E-02	3.50E-01	4.79E-02	6.56E-03	**2.49E+00**	**1.76E+00**	**1.24E+00**	6.53E-01	4.62E-01	3.26E-01	4.98E-01	3.52E-01	2.49E-01
Endosulfan I	4.56E-03	2.04E-03	9.13E-04	1.67E-03	7.47E-04	3.34E-04	1.16E-03	5.19E-04	2.32E-04	1.92E-03	8.61E-04	3.85E-04	3.01E-05	1.35E-05	6.03E-06	8.30E-02	3.71E-02	1.66E-02	7.29E-02	3.26E-02	1.46E-02	1.46E-02	6.51E-03	2.91E-03
Endosulfan II	4.56E-03	2.04E-03	9.13E-04	1.67E-03	7.47E-04	3.34E-04	6.24E-04	2.79E-04	1.25E-04	1.92E-03	8.61E-04	3.85E-04	3.01E-05	1.35E-05	6.03E-06	8.30E-02	3.71E-02	1.66E-02	4.03E-02	1.80E-02	8.06E-03	1.02E-02	4.56E-03	2.04E-03
Endrin	1.55E-01	6.94E-02	3.10E-02	5.57E-02	2.49E-02	1.11E-02	1.40E-02	6.27E-03	2.80E-03	9.25E-01	4.14E-01	1.85E-01	7.90E-03	3.53E-03	1.58E-03	6.76E-02	3.03E-02	1.35E-02	2.12E-02	9.49E-03	4.24E-03	8.75E-03	3.91E-03	1.75E-03
gamma-BHC (Lindane)	1.22E-02	5.47E-03	2.44E-03	4.18E-03	1.87E-03	8.35E-04	3.46E-03	1.55E-03	6.93E-04	4.81E-03	2.15E-03	9.62E-04	1.92E-03	8.59E-04	3.84E-04	1.56E-03	6.96E-04	3.11E-04	1.49E-03	6.67E-04	2.99E-04	4.53E-04	2.02E-04	9.05E-05
gamma-Chlordane	6.90E-02	3.09E-02	1.38E-02	2.32E-02	1.04E-02	4.65E-03	3.70E-03	1.66E-03	7.41E-04	2.68E-02	1.20E-02	5.35E-03	4.87E-03	2.18E-03	9.74E-04	3.02E-03	2.14E-03	1.51E-03	3.60E-04	2.54E-04	1.80E-04	6.09E-04	4.31E-04	3.05E-04
Heptachlor	9.51E-02	4.25E-02	1.90E-02	3.48E-02	1.56E-02	6.96E-03	3.07E-03	1.37E-03	6.15E-04	4.01E-02	1.79E-02	8.02E-03	6.47E-04	2.89E-04	1.29E-04	6.22E-02	2.78E-02	1.24E-02	8.53E-03	3.81E-03	1.71E-03	4.76E-03	2.13E-03	9.52E-04
Heptachlor epoxide	9.62E-02	4.30E-02	1.92E-02	3.48E-02	1.56E-02	6.96E-03	8.91E-03	3.98E-03	1.78E-03	4.01E-02	1.79E-02	8.02E-03	3.07E-03	1.37E-03	6.15E-04	6.22E-02	2.78E-02	1.24E-02	2.05E-02	9.15E-03	4.09E-03	7.38E-03	3.30E-03	1.48E-03
Methoxychlor	1.34E-04	6.01E-05	2.69E-05	4.71E-05	2.10E-05	9.41E-06	1.28E-05	5.74E-06	2.56E-06	5.42E-05	2.42E-05	1.08E-05	1.42E-05	6.37E-06	2.85E-06	3.11E-03	2.20E-03	1.56E-03	9.61E-04	6.79E-04	4.80E-04	5.19E-04	3.67E-04	2.59E-04
Toxaphene	9.40E-01	4.20E-01	1.88E-01	3.29E-01	1.47E-01	6.58E-02	6.71E-02	3.00E-02	1.34E-02	3.79E-01	1.69E-01	7.58E-02	9.95E-02	4.45E-02	1.99E-02	3.06E-02	1.37E-02	6.13E-03	6.90E-03	3.08E-03	1.38E-03	4.76E-03	2.13E-03	9.52E-04
Volatile/Semivolatile Organics																								
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.48E-06	3.35E-06	1.50E-06	1.73E-05	7.72E-06	3.45E-06	6.37E-06	2.85E-06	1.27E-06
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.35E-05	6.03E-06	2.70E-06	4.01E-06	1.79E-06	8.02E-07	2.28E-05	1.02E-05	4.57E-06	4.74E-06	2.12E-06	9.48E-07	9.05E-06	4.05E-06	1.81E-06	4.55E-06	3.22E-06	2.27E-06	3.29E-05	2.33E-05	1.65E-05	8.50E-06	6.01E-06	4.25E-06
1,2-Dichlorobenzene	1.26E-05	5.61E-06	2.51E-06	2.80E-06	1.25E-06	5.60E-07	3.79E-05	1.70E-05	7.58E-06	3.35E-06	1.50E-06	6.69E-07	1.45E-05	6.47E-06	2.89E-06	1.96E-06	8.79E-07	3.93E-07	3.25E-05	1.45E-05	6.51E-06	7.74E-06	3.46E-06	1.55E-06
1,3-Dichlorobenzene	7.73E-06	3.46E-06	1.55E-06	1.03E-06	4.61E-07	2.06E-07	3.58E-05	1.60E-05	7.15E-06	1.31E-06	5.85E-07	2.62E-07	1.45E-05	6.47E-06	2.89E-06	7.28E-07	3.26E-07	1.46E-07	3.07E-05	1.37E-05	6.14E-06	7.44E-06	3.33E-06	1.49E-06
1,4-Dichlorobenzene	7.42E-06	3.32E-06	1.48E-06	9.15E-07	4.09E-07	1.83E-07	3.82E-05	1.71E-05	7.65E-06	1.17E-06	5.25E-07	2.35E-07	1.45E-05	6.47E-06	2.89E-06	1.85E-06	1.07E-06	6.16E-07	9.37E-05	5.41E-05	3.12E-05	2.20E-05	1.27E-05	7.35E-06
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	8.66E-04	3.87E-04	1.73E-04	1.28E-04	5.72E-05	2.56E-05	5.42E-04	2.43E-04	1.08E-04	1.47E-04	6.59E-05	2.95E-05	1.18E-03	5.29E-04	2.36E-04	1.03E-05	4.61E-06	2.06E-06	4.96E-05	2.22E-05	9.92E-06	3.34E-05	1.50E-05	6.69E-06
Acenaphthylene	9.28E-04	4.15E-04	1.86E-04	7.95E-05	3.55E-05	1.59E-05	1.35E-03	6.03E-04	2.70E-04	9.17E-05	4.10E-05	1.83E-05	1.62E-03	7.26E-04	3.25E-04	6.41E-06	2.87E-06	1.28E-06	1.22E-04	5.47E-05	2.44E-05	5.14E-05	2.30E-05	1.03E-05
Anthracene	2.46E-04	1.10E-04	4.93E-05	1.20E-05	5.37E-06	2.40E-06	5.68E-04	2.54E-04	1.14E-04	1.39E-05	6.24E-06	2.79E-06	4.90E-04	2.19E-04	9.79E-05	9.70E-07	4.34E-07	1.94E-07	5.27E-05	2.36E-05	1.05E-05	1.76E-05	7.87E-06	3.52E-06
Benzo(a)anthracene	5.67E-04	2.53E-04	1.13E-04	1.05E-04	4.70E-05	2.10E-05	5.25E-04	2.35E-04	1.05E-04	1.21E-04	5.42E-05	2.42E-05	6.42E-04	2.87E-04	1.28E-04	9.04E-04	4.04E-04	1.81E-04	6.17E-03	2.76E-03	1.24E-03	2.63E-03	1.18E-03	5.26E-04
Benzo(a)pyrene	9.22E-04	4.12E-04	1.84E-04	1.18E-05	5.27E-06	2.36E-06	7.04E-04	3.15E-04	1.41E-04	1.37E-05	6.12E-06	2.74E-06	2.03E-03	9.08E-04	4.06E-04	1.01E-04	4.54E-05	2.03E-05	5.72E-03	2.56E-03	1.15E-03	5.33E-03	2.39E-03	1.07E-03
Benzo(b)fluoranthene	7.01E-04	3.14E-04	1.40E-04	2.56E-05	1.14E-05	5.12E-06	2.59E-03	1.16E-03	5.19E-04	2.96E-05	1.32E-05	5.92E-06	1.44E-03	6.45E-04	2.88E-04	2.20E-04	9.86E-05	4.41E-05	2.81E-02	1.26E-02	5.63E-03	7.55E-03	3.38E-03	1.51E-03
Benzo(g,h,i)perylene	4.70E-04	2.10E-04	9.39E-05	1.24E-04	5.55E-05	2.48E-05	5.21E-04	2.33E-04	1.04E-04	1.43E-04	6.40E-05	2.86E-05	3.02E-04	1.35E-04	6.05E-05	1.07E-03	4.78E-04	2.14E-04	6.09E-03	2.73E-03	1.22E-03	1.78E-03	7.95E-04	3.56E-04
Benzo(k)fluoranthene	2.28E-04	1.02E-04	4.56E-05	9.23E-06	4.13E-06	1.85E-06	4.05E-04	1.81E-04	8.10E-05	1.07E-05	4.81E-06	2.15E-06	4.65E-04	2.08E-04	9.30E-05	7.95E-05	3.56E-05	1.59E-05	4.70E-03	2.10E-03	9.42E-04	1.90E-03	8.52E-04	3.81E-04
Chrysene	8.58E-04	3.84E-04	1.72E-04	1.20E-04	5.37E-05	2.40E-05	7.72E-04	3.45E-04	1.54E-04	1.38E-04	6.19E-05	2.77E-05	1.21E-03	5.42E-04	2.42E-04	1.03E-03	4.62E-04	2.07E-04	8.84E-03	3.95E-03	1.77E-03	4.42E-03	1.98E-03	8.85E-04
Dibenz(a,h)anthracene	1.59E-04	7.10E-05	3.17E-05	1.14E-05	5.09E-06	2.28E-06	6.21E-04	2.78E-04	1.24E-04	1.32E-05	5.91E-06	2.64E-06	2.94E-04	1.31E-04	5.88E-05	9.79E-05	4.38E-05	1.96E-05	7.55E-03	3.38E-03	1.51E-03	2.02E-03	9.02E-04	4.04E-04
Fluoranthene	8.09E-04	3.62E-04	1.62E-04	8.25E-05	3.69E-05	1.65E-05	2.93E-02	1.31E-02	5.87E-03	9.51E-05	4.25E-05	1.90E-05	1.33E-03	5.97E-04	2.67E-04	6.65E-06	2.98E-06	1.33E-06	2.91E-03	1.30E-03	5.82E-04	4.26E-04	1.90E-04	8.51E-05

TABLE L-88

Summary of Hazard Quotients for Aquatic Food Web Exposures - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Fluorene	2.06E-03	9.19E-04	4.11E-04	3.70E-04	1.66E-04	7.40E-05	7.28E-04	3.25E-04	1.46E-04	4.26E-04	1.91E-04	8.53E-05	2.39E-03	1.07E-03	4.78E-04	2.98E-05	1.33E-05	5.97E-06	4.96E-05	2.22E-05	9.92E-06	5.74E-05	2.57E-05	1.15E-05
Hexachlorobenzene	6.76E-01	3.02E-01	1.35E-01	1.36E-01	6.07E-02	2.72E-02	4.17E-01	1.86E-01	8.34E-02	1.57E-01	7.00E-02	3.13E-02	7.04E-01	3.15E-01	1.41E-01	5.72E-03	4.04E-03	2.86E-03	1.97E-02	1.39E-02	9.85E-03	1.10E-02	7.75E-03	5.48E-03
Hexachlorobutadiene	1.24E-02	5.56E-03	2.49E-03	1.88E-03	8.42E-04	3.77E-04	2.84E-02	1.27E-02	5.69E-03	2.19E-03	9.78E-04	4.37E-04	1.71E-02	7.65E-03	3.42E-03	2.38E-03	7.53E-04	2.38E-04	4.38E-02	1.38E-02	4.38E-03	1.22E-02	3.87E-03	1.22E-03
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.73E-04	3.46E-04	1.55E-04	7.50E-04	3.35E-04	1.50E-04	3.86E-04	1.73E-04	7.72E-05
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.79E-04	2.59E-04	1.16E-04	1.72E-03	7.68E-04	3.43E-04	4.40E-04	1.97E-04	8.80E-05
Indeno(1,2,3-cd)pyrene	2.89E-04	1.29E-04	5.77E-05	7.34E-05	3.28E-05	1.47E-05	2.80E-04	1.25E-04	5.60E-05	8.46E-05	3.79E-05	1.69E-05	2.05E-04	9.17E-05	4.10E-05	6.31E-04	2.83E-04	1.26E-04	3.53E-03	1.58E-03	7.08E-04	1.17E-03	5.23E-04	2.34E-04
Pentachlorophenol	9.93E-02	3.14E-02	9.93E-03	3.01E-02	9.50E-03	3.01E-03	**1.60E+00**	5.05E-01	1.60E-01	3.46E-02	1.09E-02	3.46E-03	4.01E-02	1.27E-02	4.01E-03	1.79E-02	8.00E-03	3.58E-03	**1.16E+00**	5.19E-01	2.32E-01	1.62E-01	7.26E-02	3.25E-02
Phenanthrene	1.69E-03	7.54E-04	3.37E-04	3.72E-04	1.66E-04	7.43E-05	6.14E-03	2.74E-03	1.23E-03	4.28E-04	1.91E-04	8.56E-05	1.54E-03	6.88E-04	3.08E-04	3.00E-05	1.34E-05	5.99E-06	6.09E-04	2.72E-04	1.22E-04	1.20E-04	5.35E-05	2.39E-05
Pyrene	5.81E-03	2.60E-03	1.16E-03	3.67E-04	1.64E-04	7.33E-05	1.56E-02	6.99E-03	3.13E-03	4.22E-04	1.89E-04	8.45E-05	1.10E-02	4.90E-03	2.19E-03	3.15E-03	1.41E-03	6.32E-04	1.51E-01	6.74E-02	3.02E-02	4.37E-02	1.95E-02	8.75E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	7.47E-01	2.36E-01	7.47E-02	2.22E-01	7.03E-02	2.22E-02	--	--	--	3.20E-01	1.01E-01	3.20E-02	--	--	--	**2.72E+00**	8.60E-01	2.72E-01	--	--	--	1.01E-01	3.18E-02	1.01E-02

Shaded cells indicate HQ ≥ 1

TABLE L-89

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	7.40E-02	4.68E-02	2.96E-02	8.73E-03	5.52E-03	3.49E-03	5.80E-02	3.67E-02	2.32E-02	1.48E-02	9.33E-03	5.91E-03	3.00E-01	1.73E-01	1.00E-01	2.37E-02	1.88E-02	1.48E-02	**2.12E+00**	9.48E-01	4.24E-01	2.75E-01	2.18E-01	1.72E-01
Copper	2.90E-01	1.68E-01	9.72E-02	1.11E-01	6.41E-02	3.71E-02	1.26E-01	7.26E-02	4.20E-02	1.67E-02	9.64E-03	5.58E-03	3.19E-01	1.85E-01	1.07E-01	1.83E-02	1.61E-02	1.41E-02	9.29E-02	7.19E-02	5.57E-02	2.79E-02	2.46E-02	2.16E-02
Mercury	4.68E-01	2.70E-01	1.56E-01	1.29E-01	7.43E-02	4.29E-02	3.28E-01	1.89E-01	1.09E-01	3.16E-02	2.02E-02	1.29E-02	4.88E-01	2.82E-01	1.63E-01	1.54E-02	1.20E-02	9.36E-03	2.73E-01	1.22E-01	5.46E-02	2.43E-02	1.89E-02	1.47E-02
Selenium	1.03E-01	4.63E-02	2.07E-02	4.29E-02	1.92E-02	8.58E-03	2.46E-01	1.74E-01	1.23E-01	2.59E-02	1.16E-02	5.17E-03	3.82E-01	2.70E-01	1.91E-01	2.06E-01	1.60E-01	1.25E-01	5.10E-01	3.97E-01	3.09E-01	2.23E-01	1.74E-01	1.35E-01
Pesticides																								
4,4'-DDE	3.92E-02	1.24E-02	3.92E-03	1.95E-02	6.16E-03	1.95E-03	5.28E-03	2.36E-03	1.06E-03	1.82E-02	5.75E-03	1.82E-03	2.25E-02	1.01E-02	4.50E-03	2.42E-02	1.08E-02	4.84E-03	3.53E-03	1.58E-03	7.06E-04	4.60E-03	2.06E-03	9.20E-04
4,4'-DDT	5.19E-01	1.64E-01	5.19E-02	2.79E-01	8.83E-02	2.79E-02	8.60E-03	5.44E-03	3.44E-03	2.61E-01	8.24E-02	2.61E-02	1.30E-02	8.20E-03	5.19E-03	3.47E-01	1.55E-01	6.94E-02	5.08E-02	2.27E-02	1.02E-02	3.38E-02	1.51E-02	6.76E-03
Dieldrin	9.23E-02	1.26E-02	1.73E-03	3.25E-02	4.45E-03	6.10E-04	1.46E-02	2.00E-03	2.74E-04	3.03E-02	4.16E-03	5.69E-04	7.99E-02	1.09E-02	1.50E-03	9.36E-02	6.62E-02	4.68E-02	3.90E-02	2.76E-02	1.95E-02	7.17E-02	5.07E-02	3.58E-02
Volatile/Semivolatile Organics																								
Pentachlorophenol	1.87E-02	5.91E-03	1.87E-03	8.46E-03	2.67E-03	8.46E-04	4.25E-02	1.34E-02	4.25E-03	7.90E-03	2.50E-03	7.90E-04	8.02E-03	2.54E-03	8.02E-04	4.12E-03	1.84E-03	8.23E-04	3.75E-02	1.68E-02	7.49E-03	6.95E-03	3.11E-03	1.39E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	4.14E-01	1.31E-01	4.14E-02	1.86E-01	5.88E-02	1.86E-02	--	--	--	2.26E-01	7.14E-02	2.26E-02	--	--	--	**1.87E+00**	5.92E-01	1.87E-01	--	--	--	5.51E-02	1.74E-02	5.51E-03

Shaded cells indicate HQ ≥ 1

TABLE L-90

Summary of Hazard Quotients for Aquatic Food Web Exposures - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Belted Kingfisher			Great Blue Heron			Mallard			Osprey			Tree Swallow			Mink			Muskrat			Raccoon		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals																								
Arsenic	4.92E-02	3.11E-02	1.97E-02	7.10E-03	4.49E-03	2.84E-03	3.46E-02	2.19E-02	1.38E-02	1.48E-02	9.33E-03	5.90E-03	1.86E-01	1.08E-01	6.21E-02	2.01E-02	1.59E-02	1.26E-02	**1.18E+00**	5.28E-01	2.36E-01	1.59E-01	1.26E-01	9.94E-02
Copper	2.02E-01	1.17E-01	6.75E-02	8.55E-02	4.95E-02	2.86E-02	9.83E-02	5.68E-02	3.29E-02	1.67E-02	9.64E-03	5.58E-03	2.12E-01	1.23E-01	7.09E-02	1.32E-02	1.16E-02	1.02E-02	7.36E-02	5.70E-02	4.41E-02	1.95E-02	1.71E-02	1.51E-02
Mercury	2.85E-01	1.64E-01	9.49E-02	9.77E-02	5.64E-02	3.26E-02	2.16E-01	1.25E-01	7.20E-02	3.16E-02	2.02E-02	1.29E-02	2.50E-01	1.44E-01	8.32E-02	1.05E-02	8.18E-03	6.38E-03	1.83E-01	8.19E-02	3.66E-02	1.39E-02	1.09E-02	8.46E-03
Selenium	7.90E-02	3.53E-02	1.58E-02	3.26E-02	1.46E-02	6.52E-03	1.81E-01	1.28E-01	9.05E-02	2.59E-02	1.16E-02	5.17E-03	2.88E-01	2.04E-01	1.44E-01	1.58E-01	1.23E-01	9.57E-02	3.75E-01	2.92E-01	2.27E-01	1.67E-01	1.30E-01	1.01E-01
Pesticides																								
4,4'-DDE	2.65E-02	8.38E-03	2.65E-03	1.32E-02	4.17E-03	1.32E-03	3.75E-03	1.67E-03	7.49E-04	1.23E-02	3.89E-03	1.23E-03	1.52E-02	6.81E-03	3.05E-03	1.64E-02	7.32E-03	3.27E-03	2.54E-03	1.14E-03	5.09E-04	3.14E-03	1.40E-03	6.28E-04
4,4'-DDT	1.92E-01	6.09E-02	1.92E-02	1.04E-01	3.28E-02	1.04E-02	3.71E-03	2.35E-03	1.48E-03	9.67E-02	3.06E-02	9.67E-03	4.82E-03	3.05E-03	1.93E-03	1.29E-01	5.76E-02	2.58E-02	2.12E-02	9.48E-03	4.24E-03	1.29E-02	5.77E-03	2.58E-03
Dieldrin	7.66E-02	1.05E-02	1.44E-03	2.70E-02	3.70E-03	5.06E-04	1.21E-02	1.66E-03	2.28E-04	2.52E-02	3.45E-03	4.73E-04	6.64E-02	9.09E-03	1.24E-03	7.77E-02	5.49E-02	3.88E-02	3.24E-02	2.29E-02	1.62E-02	5.95E-02	4.21E-02	2.98E-02
Volatile/Semivolatile Organics																								
Pentachlorophenol	1.55E-02	4.91E-03	1.55E-03	7.04E-03	2.22E-03	7.04E-04	3.53E-02	1.12E-02	3.53E-03	6.57E-03	2.08E-03	6.57E-04	6.69E-03	2.11E-03	6.69E-04	3.42E-03	1.53E-03	6.85E-04	3.11E-02	1.39E-02	6.23E-03	5.78E-03	2.59E-03	1.16E-03
Dioxin-Like PCB Congeners																								
2,3,7,8 TCDD (TEQ)	2.57E-01	8.12E-02	2.57E-02	1.17E-01	3.71E-02	1.17E-02	--	--	--	2.26E-01	7.14E-02	2.26E-02	--	--	--	**1.07E+00**	3.37E-01	1.07E-01	--	--	--	3.31E-02	1.05E-02	3.31E-03

Shaded cells indicate HQ ≥ 1

TABLE L-91

Summary of the *Hyalella azteca* 42-Day Toxicity Test Results - Upstream Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

		Survival				Survival				Survival				Growth				Growth				Growth			
		Day 28				Day 35				Day 42				Day 28				Day 28				Day 42			
			Statistical Comparisons				Statistical Comparisons				Statistical Comparisons			Mean	Statistical Comparisons			Mean	Statistical Comparisons			Mean	Statistical Comparisons		
Water Body/ Treatment	Sample ID	Mean (%)	Laboratory Control	Reference SD02	Reference SD04	Mean (%)	Laboratory Control	Reference SD02	Reference SD04	Mean (%)	Laboratory Control	Reference SD02	Reference SD04	Dry Weight[1] (mg)	Laboratory Control	Reference SD02	Reference SD04	Dry Biomass[2] (mg)	Laboratory Control	Reference SD02	Reference SD04	Dry Weight[1] (mg)	Laboratory Control	Reference SD02	Reference SD04
Laboratory Control	--	98.00	--	--	--	92.50	--	--	--	87.50	--	--	--	0.753	--	--	--	0.721	--	--	--	0.898	--	--	--
Reference	CAREFS04-SD02-1012	91.82	√	--	--	90.00		--	--	85.71		--	--	0.587		--	--	0.531		--	--	0.878		--	--
(Cheatham Pond)	CAREFS04-SD04-1012	95.83		--	--	92.50		--	--	90.00		--	--	0.554	√	--	--	0.525		--	--	0.887		--	--
Upstream Pond	CAS04-SD18-1012	94.17				90.23				84.32				0.467	√	√		0.436	√			0.814			
	CAS04-SD19-1012	95.45				91.25				88.75				0.756				0.703				0.863			
	CAS04-SD20-1012	94.55				83.75				80.00				0.537	√			0.519				0.942			
	CAS04-SD21-1012	89.17	√		√	83.75				81.25				0.712				0.644				1.059			
	CAS04-SD22-1012	95.00				93.75				86.25				0.563				0.533				0.866			
	CAS04-SD23-1012	94.17				85.00				81.25				0.507				0.507				0.854			

"√" indicates a statistically significant decrease in response relative to Laboratory Control or the Reference Site (column headers indicate which comparison is being made)

* Statistically different only with outlier (in Reference 04) excluded

1 - Ash free dry weight of surviving adults divided by the number of surviving adults

2 - Ash free dry weight of surviving adults divided by the number of adults at the start of the test

3 - Day 35 juveniles + Day 42 juveniles / Day 42 surviving adults

4 - Day 35 juveniles + Day 42 juveniles / Day 42 surviving females

TABLE L-91

Summary of the *Hyalella azteca* 42-Day Toxicity

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Ann

		Growth				Reproduction				Reproduction				Reproduction				Reproduction			
		Day 42				Day 35				Day 42				Day 35 + Day 42[3]				Day 35 + Day 42[4]			
		Mean	Statistical Comparisons			Mean	Statistical Comparisons			Mean	Statistical Comparisons			Mean	Statistical Comparisons			Mean	Statistical Comparisons		
Water Body/ Treatment	Sample ID	Dry Biomass[2] (mg)	Laboratory Control	Reference SD02	Reference SD04	Juveniles/ Amphipod	Laboratory Control	Reference SD02	Reference SD04	Juveniles/ Female	Laboratory Control	Reference SD02	Reference SD04	Juveniles/ Amphipod	Laboratory Control	Reference SD02	Reference SD04	Juveniles/ Female	Laboratory Control	Reference SD02	Reference SD04
Laboratory Control	--	0.783	--	--	--	1.4	--	--	--	7.5	--	--	--	5.7	--	--	--	10.0	--	--	--
Reference	CAREFS04-SD02-1012	0.752		--	--	1.6		--	--	8.6		--	--	5.8		--	--	11.8		--	--
(Cheatham Pond)	CAREFS04-SD04-1012	0.804		--	--	1.9		--	--	6.6		--	--	6.1		--	--	9.8		--	--
Upstream Pond	CAS04-SD18-1012	0.683				1.3				8.9				6.3				11.2			
	CAS04-SD19-1012	0.763			*	1.4				9.5				6.0				12.5			
	CAS04-SD20-1012	0.744				2.1				9.8				8.5				14.2			
	CAS04-SD21-1012	0.860				2.2				11.3				8.8				15.1			
	CAS04-SD22-1012	0.739			*	0.7	√		√	8.0				5.5				9.5			
	CAS04-SD23-1012	0.682			*	0.9			√	7.3				4.6				8.9			

"√" indicates a statistically significant decrease in response relative to Laboratory Control or the Reference Site (column headers indicate which comparison is being made)

* Statistically different only with outlier (in Reference 04) excluded

1 - Ash free dry weight of surviving adults divided by the number of surviving adults

2 - Ash free dry weight of surviving adults divided by the number of adults at the start of the test

3 - Day 35 juveniles + Day 42 juveniles / Day 42 surviving adults

4 - Day 35 juveniles + Day 42 juveniles / Day 42 surviving females

TABLE L-92

Summary of Significant Differences From Sediment Toxicity Tests

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Treatment	Sample	Survival			Growth - Dry Weight		Growth - Dry Biomass		Reproduction - Juveniles/Adult		Reproduction - Juveniles/Female	
		Day 28	Day 35	Day 42	Day 28	Day 42	Day 28	Day 42	Day 35	Day 35 + 42	Day 42	Day 35 + 42
Control	Laboratory Control											
Reference	CAREFS04-SD02-1012	C										
	CAREFS04-SD04-1012				C							
Upstream Pond	CAS04-SD18-1012				C, R2		C					
	CAS04-SD19-1012							*				
	CAS04-SD20-1012				C							
	CAS04-SD21-1012	C, R4										
	CAS04-SD22-1012							*	C, R4			
	CAS04-SD23-1012							*	R4			

C = Control; R = Reference (2, 4)

* Statistically different only with outlier (in Reference 04) excluded

Statistically significant (reduced responses only) as compared to laboratory control

Statistically significant (reduced responses only) as compared to laboratory control and both reference samples

Statistically significant (reduced responses only) as compared to laboratory control and one reference sample

Statistically significant (reduced responses only) as compared to one or both reference samples

No significant differences (reduced responses only)

TABLE L-93

Evaluation of Sampling Results - 2012 Aquatic Biological Surveys

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																												
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
Cheatham Pond (Site 4 Reference) - Vegetated Areas																																						
SD-01	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	2	0	1	1	0	0	4	2	1	1	0	0	0	0	0	0	0	0	5	0	0	0	17	8
SD-02	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	1	0	3	0	0	1	0	0	4	1	1	3	0	0	0	1	0	0	0	3	2	0	0	0	20	10
SD-03	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	0	0	0	3	0	1	2	0	0	3	2	1	4	0	0	1	0	0	0	0	3	14	0	0	0	34	10
SD-04	10/12/2012	Absent	Common	Common	Absent	Common	Common	0	3	0	0	0	0	1	2	0	3	0	0	0	5	3	2	6	0	0	0	0	0	0	2	0	7	0	0	0	31	9
SD-05	10/12/2012	Rare	Common	Common	Absent	Common	Common	0	3	0	0	1	0	0	0	0	0	1	0	0	3	1	2	4	0	0	0	0	0	0	1	3	10	0	0	0	26	9
TOTAL		--	--	--	--	--	--	--	--	0	0	1	1	1	10	0	5	5	0	0	19	9	7	18	0	0	1	1	0	0	3	9	38	0	0	0	128	15
									Minimum:	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	2	0	0	0	17	8
									Average:	0	0	0.2	0.2	0.2	2.0	0	1.0	1.0	0	0	3.8	1.8	1.4	3.6	0	0	0.2	0.2	0	0	0.6	1.8	7.6	0	0	0	25.6	9.2
									Maximum:	0	0	1	1	1	3	0	3	2	0	0	5	3	2	6	0	0	1	1	0	0	2	3	14	0	0	0	34	10
Youth Pond - Vegetated Areas																																						
SD-1	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	0	0	3	1	0	0	0	0	4	3	1	1	0	0	1	0	0	0	1	0	3	0	0	0	18	9
SD-2	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	2	0	5	0	0	0	0	0	4	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	16	6
SD-3	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	0	0	3	0	0	0	0	0	7	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0	16	5
SD-5	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	1	3	0	4	0	1	0	0	0	3	1	1	1	0	0	2	0	0	0	0	0	3	0	0	0	20	10
SD-7	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	1	0	3	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	2	5	0	0	0	17	7
SD-9	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	0	1	0	0	0	0	0	0	0	4	5	3	1	0	0	0	0	0	0	0	0	1	0	2	0	17	7
SD-12	10/8/2012	Rare	Abundant	Dominant	Absent	Common	Common	0	3	0	0	1	0	0	2	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	7	5
SD-8	10/8/2012	Rare	Common	Abundant	Absent	Common	Common	1	2	0	0	1	0	1	3	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	11	6
TOTAL		--	--	--	--	--	--	--	--	0	0	3	7	1	23	1	3	0	0	0	27	17	7	9	0	0	4	0	0	0	1	2	15	0	2	0	122	15
									Minimum:	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5
									Average:	0	0	0.4	0.9	0.1	2.9	0.1	0.4	0	0	0	3.4	2.1	0.9	1.1	0	0	0.5	0	0	0	0.1	0.3	1.9	0	0.3	0	15.3	6.9
									Maximum:	0	0	1	3	1	5	1	1	0	0	0	7	5	3	2	0	0	2	0	0	0	1	2	5	0	2	0	20	10
						Percent of Reference			Minimum:	--	--	--	--	--	--	--	--	--	--	--	0.3	0.0	0.0	0.0	--	--	--	--	--	--	--	--	0.0	--	--	--	0.41	0.63
									Average:	--	--	1.9	4.4	0.6	1.4	>1	0.4	0.0	--	--	0.9	1.2	0.6	0.3	--	--	2.5	0.0	--	--	0.2	0.1	0.2	--	>1	--	0.60	0.75
									Maximum:	--	--	1.0	3.0	1.0	1.7	>1	0.3	0.0	--	--	1.4	1.7	1.5	0.3	--	--	2.0	0.0	--	--	0.5	0.7	0.4	--	>1	--	0.59	1.00
Upstream Pond - Vegetated Areas																																						
SD-11	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	0	0	0	0	4	2	0	5	0	0	0	0	0	0	0	0	2	0	1	0	15	6
SD-12	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	1	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	1	2	7	0	0	0	17	7
SD-13	10/11/2012	Rare	Rare	Rare	Absent	Rare	Common	0	3	0	0	0	0	0	3	0	1	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8	5
SD-14	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	0	0	0	1	0	0	4	2	1	3	0	0	0	0	0	0	0	0	5	0	1	0	17	7
SD-18	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	0	0	2	0	0	0	13	5
SD-21	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	0	3	0	0	0	0	0	1	0	1	2	0	0	8	4	0	6	0	0	0	0	0	0	0	0	4	0	0	0	26	7
SD-19	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	1	2	0	0	0	0	0	1	0	3	0	0	0	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5
SD-20	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	1	2	0	0	0	0	0	4	0	0	0	0	0	6	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	14	4
TOTAL		--	--	--	--	--	--	--	--	0	0	1	2	0	11	0	5	4	0	0	34	14	2	22	0	0	0	0	0	0	1	2	20	0	2	0	120	13
									Minimum:	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	4
									Average:	0	0	0.1	0.3	0	1.4	0	0.6	0.5	0	0	4.3	1.8	0.3	2.8	0	0	0	0	0	0	0.1	0.3	2.5	0	0.3	0	15.0	5.8
									Maximum:	0	0	1	2	0	4	0	3	2	0	0	8	4	1	6	0	0	0	0	0	0	1	2	7	0	1	0	26	7
						Percent of Reference			Minimum:	--	--	--	--	--	--	--	--	--	--	--	0.3	0.0	0.0	0.0	--	--	--	--	--	--	--	--	0.0	--	--	--	0.47	0.50
									Average:	--	--	0.6	1.3	0.0	0.7	--	0.6	0.5	--	--	1.1	1.0	0.2	0.8	--	--	0.0	0.0	--	--	0.2	0.1	0.3	--	>1	--	0.59	0.63
									Maximum:	--	--	1.0	2.0	0.0	1.3	--	1.0	1.0	--	--	1.6	1.3	0.5	1.0	--	--	0.0	0.0	--	--	0.5	0.7	0.5	--	>1	--	0.76	0.70
Cheatham Pond (Penniman Lake Reference) - Open Water Areas																																						
SD-01	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
SD-02	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	3
SD-03	10/12/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	7	3
SD-04	10/12/2012	Rare	Common	Common	Absent	Rare	Common	3	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	4
SD-05	10/12/2012	Rare	Common	Common	Absent	Common	Common	2	1	0	0	0	0	1	4	0	0	1	0	0	4	1	2	3	0	0	0	0	0	0	0	0	11	0	0	0	27	8
TOTAL		--	--	--	--	--	--	--	--	0	0	0	2	1	12	0	2	1	0	0	5	1	2	4	0	0	0	0	0	0	0	0	22	0	0	0	52	10
									Minimum:	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	3
									Average:	0	0	0	0.4	0.2	2.4	0	0.4	0.2	0	0	1.0	0.2	0.4	0.8	0	0	0	0	0	0	0	0	4.4	0	0	0	10.4	4.2

TABLE L-93

Evaluation of Sampling Results - 2012 Aquatic Biological Surveys

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample Location	Date	Qualitative Field Evaluation of Aquatic Biota						Sampling Method		Benthic Macroinvertebrate Counts																										
		Periphyton	Filamentous Algae	Macrophytes	Slimes	Macro-invertebrates	Fish	Ponar (grab)	Dip Net (jabs)	Porifera	Hydrozoa	Platyhelminthes	Turbellaria	Hirudinea	Oligochaeta	Isopoda	Amphipoda	Decapoda	Gastropoda	Bivalvia	Anisoptera	Zygoptera	Hemiptera	Coleoptera	Lepidoptera	Sialidae	Corydalidae	Tipulidae	Empididae	Simuliidae	Tabinidae	Culcidae	Chironomidae	Ephemoptera	Trichoptera	Plecoptera	Total Organisms	Total Taxa
									Maximum:	0	0	0	2	1	4	0	1	1	0	0	4	1	2	3	0	0	0	0	0	0	0	0	11	0	0	0	27	8
Youth Pond - Open Water Areas																																						
SD-4	10/8/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	1	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	5	0	0	0	16	6
SD-10	10/8/2012	Rare	Common	Rare	Absent	Common	Common	3	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2	0	8	0	0	0	19	5
SD-13	10/8/2012	Rare	Common	Rare	Absent	Rare	Common	3	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
TOTAL		--	--	--	--	--	--	--	--	0	0	0	3	0	6	0	4	0	0	0	3	0	0	0	0	0	0	2	0	1	4	2	16	0	0	0	41	9
									Minimum:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	3
									Average:	0	0	0	1.0	0	2.0	0	1.3	0	0	0	1.0	0	0	0	0	0	0	0.7	0	0.3	1.3	0.7	5.3	0	0	0	13.7	4.7
									Maximum:	0	0	0	2	0	6	0	4	0	0	0	2	0	0	0	0	0	0	2	0	1	2	2	8	0	0	0	19	6
						Percent of Reference			Minimum:	--	--	--	--	--	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.0	--	--	--	1.20	1.00
									Average:	--	--	--	2.5	0.0	0.8	--	3.3	0.0	--	--	1.0	0.0	0.0	0.0	--	--	--	>1	--	>1	>1	>1	1.2	--	--	--	1.31	1.11
									Maximum:	--	--	--	1.0	0.0	1.5	--	4.0	0.0	--	--	0.5	0.0	0.0	0.0	--	--	--	>1	--	>1	>1	>1	0.7	--	--	--	0.70	0.75
Upstream Pond - Open Water Areas																																						
SD-22	10/11/2012	Rare	Rare	Rare	Absent	Rare	Common	3	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
SD-23	10/11/2012	Rare	Rare	Rare	Absent	Common	Common	3	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1	4	14	0	0	0	25	6
TOTAL		--	--	--	--	--	--	--	--	0	0	0	1	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	3	1	4	16	0	0	0	29	8
									Minimum:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	3
									Average:	0	0	0	0.5	0	0.5	0	0.5	0	0	0	1.0	0	0	0	0	0	0	0	0	1.5	0.5	2.0	8.0	0	0	0	14.5	4.5
									Maximum:	0	0	0	1	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	3	1	4	14	0	0	0	25	6
						Percent of Reference			Minimum:	--	--	--	--	--	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.0	--	--	--	0.80	1.00
									Average:	--	--	--	1.3	0.0	0.2	--	1.3	0.0	--	--	1.0	0.0	0.0	0.0	--	--	--	--	--	>1	>1	>1	1.8	--	--	--	1.39	1.07
									Maximum:	--	--	--	0.5	0.0	0.3	--	1.0	0.0	--	--	0.5	0.0	0.0	0.0	--	--	--	--	--	>1	>1	>1	1.3	--	--	--	0.93	0.75

TABLE L-94

Chemical and Physical Parameter Measurements in Site Samples Used in Sediment Toxicity Tests

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	CAS04-SD18 CAS04-SD18-1012 10/02/12	CAS04-SD19 CAS04-SD19-1012 10/02/12	CAS04-SD20 CAS04-SD20-1012 10/02/12	CAS04-SD21 CAS04-SD21-1012 10/02/12	CAS04-SD22 CAS04-SD22-1012 10/02/12	CAS04-SD23 CAS04-SD23-1012 10/02/12	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	95% UCL (Norm)	Arithmetic Mean
Metals (MG/KG)											
Aluminum	14,400	21,100	18,700	8,490	17,600	16,800	6 / 6	8,490	21,100	19,772	16,182
Antimony	0.83 J	0.47 J	0.78 J	0.63 J	0.92 J	0.89 J	6 / 6	0.47	0.92	0.90	0.75
Arsenic	111	20.1	18.1	7.30	19.1	18.0	6 / 6	7.30	111	64.2	32.3
Barium	78.6	74.7	76.7	34.5	62.8	56.1	6 / 6	34.5	78.6	77.8	63.9
Beryllium	0.47 J	0.99	0.98	0.51 J	1.10	0.93	6 / 6	0.47	1.10	1.05	0.83
Cadmium	0.54 J	2.10	3.30	2.50	5.90	5.20	6 / 6	0.54	5.90	4.90	3.26
Chromium	23.9	32.6	31.4	18.8	33.9	29.7	6 / 6	18.8	33.9	33.2	28.4
Cobalt	3.10	4.70	5.10	2.80	5.50	4.50	6 / 6	2.80	5.50	5.18	4.28
Copper	19.6	41.7	85.6	68.4	125	85.2	6 / 6	19.6	125	101	70.9
Iron	13,300	24,600	24,500	15,900	30,200	28,900	6 / 6	13,300	30,200	28,551	22,900
Lead	42.6	44.0	76.7	23.2	53.7	46.3	6 / 6	23.2	76.7	62.1	47.8
Manganese	75.1	91.3	121	74.4	157	132	6 / 6	74.4	157	136	108
Mercury	0.05	0.17	0.14	0.06	0.15	0.08	6 / 6	0.05	0.17	0.15	0.11
Nickel	26.3	11.7	13.5	7.90	15.6	12.9	6 / 6	7.90	26.3	19.8	14.7
Selenium	0.82 U	1.10 U	0.41 J	0.80 U	1.10 U	1.20 U	1 / 6	0.41	0.41	0.56	0.49
Silver	0.14 J	0.06 J	0.26 J	0.12 J	0.17 J	0.25 J	6 / 6	0.06	0.26	0.23	0.17
Thallium	0.59 U	0.80 U	0.89 U	0.58 U	0.78 U	0.85 U	0 / 6	--	--	0.43	0.37
Vanadium	31.5	45.8	44.2	23.0	45.8	40.8	6 / 6	23.0	45.8	46.2	38.5
Zinc	88.5	244	354	178	388	298	6 / 6	88.5	388	351	258
Polychlorinated Biphenyls (UG/KG)											
Aroclor-1016	14 U	20 U	25 U	16 U	21 U	18 U	0 / 6	--	--	11.1	9.50
Aroclor-1221	14 U	20 U	25 U	16 U	21 U	18 U	0 / 6	--	--	11.1	9.50
Aroclor-1232	16 U	24 U	30 U	19 U	24 U	21 U	0 / 6	--	--	13.2	11.2
Aroclor-1242	14 U	20 U	25 U	16 U	21 U	18 U	0 / 6	--	--	11.1	9.50
Aroclor-1248	14 U	20 U	25 U	16 U	21 U	18 U	0 / 6	--	--	11.1	9.50
Aroclor-1254	14 U	20 U	25 U	16 U	21 U	510	1 / 6	510	510	261	93.0
Aroclor-1260	69 J	290 J	1,000 J	630 J	2,300 J	1,600	6 / 6	69.0	2,300	1,675	982
Semivolatile Organic Compounds (UG/KG)											
2-Methylnaphthalene	29.0 J	23.0 U	32.0 U	21.0 U	7.00 J	10.0 J	3 / 6	7.00	29.0	20.5	14.0
Acenaphthene	33.0 J	23.0 U	6.10 J	7.90 J	18.0 J	30.0 J	5 / 6	6.10	33.0	27.2	17.8
Acenaphthylene	9.20 J	23.0 U	4.80 J	5.90 J	14.0 J	20.0 J	5 / 6	4.80	20.0	15.5	10.9
Anthracene	41.0	7.30 J	17.0 J	18.0 J	53.0	82.0	6 / 6	7.30	82.0	59.5	36.4
Benzo(a)anthracene	210	55.0	110	120	330	520	6 / 6	55.0	520	367	224
Benzo(a)pyrene	440	60.0	120	120	330	500	6 / 6	60.0	500	415	262
Benzo(b)fluoranthene	580	110	220	210	640	950	6 / 6	110	950	719	452
Benzo(g,h,i)perylene	210	33.0 J	68.0	66.0	190	270	6 / 6	33.0	270	219	140
Benzo(k)fluoranthene	180	34.0 J	97.0	95.0	220	320	6 / 6	34.0	320	243	158
Chrysene	300	79.0	190	200	560	810	6 / 6	79.0	810	583	357
Dibenz(a,h)anthracene	88.0	12.0 J	14.0 J	24.0 J	74.0	110	6 / 6	12.0	110	88.5	53.7
Fluoranthene	260	120	280	230	620	1,100	6 / 6	120	1,100	737	435
Fluorene	50.0	23.0 U	12.0 J	14.0 J	36.0 J	58.0	5 / 6	12.0	58.0	47.3	30.3
Indeno(1,2,3-cd)pyrene	340 K	44.0 K	95.0 K	100 K	290 K	420 K	6 / 6	44.0	420	342	215
Naphthalene	360	23.0 U	11.0 J	21.0 U	26.0 U	12.0 J	3 / 6	11.0	360	187	69.7
PAH (HMW)	2,618	547	1,154	1,185	3,334	5,000	6 / 6	547	5,000	3,687	2,306
PAH (LMW)	942	244	487	417	1,111	1,902	6 / 6	244	1,902	1,354	850
PAH (total)	3,560	791	1,641	1,602	4,445	6,902	6 / 6	791	6,902	5,039	3,157
Phenanthrene	160	59.0	140	120	350	590	6 / 6	59.0	590	400	237
Pyrene	270	120	240	250	700	1,100	6 / 6	120	1,100	757	447
Other Parameters											
SEM/AVS Ratio	0.33	0.08	0.24	0.11	0.08	0.11					
pH	7.00	6.70	6.60	6.70	6.80	6.10	6 / 6	6.10	7.00	6.90	6.65
Total organic carbon (MG/KG)	36,000	66,000	92,000	34,000	62,000	46,000	6 / 6	34,000	92,000	74,083	56,000

Shading indicates detections

TABLE L-95

Reporting Limit to ESV Comparison

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
Surface Soil									
1,2,4-Trichlorobenzene	UG/KG	0 / 28	0.90	5,500	267	1,270	0.001	4.33	0.21
1,2-Dichlorobenzene	UG/KG	0 / 28	0.90	5,500	267	1,000	0.001	5.50	0.27
1,3-Dichlorobenzene	UG/KG	0 / 28	0.90	5,500	267	1,000	0.001	5.50	0.27
1,4-Dichlorobenzene	UG/KG	0 / 28	0.90	5,500	267	1,280	0.001	4.30	0.21
2,3,4,6-Tetrachlorophenol	UG/KG	0 / 7	250.0	520	211	500	0.50	1.04	0.42
2,4,5-Trichlorophenol	UG/KG	0 / 28	130.0	14,000	943	1,350	0.10	10.4	0.70
2,4,6-Trichlorophenol	UG/KG	0 / 28	130.0	5,500	438	580	0.22	9.48	0.76
2,4-Dichlorophenol	UG/KG	0 / 28	130.0	5,500	429	500	0.26	11.0	0.86
2-Chlorophenol	UG/KG	0 / 28	130.0	5,500	444	500	0.26	11.0	0.89
2-Nitrophenol	UG/KG	0 / 28	130.0	5,500	447	1,000	0.13	5.50	0.45
4,6-Dinitro-2-methylphenol	UG/KG	0 / 28	380.0	14,000	1,080	1,000	0.38	14.0	1.08
4-Chloro-3-methylphenol	UG/KG	0 / 28	130.0	5,500	444	500	0.26	11.0	0.89
4-Chloroaniline	UG/KG	0 / 28	130.0	5,500	401	500	0.26	11.0	0.80
4-Methylphenol	UG/KG	0 / 6	380.0	5,500	1,240	1,000	0.38	5.50	1.24
4-Nitrophenol	UG/KG	0 / 28	130.0	14,000	977	380	0.34	36.8	2.57
Atrazine	UG/KG	0 / 22	130.0	420	161	11.9	10.9	35.3	13.5
Di-n-butylphthalate	UG/KG	0 / 28	41.0	240,000	4,730	40,000	0.001	6.00	0.12
Hexachlorobenzene	UG/KG	0 / 28	21.0	49,000	1,173	1,000	0.02	49.0	1.17
Hexachlorocyclopentadiene	UG/KG	0 / 28	130.0	5,500	392	2,000	0.07	2.75	0.20
n-Nitrosodiphenylamine	UG/KG	0 / 28	250.0	5,500	519	1,090	0.23	5.05	0.48
Pentachlorophenol	UG/KG	0 / 28	100.0	240,000	5,062	5,000	0.02	48.0	1.01
Toxaphene	UG/KG	0 / 28	32.0	1,400	103	500	0.06	2.80	0.21
Subsurface Soil									
1,2,4-Trichlorobenzene	UG/KG	0 / 20	5.00	17,000	917	1,270	0.004	13.4	0.72
1,2-Dichlorobenzene	UG/KG	0 / 20	5.00	17,000	917	1,000	0.01	17.0	0.92
1,3-Dichlorobenzene	UG/KG	0 / 20	5.00	17,000	917	1,000	0.01	17.0	0.92
1,4-Dichlorobenzene	UG/KG	0 / 20	5.00	17,000	917	1,280	0.004	13.3	0.72
2,4,5-Trichlorophenol	UG/KG	0 / 20	730	42,000	2,652	1,350	0.54	31.1	1.96
2,4,6-Trichlorophenol	UG/KG	0 / 20	430	17,000	1,111	580	0.74	29.3	1.92
2,4-Dichlorophenol	UG/KG	0 / 20	400	17,000	1,098	500	0.80	34.0	2.20
2,4-Dimethylphenol	UG/KG	0 / 20	440	17,000	1,119	1,000	0.44	17.0	1.12
2,4-Dinitrophenol	UG/KG	0 / 20	1,000	42,000	2,778	20,000	0.05	2.10	0.14
2-Chlorophenol	UG/KG	0 / 20	440	17,000	1,119	500	0.88	34.0	2.24

TABLE L-95

Reporting Limit to ESV Comparison

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
2-Methylphenol	UG/KG	0 / 20	480	17,000	1,160	1,000	0.48	17.0	1.16
2-Nitrophenol	UG/KG	0 / 20	450	17,000	1,123	1,000	0.45	17.0	1.12
4,6-Dinitro-2-methylphenol	UG/KG	0 / 20	980	42,000	2,767	1,000	0.98	42.0	2.77
4-Chloro-3-methylphenol	UG/KG	0 / 20	440	17,000	1,119	500	0.88	34.0	2.24
4-Chloroaniline	UG/KG	0 / 20	320	17,000	1,062	500	0.64	34.0	2.12
4-Methylphenol	UG/KG	0 / 5	480	17,000	3,658	1,000	0.48	17.0	3.66
4-Nitrophenol	UG/KG	0 / 20	830	42,000	2,694	380	2.18	111	7.09
Atrazine	UG/KG	0 / 15	290	390	179	11.9	24.4	32.8	15.1
Dimethyl phthalate	UG/KG	0 / 20	290	17,000	1,049	10,640	0.03	1.60	0.10
Hexachlorocyclopentadiene	UG/KG	0 / 20	290	17,000	1,049	2,000	0.15	8.50	0.52
n-Nitrosodiphenylamine	UG/KG	0 / 20	480	17,000	1,184	1,090	0.44	15.6	1.09
Pentachlorophenol	UG/KG	0 / 20	89.0	42,000	2,359	5,000	0.02	8.40	0.47
Phenol	UG/KG	0 / 20	420	17,000	1,107	1,880	0.22	9.04	0.59
Endrin aldehyde	UG/KG	0 / 20	3.30	6.70	1.93	1.95	1.69	3.44	0.99
Surface Water									
Carbon disulfide	UG/L	0 / 19	1.00	5.00	1.13	0.92	1.09	5.43	1.23
1,2,4,5-Tetrachlorobenzene	UG/L	0 / 19	6.00	10.0	4.13	3.00	2.00	3.33	1.38
2,3,4,6-Tetrachlorophenol	UG/L	0 / 6	6.00	6.00	3.00	1.20	5.00	5.00	2.50
2,4,6-Trichlorophenol	UG/L	0 / 19	6.00	10.0	4.13	4.90	1.22	2.04	0.84
2,4-Dinitrophenol	UG/L	0 / 19	6.00	24.0	9.16	19.0	0.32	1.26	0.48
2-Chloronaphthalene	UG/L	0 / 19	0.19	3.00	0.54	0.40	0.48	7.50	1.35
3,3'-Dichlorobenzidine	UG/L	0 / 19	6.00	10.0	4.13	4.50	1.33	2.22	0.92
4,6-Dinitro-2-methylphenol	UG/L	0 / 19	6.00	24.0	9.16	2.30	2.61	10.4	3.98
4-Bromophenyl-phenylether	UG/L	0 / 19	6.00	10.0	4.13	1.50	4.00	6.67	2.75
4-Chloro-3-methylphenol	UG/L	0 / 19	6.00	11.0	4.39	0.30	20.0	36.7	14.6
Atrazine	UG/L	0 / 19	3.00	10.0	3.66	1.80	1.67	5.56	2.03
Benzo(a)anthracene	UG/L	0 / 19	0.080	0.34	0.079	0.027	2.96	12.6	2.93
Dibenzofuran	UG/L	0 / 19	3.00	10.0	3.66	3.70	0.81	2.70	0.99
Hexachlorobutadiene	UG/L	0 / 19	6.00	10.0	4.13	1.30	4.62	7.69	3.18
Hexachlorocyclopentadiene	UG/L	0 / 19	6.00	10.0	4.13	1.04	5.77	9.62	3.97
4,4'-DDD	UG/L	0 / 19	0.050	0.13	0.043	0.011	4.55	11.8	3.93
4,4'-DDE	UG/L	0 / 19	0.050	0.13	0.043	0.013	3.85	10.0	3.33
4,4'-DDT	UG/L	0 / 19	0.050	0.13	0.043	0.013	3.85	10.0	3.33
Aroclor-1016	UG/L	0 / 19	0.47	0.67	0.26	0.14	3.36	4.79	1.86

TABLE L-95

Reporting Limit to ESV Comparison

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
Aroclor-1221	UG/L	0 / 19	0.50	0.93	0.33	0.28	1.79	3.32	1.19
Aroclor-1232	UG/L	0 / 19	0.47	0.67	0.26	0.58	0.81	1.16	0.45
Aroclor-1242	UG/L	0 / 19	0.50	0.80	0.30	0.053	9.43	15.1	5.62
Aroclor-1248	UG/L	0 / 19	0.50	0.93	0.33	0.081	6.17	11.5	4.11
Aroclor-1254	UG/L	0 / 19	0.47	0.67	0.26	0.033	14.2	20.3	7.89
Aroclor-1260	UG/L	0 / 19	0.50	0.80	0.30	0.14	3.57	5.71	2.13
Dieldrin	UG/L	0 / 19	0.050	0.13	0.043	0.056	0.89	2.32	0.77
Endosulfan I	UG/L	0 / 19	0.047	0.067	0.026	0.056	0.84	1.20	0.46
Endosulfan II	UG/L	0 / 19	0.050	0.13	0.043	0.056	0.89	2.32	0.77
Endosulfan sulfate	UG/L	0 / 19	0.050	0.13	0.043	0.056	0.89	2.32	0.77
Endrin	UG/L	0 / 19	0.050	0.13	0.043	0.036	1.39	3.61	1.20
Heptachlor	UG/L	0 / 19	0.047	0.067	0.026	0.0069	6.81	9.71	3.72
Heptachlor epoxide	UG/L	0 / 19	0.047	0.067	0.026	0.0069	6.81	9.71	3.72
Methoxychlor	UG/L	0 / 19	0.050	0.67	0.19	0.030	1.67	22.3	6.19
Toxaphene	UG/L	0 / 19	0.64	1.30	0.45	0.011	58.2	118	41.3
Cyanide	UG/L	0 / 19	11.0	12.0	5.84	5.20	2.12	2.31	1.12
Aluminum, Dissolved	UG/L	0 / 19	25.0	300	107	87.0	0.29	3.45	1.23
Surface Sediment									
Diethylphthalate	UG/KG	0 / 36	130	1,600	281	630	0.21	2.54	0.45
Hexachlorobenzene	UG/KG	0 / 36	25.0	1,600	188	20.0	1.25	80.0	9.39
Phenol	UG/KG	0 / 36	130	2,000	323	48.0	2.71	41.7	6.74
alpha-BHC	UG/KG	0 / 35	2.20	66.0	8.91	6.00	0.37	11.0	1.49
Aroclor-1016	UG/KG	0 / 49	10.0	280	27.8	59.8	0.17	4.68	0.47
Aroclor-1221	UG/KG	0 / 49	10.0	660	39.2	59.8	0.17	11.0	0.66
Aroclor-1232	UG/KG	0 / 49	12.0	440	32.0	59.8	0.20	7.36	0.54
beta-BHC	UG/KG	0 / 35	2.20	66.0	8.91	5.00	0.44	13.2	1.78
delta-BHC	UG/KG	0 / 35	2.20	66.0	8.91	3.00	0.73	22.0	2.97
Endrin ketone	UG/KG	0 / 35	4.30	66.0	9.58	2.22	1.94	29.7	4.32
Subsurface Sediment									
2-Methylnaphthalene	UG/KG	0 / 30	23.0	600	51.4	70.0	0.33	8.57	0.73
Diethylphthalate	UG/KG	0 / 30	250	1,000	228	630	0.40	1.59	0.36
Hexachlorobenzene	UG/KG	0 / 30	23.0	1,000	140	20.0	1.15	50.0	6.99
Phenol	UG/KG	0 / 30	250	1,000	268	48.0	5.21	20.8	5.58
Aldrin	UG/KG	0 / 30	2.00	51.0	6.88	2.00	1.00	25.5	3.44

TABLE L-95

Reporting Limit to ESV Comparison

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	ESV	Minimum Ratio	Maximum Ratio	Mean Ratio
alpha-BHC	UG/KG	0 / 30	2.00	51.0	6.88	6.00	0.33	8.50	1.15
Aroclor-1016	UG/KG	0 / 30	22.0	210	30.5	59.8	0.37	3.51	0.51
Aroclor-1221	UG/KG	0 / 30	51.0	270	42.7	59.8	0.85	4.52	0.71
Aroclor-1232	UG/KG	0 / 30	34.0	210	34.1	59.8	0.57	3.51	0.57
Aroclor-1242	UG/KG	0 / 30	22.0	210	30.5	59.8	0.37	3.51	0.51
beta-BHC	UG/KG	0 / 30	2.00	51.0	6.88	5.00	0.40	10.2	1.38
delta-BHC	UG/KG	0 / 30	2.00	51.0	6.88	3.00	0.67	17.0	2.29
gamma-BHC (Lindane)	UG/KG	0 / 30	2.00	51.0	6.88	2.37	0.84	21.5	2.90
Fish Tissue									
Silver	MG/KG	0 / 12	0.021	0.37	0.09	0.12	0.18	3.08	0.73

Shaded cells indicate ratio > 1

TABLE L-96

Summary of Chemicals of Concern

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Terrestrial Food Web	Surface Soil				Subsurface Soil			Surface Water			Surface Sediment					Fish Tissue		Aquatic Food Web	
		Site 4 NW	Site 4 South	Site 4 East	Developed Area	Site 4 NW	Site 4 South	Site 4 East	Upstream Pond	Site 4 Streams	Youth Pond	Upstream Pond	Site 4 Streams	Youth Pond	York River Ditch	Northern Ditch	Upstream Pond	Youth Pond	Site 4	Youth Pond
Inorganics																				
Arsenic		X												x						
Cadmium												X		x						
Copper												X		x						
Lead		x										X		x	x					
Mercury			X				X							x						
Selenium														x						
Silver												X								
Zinc			X				X					X		x						
PCBs																				
Aroclor-1254												x							x	
Total PCBs												x							x	
Dioxin-like PCBs	x																		x	
Pesticides																				
Aldrin			x																	
Dieldrin		x										x								
Endosulfan I		x																		
Endosulfan II												x								
Endosulfan sulfate		x																		
Endrin		x	x									x								
Endrin aldehyde		x	x																	
Endrin ketone			x																	
gamma-BHC (lindane)		x																		
Methoxychlor												x								
Semivolatile Organic Compounds																				
PAHs		X										x			x					

X - Likely site-related

x - Not likely site-related

ATTACHMENT TABLE L-1-1

Summary of Meadow Vole Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	1.26E+00	0.252	0.56	1.26	**5.01E+00**	**2.24E+00**	**1.00E+00**
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	1.80E-01	0.77	2.43	7.70	2.34E-01	7.40E-02	2.34E-02
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	7.07E-01	2.40	5.37	12.0	2.94E-01	1.32E-01	5.89E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	1.86E+00	5.60	7.23	9.34	3.33E-01	2.58E-01	2.00E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	3.10E+00	4.70	6.47	8.90	6.59E-01	4.79E-01	3.48E-01
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	3.65E-02	0.032	0.072	0.16	**1.14E+00**	5.11E-01	2.28E-01
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	3.18E-01	1.70	2.40	3.40	1.87E-01	1.32E-01	9.37E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	5.98E-02	0.20	0.26	0.33	2.99E-01	2.33E-01	1.81E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	1.26E-01	12.0	26.9	60.2	1.05E-02	4.69E-03	2.10E-03
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	1.30E+01	75.4	169	377	1.73E-01	7.73E-02	3.46E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	1.10E-02	0.136	0.304	0.680	8.08E-02	3.61E-02	1.62E-02
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	4.70E-02	0.136	0.304	0.680	3.46E-01	1.55E-01	6.91E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	1.61E-02	0.136	0.304	0.680	1.18E-01	5.30E-02	2.37E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	4.31E-02	0.136	0.304	0.680	3.17E-01	1.42E-01	6.34E-02
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	7.41E-03	0.136	0.304	0.680	5.45E-02	2.44E-02	1.09E-02
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	6.10E-03	0.136	0.304	0.680	4.48E-02	2.01E-02	8.97E-03
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	6.77E-02	0.136	0.304	0.680	4.98E-01	2.23E-01	9.96E-02
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	6.32E-02	0.136	0.304	0.680	4.64E-01	2.08E-01	9.29E-02
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	6.53E-03	0.147	0.329	0.735	4.45E-02	1.99E-02	8.89E-03
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	4.24E-03	0.147	0.329	0.735	2.88E-02	1.29E-02	5.77E-03
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	7.80E-03	0.147	0.329	0.735	5.31E-02	2.37E-02	1.06E-02
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	7.90E-04	0.20	0.45	1.00	3.95E-03	1.77E-03	7.90E-04
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	7.06E-03	1.60	2.26	3.20	4.41E-03	3.12E-03	2.21E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	5.65E-05	4.58	6.48	9.16	1.23E-05	8.72E-06	6.17E-06
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	6.99E-03	1.60	2.26	3.20	4.37E-03	3.09E-03	2.19E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	1.88E-02	1.60	2.26	3.20	1.17E-02	8.30E-03	5.87E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	1.68E-01	0.015	0.021	0.030	**1.12E+01**	**7.91E+00**	**5.59E+00**
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	3.76E-01	0.15	0.34	0.75	**2.51E+00**	**1.12E+00**	5.02E-01
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	5.82E-04	0.15	0.34	0.75	3.88E-03	1.73E-03	7.76E-04
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	8.20E-03	0.184	0.411	0.920	4.46E-02	1.99E-02	8.92E-03
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	2.07E-01	8.00	17.9	40.0	2.58E-02	1.15E-02	5.16E-03
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	4.35E-04	4.58	6.48	9.16	9.49E-05	6.71E-05	4.74E-05
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	1.06E-03	0.20	0.45	1.00	5.32E-03	2.38E-03	1.06E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	3.19E-03	0.20	0.45	1.00	1.59E-02	7.12E-03	3.19E-03
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	2.28E-02	4.00	5.66	8.00	5.71E-03	4.03E-03	2.85E-03
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	5.59E-02	8.00	17.9	40.0	6.99E-03	3.12E-03	1.40E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	2.42E-03	76.0	170	380	3.18E-05	1.42E-05	6.36E-06
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	4.85E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	7.95E-01	53.0	75.0	106	1.50E-02	1.06E-02	7.50E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	1.36E+00	85.7	192	429	1.58E-02	7.07E-03	3.16E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	1.27E+00	85.7	192	429	1.48E-02	6.63E-03	2.97E-03

ATTACHMENT TABLE L-1-1

Summary of Meadow Vole Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	1.37E+00	30.0	52.0	90.0	4.56E-02	2.63E-02	1.52E-02
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	3.36E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	3.51E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	7.44E-02	65.6	147	328	1.13E-03	5.07E-04	2.27E-04
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	1.08E-01	65.6	147	328	1.65E-03	7.37E-04	3.29E-04
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	2.16E+00	65.6	147	328	3.29E-02	1.47E-02	6.58E-03
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	6.90E-01	0.62	1.37	3.07	**1.12E+00**	5.02E-01	2.25E-01
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	1.86E+00	0.62	1.37	3.07	**3.02E+00**	**1.35E+00**	6.05E-01
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	1.01E+01	0.62	1.37	3.07	**1.63E+01**	**7.32E+00**	**3.27E+00**
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	5.70E+00	0.62	1.37	3.07	**9.28E+00**	**4.15E+00**	**1.86E+00**
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	7.34E-01	0.62	1.37	3.07	**1.19E+00**	5.34E-01	2.39E-01
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	8.69E-01	0.62	1.37	3.07	**1.41E+00**	6.32E-01	2.83E-01
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	5.76E-01	0.62	1.37	3.07	9.37E-01	4.19E-01	1.88E-01
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	2.33E+02	65.6	147	328	**3.56E+00**	**1.59E+00**	7.12E-01
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	1.16E-01	65.6	147	328	1.76E-03	7.89E-04	3.53E-04
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	1.48E+00	2.00	2.83	4.00	7.41E-01	5.24E-01	3.71E-01
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	3.96E-01	2.00	6.32	20.0	1.98E-01	6.26E-02	1.98E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	2.43E-01	75.0	168	375	3.23E-03	1.45E-03	6.47E-04
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	7.18E+00	100	224	500	7.18E-02	3.21E-02	1.44E-02
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	1.25E+00	0.62	1.37	3.07	**2.03E+00**	9.10E-01	4.07E-01
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	7.20E+02	8.42	18.8	42.1	**8.56E+01**	**3.83E+01**	**1.71E+01**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	5.23E+00	65.6	147	328	7.97E-02	3.57E-02	1.59E-02
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	9.36E+01	0.62	1.37	3.07	**1.52E+02**	**6.81E+01**	**3.05E+01**
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	1.14E-07	0.000001	0.000003	0.00001	1.14E-01	3.60E-02	1.14E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0133 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0300 = Body weight (kg)

ATTACHMENT TABLE L-1-2

Summary of Short-Tailed Shrew Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	7.31E+00	0.252	0.56	1.26	**2.90E+01**	**1.30E+01**	**5.80E+00**
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	3.13E+00	0.77	2.43	7.70	**4.06E+00**	**1.28E+00**	4.06E-01
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	2.69E+00	2.40	5.37	12.0	**1.12E+00**	5.01E-01	2.24E-01
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	8.18E+00	5.60	7.23	9.34	**1.46E+00**	**1.13E+00**	8.75E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	1.61E+01	4.70	6.47	8.90	**3.42E+00**	**2.49E+00**	**1.81E+00**
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	3.47E-02	0.032	0.072	0.16	**1.08E+00**	4.85E-01	2.17E-01
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	1.56E+00	1.70	2.40	3.40	9.17E-01	6.48E-01	4.58E-01
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	4.00E-01	0.20	0.26	0.33	**2.00E+00**	**1.56E+00**	**1.21E+00**
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	4.17E-01	12.0	26.9	60.2	3.46E-02	1.55E-02	6.92E-03
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	3.00E+01	75.4	169	377	3.98E-01	1.78E-01	7.97E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	8.62E-02	0.136	0.304	0.680	6.34E-01	2.83E-01	1.27E-01
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	2.30E-01	0.136	0.304	0.680	**1.69E+00**	7.58E-01	3.39E-01
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	8.65E-02	0.136	0.304	0.680	6.36E-01	2.85E-01	1.27E-01
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	4.99E-01	0.136	0.304	0.680	**3.67E+00**	**1.64E+00**	7.33E-01
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	8.60E-02	0.136	0.304	0.680	6.33E-01	2.83E-01	1.27E-01
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	8.59E-02	0.136	0.304	0.680	6.31E-01	2.82E-01	1.26E-01
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	1.90E+00	0.136	0.304	0.680	**1.40E+01**	**6.24E+00**	**2.79E+00**
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	2.30E-01	0.136	0.304	0.680	**1.69E+00**	7.58E-01	3.39E-01
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	1.59E-01	0.147	0.329	0.735	**1.08E+00**	4.83E-01	2.16E-01
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	1.57E-01	0.147	0.329	0.735	**1.07E+00**	4.77E-01	2.13E-01
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	2.66E-01	0.147	0.329	0.735	**1.81E+00**	8.10E-01	3.62E-01
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	1.34E-02	0.20	0.45	1.00	6.68E-02	2.99E-02	1.34E-02
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	5.89E-03	1.60	2.26	3.20	3.68E-03	2.60E-03	1.84E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	5.05E-04	4.58	6.48	9.16	1.10E-04	7.80E-05	5.51E-05
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	5.88E-03	1.60	2.26	3.20	3.68E-03	2.60E-03	1.84E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	2.02E-02	1.60	2.26	3.20	1.26E-02	8.91E-03	6.30E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	3.97E+00	0.015	0.021	0.030	**2.65E+02**	**1.87E+02**	**1.32E+02**
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	3.22E-01	0.15	0.34	0.75	**2.15E+00**	9.60E-01	4.29E-01
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	8.50E-04	0.15	0.34	0.75	5.67E-03	2.53E-03	1.13E-03
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	5.75E-02	0.184	0.411	0.920	3.12E-01	1.40E-01	6.25E-02
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	2.69E+00	8.00	17.9	40.0	3.37E-01	1.51E-01	6.74E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	7.32E-03	4.58	6.48	9.16	1.60E-03	1.13E-03	7.99E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	1.48E-02	0.20	0.45	1.00	7.40E-02	3.31E-02	1.48E-02
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	4.76E-02	0.20	0.45	1.00	2.38E-01	1.06E-01	4.76E-02
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	5.57E-02	4.00	5.66	8.00	1.39E-02	9.84E-03	6.96E-03
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	1.93E-01	8.00	17.9	40.0	2.41E-02	1.08E-02	4.82E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	2.81E-03	76.0	170	380	3.70E-05	1.65E-05	7.40E-06
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	4.79E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	5.14E-01	53.0	75.0	106	9.69E-03	6.85E-03	4.84E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	8.33E-01	85.7	192	429	9.72E-03	4.35E-03	1.94E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	8.27E-01	85.7	192	429	9.65E-03	4.32E-03	1.93E-03
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	8.34E-01	30.0	52.0	90.0	2.78E-02	1.60E-02	9.27E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	7.67E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	7.68E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	1.28E+00	65.6	147	328	1.95E-02	8.74E-03	3.91E-03
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	1.87E-01	65.6	147	328	2.86E-03	1.28E-03	5.71E-04

ATTACHMENT TABLE L-1-2

Summary of Short-Tailed Shrew Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	7.92E+00	65.6	147	328	1.21E-01	5.40E-02	2.42E-02
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	9.00E+00	0.62	1.37	3.07	**1.46E+01**	**6.55E+00**	**2.93E+00**
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	7.65E+00	0.62	1.37	3.07	**1.24E+01**	**5.57E+00**	**2.49E+00**
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	9.22E+00	0.62	1.37	3.07	**1.50E+01**	**6.71E+00**	**3.00E+00**
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	2.74E+00	0.62	1.37	3.07	**4.46E+00**	**2.00E+00**	8.94E-01
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	3.51E+00	0.62	1.37	3.07	**5.71E+00**	**2.55E+00**	**1.14E+00**
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	1.47E+01	0.62	1.37	3.07	**2.38E+01**	**1.07E+01**	**4.77E+00**
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	1.70E+00	0.62	1.37	3.07	**2.76E+00**	**1.23E+00**	5.53E-01
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	4.64E+01	65.6	147	328	7.08E-01	3.17E-01	1.42E-01
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	1.67E+00	65.6	147	328	2.55E-02	1.14E-02	5.09E-03
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	1.06E+01	2.00	2.83	4.00	**5.32E+00**	**3.76E+00**	**2.66E+00**
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	7.71E-01	2.00	6.32	20.0	3.86E-01	1.22E-01	3.86E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	7.61E-01	75.0	168	375	1.01E-02	4.54E-03	2.03E-03
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	7.09E+00	100	224	500	7.09E-02	3.17E-02	1.42E-02
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	4.64E+00	0.62	1.37	3.07	**7.54E+00**	**3.38E+00**	**1.51E+00**
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	4.62E+02	8.42	18.8	42.1	**5.49E+01**	**2.45E+01**	**1.10E+01**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	2.43E+01	65.6	147	328	3.70E-01	1.65E-01	7.40E-02
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	3.12E+01	0.62	1.37	3.07	**5.07E+01**	**2.27E+01**	**1.02E+01**
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	6.44E-06	0.000001	0.000003	0.00001	**6.44E+00**	**2.04E+00**	6.44E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0019 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.823 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.047 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.130 = Proportion of diet composed of soil
WIR = 0.0048 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0133 = Body weight (kg)

ATTACHMENT TABLE L-1-3

Summary of White-Footed Mouse Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	6.79E-01	0.252	0.56	1.26	**2.70E+00**	**1.21E+00**	5.39E-01
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	6.75E-01	0.77	2.43	7.70	8.76E-01	2.77E-01	8.76E-02
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	5.21E-01	2.40	5.37	12.0	2.17E-01	9.70E-02	4.34E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	1.65E+00	5.60	7.23	9.34	2.96E-01	2.29E-01	1.77E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	1.42E+00	4.70	6.47	8.90	3.02E-01	2.19E-01	1.59E-01
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	1.35E-02	0.032	0.072	0.16	4.23E-01	1.89E-01	8.45E-02
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	2.45E-01	1.70	2.40	3.40	1.44E-01	1.02E-01	7.19E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	9.44E-02	0.20	0.26	0.33	4.72E-01	3.67E-01	2.86E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	4.82E-02	12.0	26.9	60.2	4.00E-03	1.79E-03	8.00E-04
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	8.40E+00	75.4	169	377	1.11E-01	4.98E-02	2.23E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	1.98E-02	0.136	0.304	0.680	1.46E-01	6.52E-02	2.92E-02
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	5.77E-02	0.136	0.304	0.680	4.24E-01	1.90E-01	8.48E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	2.12E-02	0.136	0.304	0.680	1.56E-01	6.98E-02	3.12E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	1.10E-01	0.136	0.304	0.680	8.09E-01	3.62E-01	1.62E-01
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	1.90E-02	0.136	0.304	0.680	1.40E-01	6.25E-02	2.80E-02
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	1.85E-02	0.136	0.304	0.680	1.36E-01	6.09E-02	2.72E-02
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	3.97E-01	0.136	0.304	0.680	**2.92E+00**	**1.31E+00**	5.84E-01
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	5.12E-02	0.136	0.304	0.680	3.76E-01	1.68E-01	7.52E-02
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	3.33E-02	0.147	0.329	0.735	2.26E-01	1.01E-01	4.53E-02
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	3.30E-02	0.147	0.329	0.735	2.24E-01	1.00E-01	4.49E-02
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	5.58E-02	0.147	0.329	0.735	3.79E-01	1.70E-01	7.59E-02
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	2.86E-03	0.20	0.45	1.00	1.43E-02	6.39E-03	2.86E-03
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	2.90E-03	1.60	2.26	3.20	1.81E-03	1.28E-03	9.06E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	1.45E-04	4.58	6.48	9.16	3.18E-05	2.25E-05	1.59E-05
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	2.88E-03	1.60	2.26	3.20	1.80E-03	1.27E-03	9.00E-04
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	8.46E-03	1.60	2.26	3.20	5.29E-03	3.74E-03	2.64E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	8.53E-01	0.015	0.021	0.030	**5.68E+01**	**4.02E+01**	**2.84E+01**
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	1.54E-01	0.15	0.34	0.75	**1.03E+00**	4.60E-01	2.06E-01
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	3.63E-04	0.15	0.34	0.75	2.42E-03	1.08E-03	4.84E-04
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	1.35E-02	0.184	0.411	0.920	7.32E-02	3.28E-02	1.46E-02
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	6.01E-01	8.00	17.9	40.0	7.51E-02	3.36E-02	1.50E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	1.59E-03	4.58	6.48	9.16	3.47E-04	2.45E-04	1.73E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	3.20E-03	0.20	0.45	1.00	1.60E-02	7.15E-03	3.20E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	1.04E-02	0.20	0.45	1.00	5.22E-02	2.33E-02	1.04E-02
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	1.62E-02	4.00	5.66	8.00	4.04E-03	2.86E-03	2.02E-03
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	4.96E-02	8.00	17.9	40.0	6.20E-03	2.77E-03	1.24E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	2.07E-03	76.0	170	380	2.72E-05	1.22E-05	5.44E-06
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	2.50E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	2.90E-01	53.0	75.0	106	5.47E-03	3.87E-03	2.73E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	4.97E-01	85.7	192	429	5.80E-03	2.60E-03	1.16E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	4.75E-01	85.7	192	429	5.54E-03	2.48E-03	1.11E-03
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	5.01E-01	30.0	52.0	90.0	1.67E-02	9.64E-03	5.56E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	2.29E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	2.33E-01	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-3

Summary of White-Footed Mouse Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	2.01E-01	65.6	147	328	3.06E-03	1.37E-03	6.12E-04
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	5.21E-02	65.6	147	328	7.95E-04	3.55E-04	1.59E-04
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	1.70E+00	65.6	147	328	2.59E-02	1.16E-02	5.18E-03
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	1.41E+00	0.62	1.37	3.07	**2.29E+00**	**1.03E+00**	4.60E-01
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	1.60E+00	0.62	1.37	3.07	**2.60E+00**	**1.17E+00**	5.22E-01
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	3.77E+00	0.62	1.37	3.07	**6.14E+00**	**2.75E+00**	**1.23E+00**
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	1.79E+00	0.62	1.37	3.07	**2.91E+00**	**1.30E+00**	5.83E-01
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	6.33E-01	0.62	1.37	3.07	**1.03E+00**	4.60E-01	2.06E-01
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	2.51E+00	0.62	1.37	3.07	**4.09E+00**	**1.83E+00**	8.19E-01
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	4.20E-01	0.62	1.37	3.07	6.83E-01	3.06E-01	1.37E-01
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	6.72E+01	65.6	147	328	**1.02E+00**	4.58E-01	2.05E-01
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	2.37E-01	65.6	147	328	3.61E-03	1.61E-03	7.22E-04
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	2.39E+00	2.00	2.83	4.00	**1.20E+00**	8.45E-01	5.98E-01
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	2.45E-01	2.00	6.32	20.0	1.22E-01	3.87E-02	1.22E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	2.04E-01	75.0	168	375	2.71E-03	1.21E-03	5.43E-04
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	3.11E+00	100	224	500	3.11E-02	1.39E-02	6.23E-03
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	1.04E+00	0.62	1.37	3.07	**1.68E+00**	7.54E-01	3.37E-01
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	2.77E+02	8.42	18.8	42.1	**3.29E+01**	**1.47E+01**	**6.58E+00**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	4.72E+00	65.6	147	328	7.19E-02	3.22E-02	1.44E-02
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	2.89E+01	0.62	1.37	3.07	**4.70E+01**	**2.10E+01**	**9.41E+00**
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	1.35E-06	0.000001	0.000003	0.00001	**1.35E+00**	4.26E-01	1.35E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.00073	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi =	0.470	= Proportion of diet composed of food item (soil invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi =	0.510	= Proportion of diet composed of food item (terrestrial plants)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.020	= Proportion of diet composed of soil
WIR =	0.0092	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0141	= Body weight (kg)

ATTACHMENT TABLE L-1-4

Summary of Red Fox Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	Regresson	7.56E-01	Regresson	2.72E+00	Regresson	9.42E-01	5.80E-02	5.40E-01	1.04	1.31	1.66	5.20E-01	4.11E-01	3.26E-01
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	Regresson	4.22E-01	Regresson	5.00E-01	Regresson	7.14E+00	8.20E-04	1.52E-01	0.77	2.43	7.70	1.97E-01	6.23E-02	1.97E-02
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	Regresson	4.67E+00	Regresson	4.86E+00	Regresson	4.86E+00	6.30E-03	3.12E-01	2.40	5.37	12.0	1.30E-01	5.81E-02	2.60E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	Regresson	1.65E+01	Regresson	1.59E+01	Regresson	2.00E+01	2.59E-02	1.02E+00	11.7	13.3	15.1	8.68E-02	7.64E-02	6.72E-02
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	Regresson	2.07E+01	Regresson	1.72E+01	Regresson	4.18E+01	5.90E-03	2.17E+00	4.70	6.47	8.90	4.61E-01	3.35E-01	2.44E-01
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	0.130	1.14E-01	0.192	1.69E-01	0.192	1.69E-01	2.00E-04	8.61E-03	0.15	0.19	0.25	5.74E-02	4.45E-02	3.44E-02
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	Regresson	4.68E+00	Regresson	4.68E+00	Regresson	4.68E+00	3.50E-03	2.66E-01	1.70	2.40	3.40	1.56E-01	1.11E-01	7.82E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	Regresson	6.60E-01	Regresson	6.60E-01	Regresson	6.60E-01	1.30E-03	3.42E-02	0.20	0.26	0.33	1.71E-01	1.33E-01	1.04E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	0.810	1.67E+01	0.007	1.44E-01	0.501	1.03E+01	7.00E-05	3.98E-01	12.0	26.9	60.2	3.31E-02	1.48E-02	6.62E-03
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	Regresson	1.34E+02	Regresson	1.18E+02	Regresson	1.50E+02	6.54E-02	6.54E+00	75.4	169	377	8.67E-02	3.88E-02	1.73E-02
Polychlorinated Biphenyls																			
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	See footnote	3.74E-01	See footnote	1.04E-01	See footnote	6.07E-01	6.70E-04	1.63E-02	1.37	2.17	3.43	1.19E-02	7.53E-03	4.76E-03
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	See footnote	1.10E+00	See footnote	4.51E-01	See footnote	1.62E+00	9.30E-04	4.77E-02	0.137	0.306	0.685	3.48E-01	1.56E-01	6.96E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	See footnote	4.00E-01	See footnote	1.53E-01	See footnote	6.09E-01	6.70E-04	1.76E-02	0.137	0.306	0.685	1.28E-01	5.73E-02	2.56E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	See footnote	2.11E+00	See footnote	4.15E-01	See footnote	3.52E+00	8.00E-04	8.97E-02	0.137	0.306	0.685	6.55E-01	2.93E-01	1.31E-01
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	See footnote	3.55E-01	See footnote	6.79E-02	See footnote	6.05E-01	9.30E-04	1.55E-02	0.137	0.306	0.685	1.13E-01	5.05E-02	2.26E-02
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	See footnote	3.49E-01	See footnote	5.62E-02	See footnote	6.04E-01	6.70E-04	1.51E-02	0.137	0.306	0.685	1.11E-01	4.95E-02	2.21E-02
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	See footnote	7.64E+00	See footnote	6.53E-01	See footnote	1.34E+01	8.00E-04	3.19E-01	0.137	0.306	0.685	**2.33E+00**	**1.04E+00**	4.66E-01
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	See footnote	9.76E-01	See footnote	6.09E-01	See footnote	1.62E+00	7.81E-04	5.19E-02	0.137	0.306	0.685	3.79E-01	1.69E-01	7.58E-02
Pesticides																			
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	See footnote	6.39E-01	See footnote	6.28E-02	See footnote	1.12E+00	1.30E-04	2.69E-02	0.147	0.329	0.735	1.83E-01	8.19E-02	3.66E-02
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	See footnote	6.34E-01	See footnote	4.05E-02	See footnote	1.11E+00	1.30E-04	2.61E-02	0.147	0.329	0.735	1.77E-01	7.93E-02	3.55E-02
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	See footnote	1.07E+00	See footnote	7.50E-02	See footnote	1.88E+00	1.30E-04	4.44E-02	0.147	0.329	0.735	3.02E-01	1.35E-01	6.04E-02
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	See footnote	5.42E-02	See footnote	7.36E-03	See footnote	9.41E-02	6.70E-05	2.32E-03	0.20	0.45	1.00	1.16E-02	5.19E-03	2.32E-03
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	See footnote	5.50E-02	See footnote	6.81E-02	See footnote	4.14E-02	6.70E-05	2.57E-03	1.60	2.26	3.20	1.61E-03	1.14E-03	8.03E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	6.70E-05	9.19E-05	4.58	6.48	9.16	2.01E-05	1.42E-05	1.00E-05
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	See footnote	5.47E-02	See footnote	6.75E-02	See footnote	4.14E-02	6.70E-05	2.56E-03	1.60	2.26	3.20	1.60E-03	1.13E-03	7.99E-04
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	See footnote	1.62E-01	See footnote	1.82E-01	See footnote	1.42E-01	6.70E-05	7.56E-03	1.60	2.26	3.20	4.73E-03	3.34E-03	2.36E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	See footnote	1.64E+01	See footnote	1.63E+00	See footnote	2.80E+01	1.30E-04	6.73E-01	0.015	0.021	0.030	**4.49E+01**	**3.17E+01**	**2.24E+01**
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	See footnote	2.97E+00	See footnote	3.65E+00	See footnote	2.27E+00	6.70E-05	1.38E-01	0.15	0.34	0.75	9.23E-01	4.13E-01	1.85E-01
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	See footnote	5.37E-03	See footnote	5.08E-03	See footnote	5.67E-03	1.30E-04	2.67E-04	0.15	0.34	0.75	1.78E-03	7.95E-04	3.56E-04
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	See footnote	2.58E-01	See footnote	7.89E-02	See footnote	4.05E-01	1.30E-04	1.11E-02	0.184	0.411	0.920	6.03E-02	2.70E-02	1.21E-02
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	See footnote	1.16E+01	See footnote	2.00E+00	See footnote	1.90E+01	6.70E-05	4.78E-01	8.00	17.9	40.0	5.98E-02	2.67E-02	1.20E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	See footnote	2.98E-02	See footnote	3.92E-03	See footnote	5.14E-02	6.70E-05	1.27E-03	4.58	6.48	9.16	2.77E-04	1.96E-04	1.39E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	See footnote	6.08E-02	See footnote	1.00E-02	See footnote	1.04E-01	6.70E-05	2.62E-03	0.20	0.45	1.00	1.31E-02	5.85E-03	2.62E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	See footnote	2.00E-01	See footnote	3.06E-02	See footnote	3.35E-01	6.70E-05	8.34E-03	0.20	0.45	1.00	4.17E-02	1.86E-02	8.34E-03
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	See footnote	3.03E-01	See footnote	2.18E-01	See footnote	3.91E-01	6.70E-04	1.42E-02	4.00	5.66	8.00	3.55E-03	2.51E-03	1.77E-03
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	See footnote	9.39E-01	See footnote	5.36E-01	See footnote	1.36E+00	1.30E-03	4.39E-02	8.00	17.9	40.0	5.48E-03	2.45E-03	1.10E-03
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	See footnote	1.48E-02	See footnote	1.48E-02	See footnote	1.48E-02	2.00E-03	9.48E-04	76.0	170	380	1.25E-05	5.58E-06	2.50E-06
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	See footnote	3.56E-01	See footnote	4.27E-01	See footnote	3.13E-01	1.00E-02	1.86E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	See footnote	5.56E+00	See footnote	7.69E+00	See footnote	3.62E+00	2.00E-03	2.66E-01	53.0	75.0	106	5.02E-03	3.55E-03	2.51E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	See footnote	9.57E+00	See footnote	1.31E+01	See footnote	5.88E+00	1.00E-03	4.46E-01	85.7	192	429	5.21E-03	2.33E-03	1.04E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	See footnote	9.14E+00	See footnote	1.23E+01	See footnote	5.84E+00	1.00E-03	4.26E-01	85.7	192	429	4.97E-03	2.22E-03	9.94E-04
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	See footnote	9.64E+00	See footnote	1.33E+01	See footnote	5.88E+00	1.00E-03	4.49E-01	30.0	52.0	90.0	1.50E-02	8.64E-03	4.99E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	See footnote	4.28E+00	See footnote	3.22E+00	See footnote	5.39E+00	1.00E-02	2.01E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	See footnote	4.36E+00	See footnote	3.36E+00	See footnote	5.39E+00	1.00E-02	2.04E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	4.07E-02	65.6	147	328	6.20E-04	2.77E-04	1.24E-04
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	9.72E-03	65.6	147	328	1.48E-04	6.62E-05	2.96E-05
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	2.98E-01	65.6	147	328	4.54E-03	2.03E-03	9.08E-04
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	3.40E-04	3.03E-01	0.62	1.37	3.07	4.92E-01	2.20E-01	9.87E-02
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.40E-04	2.75E-01	0.62	1.37	3.07	4.47E-01	2.00E-01	8.95E-02
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	5.80E-04	6.29E-01	0.62	1.37	3.07	**1.02E+00**	4.57E-01	2.05E-01
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.60E-04	2.81E-01	0.62	1.37	3.07	4.58E-01	2.05E-01	9.17E-02
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.50E-04	1.44E-01	0.62	1.37	3.07	2.35E-01	1.05E-01	4.70E-02
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	3.99E-01	0.62	1.37	3.07	6.50E-01	2.91E-01	1.30E-01
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	5.93E-02	0.62	1.37	3.07	9.64E-02	4.31E-02	1.93E-02
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	3.20E-04	8.55E+00	65.6	147	328	1.30E-01	5.83E-02	2.61E-02

ATTACHMENT TABLE L-1-4

Summary of Red Fox Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	6.26E-02	65.6	147	328	9.54E-04	4.27E-04	1.91E-04
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	See footnote	4.61E+01	See footnote	1.44E+01	See footnote	7.51E+01	2.00E-04	2.05E+00	2.00	2.83	4.00	**1.02E+00**	7.25E-01	5.12E-01
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	See footnote	4.59E+00	See footnote	3.79E+00	See footnote	5.42E+00	1.00E-02	2.15E-01	2.00	6.32	20.0	1.07E-01	3.40E-02	1.07E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	See footnote	3.80E+00	See footnote	2.31E+00	See footnote	5.34E+00	1.00E-02	1.78E-01	75.0	168	375	2.37E-03	1.06E-03	4.75E-04
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	See footnote	6.00E+01	See footnote	6.96E+01	See footnote	5.00E+01	2.00E-04	2.79E+00	100	224	500	2.79E-02	1.25E-02	5.59E-03
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.40E-04	1.61E-01	0.62	1.37	3.07	2.61E-01	1.17E-01	5.23E-02
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	See footnote	5.34E+03	See footnote	6.98E+03	See footnote	3.26E+03	9.80E-04	2.40E+02	8.42	18.8	42.1	**2.85E+01**	**1.27E+01**	**5.70E+00**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	9.10E-01	65.6	147	328	1.39E-02	6.20E-03	2.77E-03
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.90E-04	3.76E+00	0.62	1.37	3.07	**6.11E+00**	**2.73E+00**	**1.22E+00**
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	7.20E-08	0.000001	0.000003	0.00001	7.20E-02	2.28E-02	7.20E-03

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1476 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.292 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.4115 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 3.17 = Body weight (kg)

ATTACHMENT TABLE L-1-5

Summary of American Robin Exposure Doses (Omnivore) - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	2.46E+00	2.46	4.26	7.38	**1.00E+00**	5.78E-01	3.33E-01
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	1.41E+00	1.47	3.29	7.35	9.60E-01	4.29E-01	1.92E-01
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	1.30E+00	2.66	5.95	13.3	4.88E-01	2.18E-01	9.76E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	3.95E+00	4.05	7.00	12.1	9.74E-01	5.64E-01	3.26E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	5.51E+00	3.85	8.61	19.3	**1.43E+00**	6.40E-01	2.86E-01
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	3.24E-02	0.49	0.77	1.20	6.61E-02	4.23E-02	2.70E-02
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	6.61E-01	6.71	15.0	33.6	9.85E-02	4.40E-02	1.97E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	2.00E-01	0.44	0.81	1.50	4.54E-01	2.46E-01	1.33E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	1.69E-01	4.04	9.03	20.2	4.19E-02	1.87E-02	8.38E-03
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	1.90E+01	66.1	148	331	2.87E-01	1.28E-01	5.74E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	4.16E-02	0.41	0.92	2.05	1.01E-01	4.54E-02	2.03E-02
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	1.22E-01	0.41	0.92	2.05	2.98E-01	1.33E-01	5.96E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	4.47E-02	0.41	0.92	2.05	1.09E-01	4.88E-02	2.18E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	2.31E-01	0.41	0.92	2.05	5.64E-01	2.52E-01	1.13E-01
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	3.94E-02	0.41	0.92	2.05	9.60E-02	4.30E-02	1.92E-02
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	3.86E-02	0.41	0.92	2.05	9.41E-02	4.21E-02	1.88E-02
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	8.30E-01	0.41	0.92	2.05	**2.02E+00**	9.05E-01	4.05E-01
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	1.19E-01	0.41	0.92	2.05	2.91E-01	1.30E-01	5.83E-02
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	6.97E-02	0.50	1.58	5.00	1.39E-01	4.41E-02	1.39E-02
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	6.83E-02	0.50	1.58	5.00	1.37E-01	4.32E-02	1.37E-02
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	1.16E-01	0.50	1.58	5.00	2.32E-01	7.34E-02	2.32E-02
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	5.96E-03	0.07	0.16	0.35	8.50E-02	3.80E-02	1.70E-02
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	6.42E-03	0.56	1.12	2.25	1.15E-02	5.72E-03	2.85E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	2.28E-04	2.14	4.79	10.7	1.07E-04	4.77E-05	2.13E-05
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	6.38E-03	0.56	1.12	2.25	1.14E-02	5.68E-03	2.84E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	1.89E-02	0.56	1.12	2.25	3.37E-02	1.68E-02	8.38E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	1.77E+00	0.07	0.52	3.78	**2.50E+01**	**3.42E+00**	4.68E-01
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	3.46E-01	10.0	22.4	50.0	3.46E-02	1.55E-02	6.92E-03
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	6.48E-04	10.0	22.4	50.0	6.48E-05	2.90E-05	1.30E-05
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	2.85E-02	0.021	0.047	0.104	**1.37E+00**	6.13E-01	2.74E-01
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	1.25E+00	4.00	8.94	20.0	3.13E-01	1.40E-01	6.27E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	3.27E-03	2.14	4.79	10.7	1.53E-03	6.83E-04	3.05E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	6.70E-03	0.28	0.62	1.38	2.43E-02	1.09E-02	4.86E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	2.18E-02	0.28	0.62	1.38	7.90E-02	3.53E-02	1.58E-02
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	3.51E-02	355	794	1,775	9.88E-05	4.42E-05	1.98E-05
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	1.08E-01	1.00	2.24	5.00	1.08E-01	4.84E-02	2.16E-02
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	2.12E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	4.42E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	6.57E-01	80.4	180	402	8.17E-03	3.65E-03	1.63E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	1.12E+00	80.4	180	402	1.39E-02	6.22E-03	2.78E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	1.07E+00	80.4	180	402	1.33E-02	5.93E-03	2.65E-03
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	1.13E+00	80.4	180	402	1.40E-02	6.26E-03	2.80E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	4.96E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	5.05E-01	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-5

Summary of American Robin Exposure Doses (Omnivore) - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	4.91E-01	7.10	15.9	35.5	6.92E-02	3.09E-02	1.38E-02
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	1.26E-01	7.10	15.9	35.5	1.77E-02	7.93E-03	3.55E-03
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	4.05E+00	7.10	15.9	35.5	5.71E-01	2.55E-01	1.14E-01
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	3.50E+00	7.10	15.9	35.5	4.93E-01	2.20E-01	9.85E-02
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	3.80E+00	7.10	15.9	35.5	5.36E-01	2.40E-01	1.07E-01
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	8.96E+00	7.10	15.9	35.5	**1.26E+00**	5.64E-01	2.52E-01
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	4.22E+00	7.10	15.9	35.5	5.94E-01	2.66E-01	1.19E-01
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	1.59E+00	7.10	15.9	35.5	2.24E-01	1.00E-01	4.49E-02
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	5.87E+00	7.10	15.9	35.5	8.27E-01	3.70E-01	1.65E-01
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	9.65E-01	7.10	15.9	35.5	1.36E-01	6.08E-02	2.72E-02
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	1.53E+02	7.10	15.9	35.5	**2.16E+01**	**9.66E+00**	**4.32E+00**
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	6.17E-01	7.10	15.9	35.5	8.69E-02	3.88E-02	1.74E-02
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	5.16E+00	0.113	0.253	0.565	**4.57E+01**	**2.04E+01**	**9.14E+00**
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	5.32E-01	3.39	7.58	17.0	1.57E-01	7.02E-02	3.14E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	4.39E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	6.97E+00	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	2.42E+00	7.10	15.9	35.5	3.40E-01	1.52E-01	6.81E-02
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	6.13E+02	6.73	21.3	67.3	**9.11E+01**	**2.88E+01**	**9.11E+00**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	1.15E+01	7.10	15.9	35.5	**1.61E+00**	7.22E-01	3.23E-01
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	6.61E+01	7.10	15.9	35.5	**9.30E+00**	**4.16E+00**	**1.86E+00**
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	5.40E-06	0.000014	0.000044	0.00014	3.86E-01	1.22E-01	3.86E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0074 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0635 = Body weight (kg)

ATTACHMENT TABLE L-1-6

Summary of American Robin Exposure Doses (Invertivore) - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	1.87E+00	2.46	4.26	7.38	7.62E-01	4.40E-01	2.54E-01
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	2.02E+00	1.47	3.29	7.35	**1.38E+00**	6.16E-01	2.75E-01
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	1.21E+00	2.66	5.95	13.3	4.56E-01	2.04E-01	9.13E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	4.05E+00	4.05	7.00	12.1	**1.00E+00**	5.79E-01	3.35E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	3.86E+00	3.85	8.61	19.3	**1.00E+00**	4.49E-01	2.01E-01
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	1.39E-02	0.49	0.77	1.20	2.83E-02	1.81E-02	1.16E-02
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	6.23E-01	6.71	15.0	33.6	9.29E-02	4.16E-02	1.86E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	2.53E-01	0.44	0.81	1.50	5.74E-01	3.11E-01	1.68E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	9.74E-02	4.04	9.03	20.2	2.41E-02	1.08E-02	4.82E-03
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	1.65E+01	66.1	148	331	2.50E-01	1.12E-01	5.00E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	5.40E-02	0.41	0.92	2.05	1.32E-01	5.89E-02	2.64E-02
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	1.45E-01	0.41	0.92	2.05	3.54E-01	1.58E-01	7.08E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	5.40E-02	0.41	0.92	2.05	1.32E-01	5.89E-02	2.64E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	3.18E-01	0.41	0.92	2.05	7.76E-01	3.47E-01	1.55E-01
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	5.41E-02	0.41	0.92	2.05	1.32E-01	5.90E-02	2.64E-02
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	5.40E-02	0.41	0.92	2.05	1.32E-01	5.89E-02	2.64E-02
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	1.23E+00	0.41	0.92	2.05	**2.99E+00**	**1.34E+00**	5.98E-01
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	1.18E-01	0.41	0.92	2.05	2.88E-01	1.29E-01	5.77E-02
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	1.02E-01	0.50	1.58	5.00	2.04E-01	6.45E-02	2.04E-02
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	1.02E-01	0.50	1.58	5.00	2.05E-01	6.48E-02	2.05E-02
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	1.73E-01	0.50	1.58	5.00	3.46E-01	1.10E-01	3.46E-02
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	8.49E-03	0.07	0.16	0.35	1.21E-01	5.42E-02	2.42E-02
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	3.23E-03	0.56	1.12	2.25	5.77E-03	2.88E-03	1.44E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	3.21E-04	2.14	4.79	10.7	1.50E-04	6.71E-05	3.00E-05
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	3.23E-03	0.56	1.12	2.25	5.77E-03	2.88E-03	1.44E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	1.13E-02	0.56	1.12	2.25	2.01E-02	1.00E-02	5.01E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	2.60E+00	0.07	0.52	3.78	**3.67E+01**	**5.03E+00**	6.88E-01
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	1.77E-01	10.0	22.4	50.0	1.77E-02	7.92E-03	3.54E-03
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	4.85E-04	10.0	22.4	50.0	4.85E-05	2.17E-05	9.70E-06
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	3.64E-02	0.021	0.047	0.104	**1.75E+00**	7.83E-01	3.50E-01
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	1.76E+00	4.00	8.94	20.0	4.40E-01	1.97E-01	8.79E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	4.67E-03	2.14	4.79	10.7	2.18E-03	9.77E-04	4.37E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	9.37E-03	0.28	0.62	1.38	3.40E-02	1.52E-02	6.81E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	3.09E-02	0.28	0.62	1.38	1.12E-01	5.01E-02	2.24E-02
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	3.23E-02	355	794	1,775	9.10E-05	4.07E-05	1.82E-05
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	1.13E-01	1.00	2.24	5.00	1.13E-01	5.05E-02	2.26E-02
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	1.60E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	2.47E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	2.57E-01	80.4	180	402	3.20E-03	1.43E-03	6.40E-04
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	4.43E-01	80.4	180	402	5.51E-03	2.46E-03	1.10E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	4.43E-01	80.4	180	402	5.51E-03	2.46E-03	1.10E-03
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	4.43E-01	80.4	180	402	5.51E-03	2.46E-03	1.10E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	4.45E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	4.45E-01	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-6

Summary of American Robin Exposure Doses (Invertivore) - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	6.41E-01	7.10	15.9	35.5	9.03E-02	4.04E-02	1.81E-02
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	8.44E-02	7.10	15.9	35.5	1.19E-02	5.32E-03	2.38E-03
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	3.96E+00	7.10	15.9	35.5	5.57E-01	2.49E-01	1.11E-01
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	4.40E+00	7.10	15.9	35.5	6.19E-01	2.77E-01	1.24E-01
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	3.87E+00	7.10	15.9	35.5	5.46E-01	2.44E-01	1.09E-01
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	3.96E+00	7.10	15.9	35.5	5.58E-01	2.50E-01	1.12E-01
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	1.00E+00	7.10	15.9	35.5	1.41E-01	6.32E-02	2.83E-02
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	1.61E+00	7.10	15.9	35.5	2.26E-01	1.01E-01	4.52E-02
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	7.87E+00	7.10	15.9	35.5	**1.11E+00**	4.96E-01	2.22E-01
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	9.09E-01	7.10	15.9	35.5	1.28E-01	5.72E-02	2.56E-02
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	1.60E+01	7.10	15.9	35.5	**2.26E+00**	**1.01E+00**	4.52E-01
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	7.62E-01	7.10	15.9	35.5	1.07E-01	4.80E-02	2.15E-02
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	6.54E+00	0.113	0.253	0.565	**5.79E+01**	**2.59E+01**	**1.16E+01**
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	4.45E-01	3.39	7.58	17.0	1.31E-01	5.86E-02	2.62E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	4.45E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	3.94E+00	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	2.43E+00	7.10	15.9	35.5	3.42E-01	1.53E-01	6.84E-02
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	2.70E+02	6.73	21.3	67.3	**4.02E+01**	**1.27E+01**	**4.02E+00**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	1.18E+01	7.10	15.9	35.5	**1.67E+00**	7.46E-01	3.34E-01
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	1.31E+01	7.10	15.9	35.5	**1.85E+00**	8.26E-01	3.70E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	8.22E-06	0.000014	0.000044	0.00014	5.87E-01	1.86E-01	5.87E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0051 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0635 = Body weight (kg)

ATTACHMENT TABLE L-1-7

Summary of Mourning Dove Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	5.80E-02	4.15E+00	2.24	5.01	11.2	**1.85E+00**	8.29E-01	3.71E-01
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	8.20E-04	2.58E-01	1.47	3.29	7.35	1.76E-01	7.86E-02	3.52E-02
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	6.30E-03	1.63E+00	2.66	5.95	13.3	6.12E-01	2.74E-01	1.22E-01
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	2.59E-02	4.16E+00	4.05	7.00	12.1	**1.03E+00**	5.94E-01	3.43E-01
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	5.90E-03	1.00E+01	1.63	2.31	3.26	**6.14E+00**	**4.34E+00**	**3.07E+00**
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	2.00E-04	7.39E-02	0.45	0.64	0.90	1.64E-01	1.16E-01	8.22E-02
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	3.50E-03	8.28E-01	6.71	15.0	33.6	1.23E-01	5.52E-02	2.47E-02
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	1.30E-03	1.06E-01	0.29	0.41	0.58	3.66E-01	2.59E-01	1.83E-01
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	7.00E-05	3.48E-01	4.04	9.03	20.2	8.61E-02	3.85E-02	1.72E-02
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	6.54E-02	2.58E+01	66.1	148	331	3.91E-01	1.75E-01	7.82E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	6.70E-04	1.93E-02	0.36	0.80	1.80	5.36E-02	2.40E-02	1.07E-02
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	9.30E-04	8.50E-02	0.36	0.80	1.80	2.36E-01	1.06E-01	4.72E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	6.70E-04	2.91E-02	0.36	0.80	1.80	8.08E-02	3.62E-02	1.62E-02
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	8.00E-04	7.11E-02	0.36	0.80	1.80	1.98E-01	8.84E-02	3.95E-02
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	9.30E-04	1.23E-02	0.36	0.80	1.80	3.40E-02	1.52E-02	6.81E-03
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	6.70E-04	9.91E-03	0.36	0.80	1.80	2.75E-02	1.23E-02	5.51E-03
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	8.00E-04	8.07E-02	0.36	0.80	1.80	2.24E-01	1.00E-01	4.49E-02
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	7.81E-04	1.34E-01	0.36	0.80	1.80	3.73E-01	1.67E-01	7.47E-02
Pesticides													
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	1.30E-04	8.69E-03	0.50	1.58	5.00	1.74E-02	5.50E-03	1.74E-03
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	1.30E-04	3.21E-03	0.50	1.58	5.00	6.41E-03	2.03E-03	6.41E-04
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	1.30E-04	7.12E-03	0.50	1.58	5.00	1.42E-02	4.50E-03	1.42E-03
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	6.70E-05	1.21E-03	0.07	0.16	0.35	1.72E-02	7.71E-03	3.45E-03
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	6.70E-05	1.35E-02	0.56	1.12	2.25	2.42E-02	1.21E-02	6.02E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	6.70E-05	5.19E-05	1.19	2.66	5.95	4.36E-05	1.95E-05	8.72E-06
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	6.70E-05	1.34E-02	0.56	1.12	2.25	2.40E-02	1.19E-02	5.96E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	6.70E-05	3.61E-02	0.56	1.12	2.25	6.45E-02	3.22E-02	1.61E-02
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	1.30E-04	1.91E-01	0.07	0.52	3.78	**2.69E+00**	3.69E-01	5.05E-02
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	6.70E-05	7.24E-01	10.0	22.4	50.0	7.24E-02	3.24E-02	1.45E-02
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	1.30E-04	1.03E-03	10.0	22.4	50.0	1.03E-04	4.62E-05	2.07E-05
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	1.30E-04	1.45E-02	0.30	0.67	1.50	4.82E-02	2.16E-02	9.64E-03
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	6.70E-05	3.10E-01	4.00	8.94	20.0	7.75E-02	3.46E-02	1.55E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	6.70E-05	6.28E-04	1.19	2.66	5.95	5.28E-04	2.36E-04	1.06E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	6.70E-05	1.73E-03	0.28	0.62	1.38	6.28E-03	2.81E-03	1.26E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	6.70E-05	4.69E-03	0.28	0.62	1.38	1.70E-02	7.61E-03	3.41E-03
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	6.70E-04	4.38E-02	355	794	1,775	1.23E-04	5.52E-05	2.47E-05
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	1.30E-03	1.08E-01	1.00	2.24	5.00	1.08E-01	4.83E-02	2.16E-02
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	2.00E-03	3.28E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	1.00E-02	8.79E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	2.00E-03	1.54E+00	80.4	180	402	1.91E-02	8.56E-03	3.83E-03
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	1.00E-03	2.60E+00	80.4	180	402	3.24E-02	1.45E-02	6.48E-03
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	1.00E-03	2.44E+00	80.4	180	402	3.04E-02	1.36E-02	6.08E-03
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	1.00E-03	2.63E+00	80.4	180	402	3.27E-02	1.46E-02	6.54E-03
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	1.00E-02	6.45E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	1.00E-02	6.73E-01	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-7

Summary of Mourning Dove Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	6.90E-05	2.39E-01	7.10	15.9	35.5	3.37E-02	1.50E-02	6.73E-03
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	2.00E-04	2.25E-01	7.10	15.9	35.5	3.17E-02	1.42E-02	6.33E-03
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	2.00E-04	4.69E+00	7.10	15.9	35.5	6.60E-01	2.95E-01	1.32E-01
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	3.40E-04	2.07E+00	7.10	15.9	35.5	2.91E-01	1.30E-01	5.82E-02
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	2.40E-04	4.06E+00	7.10	15.9	35.5	5.72E-01	2.56E-01	1.14E-01
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	5.80E-04	2.01E+01	7.10	15.9	35.5	**2.84E+00**	**1.27E+00**	5.67E-01
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	1.60E-04	1.12E+01	7.10	15.9	35.5	**1.58E+00**	7.08E-01	3.17E-01
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	1.50E-04	1.76E+00	7.10	15.9	35.5	2.48E-01	1.11E-01	4.96E-02
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	8.00E-05	2.39E+00	7.10	15.9	35.5	3.37E-01	1.51E-01	6.74E-02
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	2.00E-04	1.18E+00	7.10	15.9	35.5	1.66E-01	7.41E-02	3.31E-02
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	3.20E-04	4.49E+02	7.10	15.9	35.5	**6.33E+01**	**2.83E+01**	**1.27E+01**
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	2.00E-04	3.98E-01	7.10	15.9	35.5	5.61E-02	2.51E-02	1.12E-02
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	2.00E-04	2.77E+00	0.113	0.253	0.565	**2.45E+01**	**1.10E+01**	**4.90E+00**
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	1.00E-02	7.59E-01	3.39	7.58	17.0	2.24E-01	1.00E-01	4.48E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	1.00E-02	4.65E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	2.00E-04	1.38E+01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	2.40E-04	2.64E+00	7.10	15.9	35.5	3.72E-01	1.67E-01	7.45E-02
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	9.80E-04	1.37E+03	6.73	21.3	67.3	**2.03E+02**	**6.43E+01**	**2.03E+01**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	8.80E-05	1.20E+01	7.10	15.9	35.5	**1.68E+00**	7.53E-01	3.37E-01
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	2.90E-04	1.81E+02	7.10	15.9	35.5	**2.55E+01**	**1.14E+01**	**5.10E+00**
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0209 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0175 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1050 = Body weight (kg)

ATTACHMENT TABLE L-1-8

Summary of Red-tailed Hawk Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	3.46E+02	Measured	7.59E+00	Regresson	3.69E+00	Regresson	7.56E-01	Regresson	2.72E+00	Regresson	9.42E-01	5.80E-02	6.47E-02	2.46	4.26	7.38	2.63E-02	1.52E-02	8.76E-03
Cadmium	3.30E+00	Measured	2.62E+01	Regresson	1.19E+00	Regresson	4.22E-01	Regresson	5.00E-01	Regresson	7.14E+00	8.20E-04	1.10E-01	1.47	3.29	7.35	7.49E-02	3.35E-02	1.50E-02
Chromium	6.30E+01	Measured	1.28E+01	0.084	5.29E+00	Regresson	4.67E+00	Regresson	4.86E+00	Regresson	4.86E+00	6.30E-03	1.98E-01	2.66	5.95	13.3	7.46E-02	3.33E-02	1.49E-02
Copper	1.50E+02	Measured	4.55E+01	Regresson	1.41E+01	Regresson	1.65E+01	Regresson	1.59E+01	Regresson	2.00E+01	2.59E-02	7.23E-01	4.05	7.00	12.1	1.78E-01	1.03E-01	5.97E-02
Lead	7.93E+02	Measured	1.21E+01	Regresson	1.12E+01	Regresson	2.07E+01	Regresson	1.72E+01	Regresson	4.18E+01	5.90E-03	1.09E+00	3.85	8.61	19.3	2.84E-01	1.27E-01	5.69E-02
Mercury	8.80E-01	Measured	1.38E-01	Regresson	3.45E-01	0.130	1.14E-01	0.192	1.69E-01	0.192	1.69E-01	2.00E-04	6.23E-03	0.49	0.77	1.20	1.27E-02	8.12E-03	5.19E-03
Nickel	4.67E+01	Measured	5.86E+00	Regresson	1.92E+00	Regresson	4.68E+00	Regresson	4.68E+00	Regresson	4.68E+00	3.50E-03	1.94E-01	6.71	15.0	33.6	2.89E-02	1.29E-02	5.77E-03
Selenium	1.00E+00	Measured	3.24E+00	Regresson	5.08E-01	Regresson	6.60E-01	Regresson	6.60E-01	Regresson	6.60E-01	1.30E-03	2.73E-02	0.44	0.81	1.50	6.21E-02	3.37E-02	1.82E-02
Silver	2.06E+01	Measured	2.76E-01	0.037	7.56E-01	0.810	1.67E+01	0.007	1.44E-01	0.501	1.03E+01	7.00E-05	3.77E-01	4.04	9.03	20.2	9.33E-02	4.17E-02	1.87E-02
Zinc	3.24E+02	Measured	1.99E+02	Regresson	1.19E+02	Regresson	1.34E+02	Regresson	1.18E+02	Regresson	1.50E+02	6.54E-02	5.54E+00	66.1	148	331	8.39E-02	3.75E-02	1.68E-02
Polychlorinated Biphenyls																			
Aroclor-1016	2.70E-01	Regression	6.89E-01	0.323	8.72E-02	See footnote	3.74E-01	See footnote	1.04E-01	See footnote	6.07E-01	6.70E-04	1.50E-02	0.41	0.92	2.05	3.65E-02	1.63E-02	7.30E-03
Aroclor-1221	5.60E-01	Regression	1.86E+00	0.749	4.19E-01	See footnote	1.10E+00	See footnote	4.51E-01	See footnote	1.62E+00	9.30E-04	4.38E-02	0.41	0.92	2.05	1.07E-01	4.78E-02	2.14E-02
Aroclor-1232	2.70E-01	Regression	6.89E-01	0.515	1.39E-01	See footnote	4.00E-01	See footnote	1.53E-01	See footnote	6.09E-01	6.70E-04	1.61E-02	0.41	0.92	2.05	3.92E-02	1.75E-02	7.83E-03
Aroclor-1242	1.00E+00	Regression	4.10E+00	0.323	3.23E-01	See footnote	2.11E+00	See footnote	4.15E-01	See footnote	3.52E+00	8.00E-04	8.32E-02	0.41	0.92	2.05	2.03E-01	9.08E-02	4.06E-02
Aroclor-1248	2.70E-01	Regression	6.89E-01	0.184	4.98E-02	See footnote	3.55E-01	See footnote	6.79E-02	See footnote	6.05E-01	9.30E-04	1.42E-02	0.41	0.92	2.05	3.47E-02	1.55E-02	6.93E-03
Aroclor-1254	2.70E-01	Regression	6.89E-01	0.139	3.76E-02	See footnote	3.49E-01	See footnote	5.62E-02	See footnote	6.04E-01	6.70E-04	1.39E-02	0.41	0.92	2.05	3.40E-02	1.52E-02	6.80E-03
Aroclor-1260	2.70E+00	Regression	1.58E+01	0.105	2.84E-01	See footnote	7.64E+00	See footnote	6.53E-01	See footnote	1.34E+01	8.00E-04	2.99E-01	0.41	0.92	2.05	7.29E-01	3.26E-01	1.46E-01
PCB (total)	3.70E+00	Measured	1.36E+00	0.139	5.15E-01	See footnote	9.76E-01	See footnote	6.09E-01	See footnote	1.62E+00	7.81E-04	4.42E-02	0.41	0.92	2.05	1.08E-01	4.82E-02	2.16E-02
Pesticides																			
4,4'-DDD	2.80E-01	Regression	1.31E+00	Regresson	3.11E-02	See footnote	6.39E-01	See footnote	6.28E-02	See footnote	1.12E+00	1.30E-04	2.51E-02	0.08	0.18	0.40	3.14E-01	1.40E-01	6.27E-02
4,4'-DDE	8.30E-02	Regression	1.33E+00	Regresson	1.25E-02	See footnote	6.34E-01	See footnote	4.05E-02	See footnote	1.11E+00	1.30E-04	2.45E-02	0.08	0.18	0.40	3.07E-01	1.37E-01	6.13E-02
4,4'-DDT	2.20E-01	Regression	2.25E+00	Regresson	2.60E-02	See footnote	1.07E+00	See footnote	7.50E-02	See footnote	1.88E+00	1.30E-04	4.17E-02	0.08	0.18	0.40	5.21E-01	2.33E-01	1.04E-01
Aldrin	3.30E-02	3.300	1.09E-01	0.139	4.60E-03	See footnote	5.42E-02	See footnote	7.36E-03	See footnote	9.41E-02	6.70E-05	2.15E-03	0.07	0.16	0.35	3.07E-02	1.37E-02	6.13E-03
alpha-BHC	4.00E-02	1.000	4.00E-02	1.735	6.94E-02	See footnote	5.50E-02	See footnote	6.81E-02	See footnote	4.14E-02	6.70E-05	2.27E-03	0.56	1.12	2.25	4.05E-03	2.02E-03	1.01E-03
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	6.70E-05	8.21E-05	2.14	4.79	10.7	3.84E-05	1.72E-05	7.68E-06
beta-BHC	4.00E-02	1.000	4.00E-02	1.719	6.88E-02	See footnote	5.47E-02	See footnote	6.75E-02	See footnote	4.14E-02	6.70E-05	2.26E-03	0.56	1.12	2.25	4.03E-03	2.01E-03	1.00E-03
delta-BHC	1.40E-01	1.000	1.40E-01	1.311	1.84E-01	See footnote	1.62E-01	See footnote	1.82E-01	See footnote	1.42E-01	6.70E-05	6.69E-03	0.56	1.12	2.25	1.20E-02	5.96E-03	2.97E-03
Dieldrin	6.50E-01	52.10	3.39E+01	1.500	9.75E-01	See footnote	1.64E+01	See footnote	1.63E+00	See footnote	2.80E+01	1.30E-04	6.34E-01	0.07	0.52	3.78	**8.95E+00**	**1.23E+00**	1.68E-01
Endosulfan I	2.20E+00	1.000	2.20E+00	1.687	3.71E+00	See footnote	2.97E+00	See footnote	3.65E+00	See footnote	2.27E+00	6.70E-05	1.22E-01	10.0	22.4	50.0	1.22E-02	5.47E-03	2.45E-03
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	See footnote	5.37E-03	See footnote	5.08E-03	See footnote	5.67E-03	1.30E-04	2.31E-04	10.0	22.4	50.0	2.31E-05	1.03E-05	4.62E-06
Endrin	1.30E-01	3.600	4.68E-01	0.535	6.95E-02	See footnote	2.58E-01	See footnote	7.89E-02	See footnote	4.05E-01	1.30E-04	1.02E-02	0.021	0.047	0.104	4.92E-01	2.20E-01	9.84E-02
gamma-BHC (Lindane)	8.60E-01	26.60	2.29E+01	1.852	1.59E+00	See footnote	1.16E+01	See footnote	2.00E+00	See footnote	1.90E+01	6.70E-05	4.49E-01	4.00	8.94	20.0	1.12E-01	5.02E-02	2.24E-02
gamma-Chlordane	1.50E-02	4.000	6.00E-02	0.165	2.47E-03	See footnote	2.98E-02	See footnote	3.92E-03	See footnote	5.14E-02	6.70E-05	1.18E-03	2.14	4.79	10.7	5.50E-04	2.46E-04	1.10E-04
Heptachlor	4.00E-02	3.000	1.20E-01	0.174	6.97E-03	See footnote	6.08E-02	See footnote	1.00E-02	See footnote	1.04E-01	6.70E-05	2.42E-03	0.28	0.62	1.38	8.77E-03	3.92E-03	1.75E-03
Heptachlor epoxide	4.00E-02	10.00	4.00E-01	0.566	2.26E-02	See footnote	2.00E-01	See footnote	3.06E-02	See footnote	3.35E-01	6.70E-05	7.81E-03	0.28	0.62	1.38	2.84E-02	1.27E-02	5.67E-03
Methoxychlor	4.00E-01	1.000	4.00E-01	0.525	2.10E-01	See footnote	3.03E-01	See footnote	2.18E-01	See footnote	3.91E-01	6.70E-04	1.26E-02	355	794	1,775	3.55E-05	1.59E-05	7.10E-06
Toxaphene	1.40E+00	1.000	1.40E+00	0.355	4.96E-01	See footnote	9.39E-01	See footnote	5.36E-01	See footnote	1.36E+00	1.30E-03	3.91E-02	1.00	2.24	5.00	3.91E-02	1.75E-02	7.82E-03
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	1.48E-02	1.000	1.48E-02	1.000	1.48E-02	See footnote	1.48E-02	See footnote	1.48E-02	See footnote	1.48E-02	2.00E-03	7.53E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5.40E-01	0.500	2.70E-01	0.792	4.28E-01	See footnote	3.56E-01	See footnote	4.27E-01	See footnote	3.13E-01	1.00E-02	1.58E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	5.50E+00	0.560	3.08E+00	1.426	7.84E+00	See footnote	5.56E+00	See footnote	7.69E+00	See footnote	3.62E+00	2.00E-03	2.32E-01	80.4	180	402	2.89E-03	1.29E-03	5.78E-04
1,2-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.452	1.35E+01	See footnote	9.57E+00	See footnote	1.31E+01	See footnote	5.88E+00	1.00E-03	3.93E-01	80.4	180	402	4.89E-03	2.19E-03	9.79E-04
1,3-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.296	1.26E+01	See footnote	9.14E+00	See footnote	1.23E+01	See footnote	5.84E+00	1.00E-03	3.76E-01	80.4	180	402	4.67E-03	2.09E-03	9.35E-04
1,4-Dichlorobenzene	5.50E+00	1.000	5.50E+00	2.475	1.36E+01	See footnote	9.64E+00	See footnote	1.33E+01	See footnote	5.88E+00	1.00E-03	3.96E-01	80.4	180	402	4.93E-03	2.20E-03	9.85E-04
4-Bromophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.566	3.11E+00	See footnote	4.28E+00	See footnote	3.22E+00	See footnote	5.39E+00	1.00E-02	1.78E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5.50E+00	1.000	5.50E+00	0.593	3.26E+00	See footnote	4.36E+00	See footnote	3.36E+00	See footnote	5.39E+00	1.00E-02	1.81E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	2.40E+01	0.300	7.20E+00	Regresson	2.53E-04	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	4.90E-06	7.10	15.9	35.5	6.90E-07	3.09E-07	1.38E-07
Acenaphthylene	4.10E+00	0.220	9.02E-01	Regresson	9.72E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	1.42E-05	7.10	15.9	35.5	2.00E-06	8.95E-07	4.00E-07
Anthracene	1.40E+02	0.320	4.48E+01	Regresson	1.74E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	1.42E-05	7.10	15.9	35.5	2.00E-06	8.95E-07	4.00E-07
Benzo(a)anthracene	1.80E+02	0.270	4.86E+01	Regresson	1.46E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	3.40E-04	2.41E-05	7.10	15.9	35.5	3.40E-06	1.52E-06	6.80E-07
Benzo(a)pyrene	1.30E+02	0.340	4.42E+01	Regresson	1.46E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.40E-04	1.70E-05	7.10	15.9	35.5	2.40E-06	1.07E-06	4.80E-07
Benzo(b)fluoranthene	2.00E+02	0.210	4.20E+01	0.480	9.60E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	5.80E-04	4.12E-05	7.10	15.9	35.5	5.80E-06	2.59E-06	1.16E-06
Benzo(g,h,i)perylene	6.60E+01	0.150	9.90E+00	Regresson	5.60E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.60E-04	1.14E-05	7.10	15.9	35.5	1.60E-06	7.16E-07	3.20E-07
Benzo(k)fluoranthene	8.10E+01	0.210	1.70E+01	Regresson	5.05E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.50E-04	1.07E-05	7.10	15.9	35.5	1.50E-06	6.71E-07	3.00E-07
Chrysene	2.10E+02	0.440	9.24E+01	Regresson	1.60E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	5.68E-06	7.10	15.9	35.5	8.00E-07	3.58E-07	1.60E-07
Dibenz(a,h)anthracene	2.20E+01	0.490	1.08E+01	0.230	5.06E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	1.42E-05	7.10	15.9	35.5	2.00E-06	8.95E-07	4.00E-07
Fluoranthene	5.00E+02	0.370	1.85E+02	4.700	2.35E+03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	3.20E-04	2.27E-05	7.10	15.9	35.5	3.20E-06	1.43E-06	6.40E-07

ATTACHMENT TABLE L-1-8

Summary of Red-tailed Hawk Exposure Doses - Screening (Step 2) - Maximum

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	4.00E+01	0.200	8.00E+00	Regresson	1.64E-04	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.00E-04	1.42E-05	7.10	15.9	35.5	2.00E-06	8.95E-07	4.00E-07
Hexachlorobenzene	4.90E+01	1.690	8.28E+01	0.246	1.21E+01	See footnote	4.61E+01	See footnote	1.44E+01	See footnote	7.51E+01	2.00E-04	1.87E+00	0.113	0.253	0.565	**1.65E+01**	**7.38E+00**	**3.30E+00**
Hexachlorobutadiene	5.50E+00	1.000	5.50E+00	0.675	3.71E+00	See footnote	4.59E+00	See footnote	3.79E+00	See footnote	5.42E+00	1.00E-02	1.91E-01	3.39	7.58	17.0	5.62E-02	2.52E-02	1.12E-02
Hexachlorocyclopentadiene	5.50E+00	1.000	5.50E+00	0.393	2.16E+00	See footnote	3.80E+00	See footnote	2.31E+00	See footnote	5.34E+00	1.00E-02	1.58E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	4.90E+01	1.000	4.90E+01	1.439	7.05E+01	See footnote	6.00E+01	See footnote	6.96E+01	See footnote	5.00E+01	2.00E-04	2.47E+00	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.90E+01	0.410	2.83E+01	0.150	1.04E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.40E-04	1.70E-05	7.10	15.9	35.5	2.40E-06	1.07E-06	4.80E-07
Pentachlorophenol	2.40E+02	14.63	3.51E+03	30.10	7.22E+03	See footnote	5.34E+03	See footnote	6.98E+03	See footnote	3.26E+03	9.80E-04	2.15E+02	6.73	21.3	67.3	**3.19E+01**	**1.01E+01**	**3.19E+00**
Phenanthrene	4.70E+02	0.280	1.32E+02	Regresson	3.85E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	6.25E-06	7.10	15.9	35.5	8.80E-07	3.94E-07	1.76E-07
Pyrene	3.90E+02	0.390	1.52E+02	2.400	9.36E+02	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	2.90E-04	2.06E-05	7.10	15.9	35.5	2.90E-06	1.30E-06	5.80E-07
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0395 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.340 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0680 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.957 = Body weight (kg)

ATTACHMENT TABLE L-1-9

Summary of Meadow Vole Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	9.96E-02	0.252	0.56	1.26	3.95E-01	1.77E-01	7.90E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	5.07E-02	0.77	2.43	7.70	6.59E-02	2.08E-02	6.59E-03
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	8.49E-02	2.40	5.37	12.0	3.54E-02	1.58E-02	7.07E-03
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	4.37E-01	5.60	7.23	9.34	7.79E-02	6.04E-02	4.67E-02
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	2.89E-01	4.70	6.47	8.90	6.16E-02	4.48E-02	3.25E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	7.01E-03	0.032	0.072	0.16	2.19E-01	9.80E-02	4.38E-02
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	5.46E-02	1.70	2.40	3.40	3.21E-02	2.27E-02	1.61E-02
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	1.58E-02	0.20	0.26	0.33	7.92E-02	6.16E-02	4.80E-02
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	5.09E-03	12.0	26.9	60.2	4.23E-04	1.89E-04	8.46E-05
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	3.14E+00	75.4	169	377	4.16E-02	1.86E-02	8.32E-03
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	4.47E-04	0.136	0.304	0.680	3.29E-03	1.47E-03	6.58E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	1.82E-03	0.136	0.304	0.680	1.34E-02	5.99E-03	2.68E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	7.28E-04	0.136	0.304	0.680	5.35E-03	2.39E-03	1.07E-03
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	1.92E-03	0.136	0.304	0.680	1.41E-02	6.32E-03	2.83E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	3.29E-04	0.136	0.304	0.680	2.42E-03	1.08E-03	4.84E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	2.52E-04	0.136	0.304	0.680	1.86E-03	8.30E-04	3.71E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	2.61E-03	0.136	0.304	0.680	1.92E-02	8.58E-03	3.84E-03
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	3.86E-03	0.136	0.304	0.680	2.84E-02	1.27E-02	5.68E-03
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	7.32E-04	0.147	0.329	0.735	4.98E-03	2.23E-03	9.96E-04
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	5.82E-04	0.147	0.329	0.735	3.96E-03	1.77E-03	7.92E-04
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	9.19E-04	0.147	0.329	0.735	6.25E-03	2.80E-03	1.25E-03
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	7.56E-05	0.20	0.45	1.00	3.78E-04	1.69E-04	7.56E-05
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	3.21E-04	1.60	2.26	3.20	2.01E-04	1.42E-04	1.00E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	1.85E-05	4.58	6.48	9.16	4.04E-06	2.85E-06	2.02E-06
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	3.18E-04	1.60	2.26	3.20	1.99E-04	1.41E-04	9.94E-05
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	1.23E-03	1.60	2.26	3.20	7.67E-04	5.43E-04	3.84E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	3.01E-03	0.015	0.021	0.030	2.01E-01	1.42E-01	1.00E-01
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	2.32E-02	0.15	0.34	0.75	1.55E-01	6.91E-02	3.09E-02
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	2.59E-04	0.15	0.34	0.75	1.73E-03	7.73E-04	3.46E-04
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	7.52E-04	0.184	0.411	0.920	4.09E-03	1.83E-03	8.18E-04
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	1.14E-02	8.00	17.9	40.0	1.43E-03	6.40E-04	2.86E-04
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	6.27E-05	4.58	6.48	9.16	1.37E-05	9.68E-06	6.84E-06
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	5.22E-05	0.20	0.45	1.00	2.61E-04	1.17E-04	5.22E-05
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	1.47E-04	0.20	0.45	1.00	7.37E-04	3.30E-04	1.47E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	1.07E-03	4.00	5.66	8.00	2.67E-04	1.89E-04	1.34E-04
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	2.96E-03	8.00	17.9	40.0	3.70E-04	1.65E-04	7.40E-05
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	4.24E-04	76.0	170	380	5.58E-06	2.49E-06	1.12E-06
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	1.29E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	4.41E-02	53.0	75.0	106	8.32E-04	5.88E-04	4.16E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	7.50E-02	85.7	192	429	8.75E-04	3.91E-04	1.75E-04
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	7.04E-02	85.7	192	429	8.21E-04	3.67E-04	1.64E-04
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	7.57E-02	30.0	52.0	90.0	2.52E-03	1.46E-03	8.41E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	2.24E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	2.34E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-9

Summary of Meadow Vole Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	3.74E-03	65.6	147	328	5.70E-05	2.55E-05	1.14E-05
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	1.25E-02	65.6	147	328	1.91E-04	8.55E-05	3.82E-05
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	1.50E-01	65.6	147	328	2.29E-03	1.02E-03	4.57E-04
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	4.21E-02	0.62	1.37	3.07	6.84E-02	3.06E-02	1.37E-02
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	8.99E-02	0.62	1.37	3.07	1.46E-01	6.54E-02	2.93E-02
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	3.05E-01	0.62	1.37	3.07	4.97E-01	2.22E-01	9.95E-02
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	1.83E-01	0.62	1.37	3.07	2.97E-01	1.33E-01	5.95E-02
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	4.32E-02	0.62	1.37	3.07	7.02E-02	3.14E-02	1.41E-02
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	5.10E-02	0.62	1.37	3.07	8.29E-02	3.71E-02	1.66E-02
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	1.80E-02	0.62	1.37	3.07	2.92E-02	1.31E-02	5.85E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	1.19E+00	65.6	147	328	1.81E-02	8.09E-03	3.62E-03
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	5.51E-03	65.6	147	328	8.40E-05	3.76E-05	1.68E-05
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	5.05E-02	2.00	2.83	4.00	2.53E-02	1.79E-02	1.26E-02
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	2.63E-02	2.00	6.32	20.0	1.31E-02	4.15E-03	1.31E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	1.64E-02	75.0	168	375	2.18E-04	9.76E-05	4.37E-05
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	2.45E-01	100	224	500	2.45E-03	1.09E-03	4.89E-04
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	4.57E-02	0.62	1.37	3.07	7.43E-02	3.33E-02	1.49E-02
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	4.81E+00	8.42	18.8	42.1	5.71E-01	2.55E-01	1.14E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	4.80E-01	65.6	147	328	7.32E-03	3.27E-03	1.46E-03
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	1.31E+00	0.62	1.37	3.07	**2.13E+00**	9.55E-01	4.27E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	5.39E-08	0.000001	0.000003	0.00001	5.39E-02	1.70E-02	5.39E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0021 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0090 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0428 = Body weight (kg)

ATTACHMENT TABLE L-1-10

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	9.68E-01	0.252	0.56	1.26	**3.84E+00**	**1.72E+00**	7.68E-01
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	1.92E+00	0.77	2.43	7.70	**2.49E+00**	7.88E-01	2.49E-01
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	1.20E+00	2.40	5.37	12.0	5.01E-01	2.24E-01	1.00E-01
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	3.71E+00	5.60	7.23	9.34	6.62E-01	5.13E-01	3.97E-01
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	2.02E+00	4.70	6.47	8.90	4.31E-01	3.13E-01	2.27E-01
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	1.27E-02	0.032	0.072	0.16	3.96E-01	1.77E-01	7.91E-02
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	5.76E-01	1.70	2.40	3.40	3.39E-01	2.40E-01	1.69E-01
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	2.44E-01	0.20	0.26	0.33	**1.22E+00**	9.48E-01	7.38E-01
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	5.06E-02	12.0	26.9	60.2	4.20E-03	1.88E-03	8.40E-04
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	1.59E+01	75.4	169	377	2.10E-01	9.41E-02	4.21E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	2.06E-03	0.136	0.304	0.680	1.51E-02	6.76E-03	3.02E-03
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	5.35E-03	0.136	0.304	0.680	3.93E-02	1.76E-02	7.86E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	2.43E-03	0.136	0.304	0.680	1.78E-02	7.98E-03	3.57E-03
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	1.49E-02	0.136	0.304	0.680	1.10E-01	4.90E-02	2.19E-02
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	2.10E-03	0.136	0.304	0.680	1.54E-02	6.90E-03	3.09E-03
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	2.01E-03	0.136	0.304	0.680	1.48E-02	6.60E-03	2.95E-03
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	5.98E-02	0.136	0.304	0.680	4.39E-01	1.97E-01	8.79E-02
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	1.03E-01	0.136	0.304	0.680	7.57E-01	3.39E-01	1.51E-01
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	2.54E-02	0.147	0.329	0.735	1.73E-01	7.73E-02	3.46E-02
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	2.68E-02	0.147	0.329	0.735	1.82E-01	8.16E-02	3.65E-02
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	3.89E-02	0.147	0.329	0.735	2.64E-01	1.18E-01	5.29E-02
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	1.62E-03	0.20	0.45	1.00	8.12E-03	3.63E-03	1.62E-03
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	3.53E-04	1.60	2.26	3.20	2.21E-04	1.56E-04	1.10E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	3.07E-04	4.58	6.48	9.16	6.70E-05	4.74E-05	3.35E-05
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	3.53E-04	1.60	2.26	3.20	2.21E-04	1.56E-04	1.10E-04
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	1.74E-03	1.60	2.26	3.20	1.09E-03	7.68E-04	5.43E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	9.38E-02	0.015	0.021	0.030	**6.25E+00**	**4.42E+00**	**3.13E+00**
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	2.62E-02	0.15	0.34	0.75	1.75E-01	7.81E-02	3.49E-02
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	5.14E-04	0.15	0.34	0.75	3.43E-03	1.53E-03	6.85E-04
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	6.91E-03	0.184	0.411	0.920	3.75E-02	1.68E-02	7.51E-03
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	1.15E-01	8.00	17.9	40.0	1.44E-02	6.44E-03	2.88E-03
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	1.36E-03	4.58	6.48	9.16	2.96E-04	2.10E-04	1.48E-04
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	8.81E-04	0.20	0.45	1.00	4.40E-03	1.97E-03	8.81E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	2.82E-03	0.20	0.45	1.00	1.41E-02	6.31E-03	2.82E-03
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	3.34E-03	4.00	5.66	8.00	8.36E-04	5.91E-04	4.18E-04
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	1.32E-02	8.00	17.9	40.0	1.65E-03	7.36E-04	3.29E-04
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	6.11E-04	76.0	170	380	8.04E-06	3.59E-06	1.61E-06
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	1.38E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	3.76E-02	53.0	75.0	106	7.10E-04	5.02E-04	3.55E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	6.09E-02	85.7	192	429	7.10E-04	3.18E-04	1.42E-04
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	6.04E-02	85.7	192	429	7.05E-04	3.15E-04	1.41E-04
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	6.09E-02	30.0	52.0	90.0	2.03E-03	1.17E-03	6.77E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	6.61E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	6.62E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-10

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	8.29E-02	65.6	147	328	1.26E-03	5.65E-04	2.53E-04
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	2.10E-02	65.6	147	328	3.20E-04	1.43E-04	6.40E-05
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	4.75E-01	65.6	147	328	7.24E-03	3.24E-03	1.45E-03
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	5.45E-01	0.62	1.37	3.07	8.86E-01	3.97E-01	1.77E-01
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	4.67E-01	0.62	1.37	3.07	7.59E-01	3.40E-01	1.52E-01
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	5.41E-01	0.62	1.37	3.07	8.80E-01	3.94E-01	1.76E-01
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	1.65E-01	0.62	1.37	3.07	2.69E-01	1.20E-01	5.39E-02
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	2.17E-01	0.62	1.37	3.07	3.52E-01	1.58E-01	7.06E-02
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	8.83E-01	0.62	1.37	3.07	**1.44E+00**	6.43E-01	2.88E-01
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	1.11E-01	0.62	1.37	3.07	1.81E-01	8.08E-02	3.62E-02
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	1.93E+00	65.6	147	328	2.95E-02	1.32E-02	5.90E-03
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	1.04E-01	65.6	147	328	1.58E-03	7.07E-04	3.16E-04
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	4.79E-01	2.00	2.83	4.00	2.39E-01	1.69E-01	1.20E-01
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	6.65E-02	2.00	6.32	20.0	3.32E-02	1.05E-02	3.32E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	6.56E-02	75.0	168	375	8.74E-04	3.91E-04	1.75E-04
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	3.19E-01	100	224	500	3.19E-03	1.43E-03	6.38E-04
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	2.85E-01	0.62	1.37	3.07	4.63E-01	2.07E-01	9.28E-02
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	1.81E+01	8.42	18.8	42.1	**2.15E+00**	9.62E-01	4.30E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	1.46E+00	65.6	147	328	2.22E-02	9.92E-03	4.44E-03
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	1.60E+00	0.62	1.37	3.07	**2.60E+00**	**1.17E+00**	5.22E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	4.02E-06	0.000001	0.000003	0.00001	**4.02E+00**	**1.27E+00**	4.02E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0015 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.823 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.047 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.130 = Proportion of diet composed of soil
WIR = 0.0038 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0169 = Body weight (kg)

ATTACHMENT TABLE L-1-11

Summary of White-Footed Mouse Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	1.19E-01	0.252	0.56	1.26	4.74E-01	2.12E-01	9.48E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	3.02E-01	0.77	2.43	7.70	3.93E-01	1.24E-01	3.93E-02
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	1.67E-01	2.40	5.37	12.0	6.97E-02	3.12E-02	1.39E-02
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	6.24E-01	5.60	7.23	9.34	1.11E-01	8.62E-02	6.68E-02
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	2.26E-01	4.70	6.47	8.90	4.82E-02	3.50E-02	2.54E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	3.41E-03	0.032	0.072	0.16	1.07E-01	4.77E-02	2.13E-02
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	8.14E-02	1.70	2.40	3.40	4.79E-02	3.39E-02	2.40E-02
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	4.03E-02	0.20	0.26	0.33	2.01E-01	1.57E-01	1.22E-01
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	4.85E-03	12.0	26.9	60.2	4.03E-04	1.80E-04	8.05E-05
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	3.04E+00	75.4	169	377	4.03E-02	1.80E-02	8.07E-03
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	4.49E-04	0.136	0.304	0.680	3.30E-03	1.47E-03	6.60E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	1.28E-03	0.136	0.304	0.680	9.38E-03	4.20E-03	1.88E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	5.70E-04	0.136	0.304	0.680	4.19E-03	1.87E-03	8.38E-04
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	2.65E-03	0.136	0.304	0.680	1.95E-02	8.71E-03	3.90E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	4.50E-04	0.136	0.304	0.680	3.31E-03	1.48E-03	6.61E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	3.93E-04	0.136	0.304	0.680	2.89E-03	1.29E-03	5.78E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	9.32E-03	0.136	0.304	0.680	6.85E-02	3.06E-02	1.37E-02
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	1.61E-02	0.136	0.304	0.680	1.19E-01	5.31E-02	2.37E-02
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	3.98E-03	0.147	0.329	0.735	2.71E-02	1.21E-02	5.41E-03
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	4.19E-03	0.147	0.329	0.735	2.85E-02	1.27E-02	5.70E-03
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	6.06E-03	0.147	0.329	0.735	4.12E-02	1.84E-02	8.25E-03
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	2.61E-04	0.20	0.45	1.00	1.30E-03	5.83E-04	2.61E-04
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	1.33E-04	1.60	2.26	3.20	8.34E-05	5.90E-05	4.17E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	5.55E-05	4.58	6.48	9.16	1.21E-05	8.57E-06	6.06E-06
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	1.33E-04	1.60	2.26	3.20	8.29E-05	5.86E-05	4.15E-05
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	5.45E-04	1.60	2.26	3.20	3.40E-04	2.41E-04	1.70E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	1.48E-02	0.015	0.021	0.030	9.89E-01	6.99E-01	4.94E-01
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	9.29E-03	0.15	0.34	0.75	6.20E-02	2.77E-02	1.24E-02
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	1.45E-04	0.15	0.34	0.75	9.69E-04	4.33E-04	1.94E-04
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	1.21E-03	0.184	0.411	0.920	6.56E-03	2.93E-03	1.31E-03
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	2.01E-02	8.00	17.9	40.0	2.52E-03	1.13E-03	5.03E-04
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	2.20E-04	4.58	6.48	9.16	4.81E-05	3.40E-05	2.40E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	1.47E-04	0.20	0.45	1.00	7.33E-04	3.28E-04	1.47E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	4.64E-04	0.20	0.45	1.00	2.32E-03	1.04E-03	4.64E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	7.73E-04	4.00	5.66	8.00	1.93E-04	1.37E-04	9.66E-05
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	2.61E-03	8.00	17.9	40.0	3.27E-04	1.46E-04	6.53E-05
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	4.05E-04	76.0	170	380	5.33E-06	2.38E-06	1.07E-06
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	5.93E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	1.59E-02	53.0	75.0	106	3.00E-04	2.12E-04	1.50E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	2.70E-02	85.7	192	429	3.15E-04	1.41E-04	6.30E-05
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	2.58E-02	85.7	192	429	3.01E-04	1.34E-04	6.01E-05
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	2.72E-02	30.0	52.0	90.0	9.05E-04	5.23E-04	3.02E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	1.54E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	1.57E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-11

Summary of White-Footed Mouse Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	9.64E-03	65.6	147	328	1.47E-04	6.57E-05	2.94E-05
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	5.19E-03	65.6	147	328	7.92E-05	3.54E-05	1.58E-05
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	8.86E-02	65.6	147	328	1.35E-03	6.04E-04	2.70E-04
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	6.59E-02	0.62	1.37	3.07	1.07E-01	4.80E-02	2.15E-02
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	7.34E-02	0.62	1.37	3.07	1.19E-01	5.34E-02	2.39E-02
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	1.28E-01	0.62	1.37	3.07	2.08E-01	9.32E-02	4.17E-02
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	6.01E-02	0.62	1.37	3.07	9.78E-02	4.38E-02	1.96E-02
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	3.12E-02	0.62	1.37	3.07	5.07E-02	2.27E-02	1.02E-02
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	1.15E-01	0.62	1.37	3.07	1.87E-01	8.37E-02	3.75E-02
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	1.77E-02	0.62	1.37	3.07	2.88E-02	1.29E-02	5.76E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	5.14E-01	65.6	147	328	7.84E-03	3.50E-03	1.57E-03
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	1.09E-02	65.6	147	328	1.67E-04	7.45E-05	3.33E-05
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	7.96E-02	2.00	2.83	4.00	3.98E-02	2.82E-02	1.99E-02
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	1.65E-02	2.00	6.32	20.0	8.23E-03	2.60E-03	8.23E-04
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	1.39E-02	75.0	168	375	1.85E-04	8.27E-05	3.70E-05
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	1.04E-01	100	224	500	1.04E-03	4.64E-04	2.07E-04
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	4.40E-02	0.62	1.37	3.07	7.15E-02	3.20E-02	1.43E-02
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	3.91E+00	8.42	18.8	42.1	4.65E-01	2.08E-01	9.30E-02
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	2.71E-01	65.6	147	328	4.13E-03	1.85E-03	8.26E-04
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	5.11E-01	0.62	1.37	3.07	8.31E-01	3.72E-01	1.66E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	6.23E-07	0.000001	0.000003	0.00001	6.23E-01	1.97E-01	6.23E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.00050	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi =	0.470	= Proportion of diet composed of food item (soil invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi =	0.510	= Proportion of diet composed of food item (terrestrial plants)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.020	= Proportion of diet composed of soil
WIR =	0.0062	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0208	= Body weight (kg)

ATTACHMENT TABLE L-1-12

Summary of Red Fox Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	Regresson	1.41E-01	Regresson	2.03E-01	Regresson	1.46E-01	1.46E-02	4.43E-02	1.04	1.31	1.66	4.26E-02	3.37E-02	2.67E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	Regresson	1.78E-01	Regresson	2.43E-01	Regresson	1.64E+00	4.29E-04	4.22E-02	0.77	2.43	7.70	5.48E-02	1.73E-02	5.48E-03
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	Regresson	2.26E+00	Regresson	2.35E+00	Regresson	2.35E+00	1.55E-03	9.42E-02	2.40	5.37	12.0	3.92E-02	1.75E-02	7.85E-03
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	Regresson	1.08E+01	Regresson	1.27E+01	Regresson	1.51E+01	9.20E-03	4.23E-01	11.7	13.3	15.1	3.62E-02	3.18E-02	2.80E-02
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	Regresson	8.20E+00	Regresson	5.84E+00	Regresson	1.51E+01	2.07E-03	3.59E-01	4.70	6.47	8.90	7.63E-02	5.54E-02	4.03E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	0.054	9.43E-03	0.067	1.17E-02	0.067	1.17E-02	1.00E-04	8.65E-04	0.15	0.19	0.25	5.76E-03	4.47E-03	3.46E-03
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	Regresson	2.55E+00	Regresson	2.55E+00	Regresson	2.55E+00	1.34E-03	8.50E-02	1.70	2.40	3.40	5.00E-02	3.54E-02	2.50E-02
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	Regresson	5.20E-01	Regresson	5.20E-01	Regresson	5.20E-01	1.30E-03	1.76E-02	0.20	0.26	0.33	8.81E-02	6.86E-02	5.34E-02
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	0.151	3.99E-01	0.006	1.50E-02	0.036	9.39E-02	7.00E-05	7.05E-03	12.0	26.9	60.2	5.85E-04	2.62E-04	1.17E-04
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	Regresson	1.22E+02	Regresson	1.08E+02	Regresson	1.28E+02	2.76E-02	3.55E+00	75.4	169	377	4.70E-02	2.10E-02	9.41E-03
Polychlorinated Biphenyls																			
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	See footnote	1.51E-02	See footnote	7.95E-03	See footnote	2.25E-02	2.84E-04	4.82E-04	1.37	2.17	3.43	3.51E-04	2.22E-04	1.40E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	See footnote	4.82E-02	See footnote	3.56E-02	See footnote	5.94E-02	3.97E-04	1.47E-03	0.137	0.306	0.685	1.07E-02	4.79E-03	2.14E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	See footnote	2.02E-02	See footnote	1.37E-02	See footnote	2.67E-02	2.84E-04	6.33E-04	0.137	0.306	0.685	4.62E-03	2.07E-03	9.24E-04
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	See footnote	1.06E-01	See footnote	3.79E-02	See footnote	1.68E-01	3.41E-04	3.10E-03	0.137	0.306	0.685	2.26E-02	1.01E-02	4.52E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	See footnote	1.38E-02	See footnote	5.03E-03	See footnote	2.27E-02	3.97E-04	4.49E-04	0.137	0.306	0.685	3.28E-03	1.47E-03	6.56E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	See footnote	1.28E-02	See footnote	3.95E-03	See footnote	2.20E-02	2.84E-04	4.12E-04	0.137	0.306	0.685	3.00E-03	1.34E-03	6.01E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	See footnote	3.84E-01	See footnote	5.20E-02	See footnote	6.74E-01	3.41E-04	1.08E-02	0.137	0.306	0.685	7.89E-02	3.53E-02	1.58E-02
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	See footnote	6.68E-01	See footnote	7.76E-02	See footnote	1.16E+00	3.33E-04	1.84E-02	0.137	0.306	0.685	1.34E-01	6.01E-02	2.69E-02
Pesticides																			
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	See footnote	1.65E-01	See footnote	1.48E-02	See footnote	2.87E-01	5.52E-05	4.47E-03	0.147	0.329	0.735	3.04E-02	1.36E-02	6.08E-03
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	See footnote	1.74E-01	See footnote	1.17E-02	See footnote	3.03E-01	5.52E-05	4.65E-03	0.147	0.329	0.735	3.16E-02	1.42E-02	6.33E-03
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	See footnote	2.52E-01	See footnote	1.86E-02	See footnote	4.39E-01	5.52E-05	6.77E-03	0.147	0.329	0.735	4.60E-02	2.06E-02	9.21E-03
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	See footnote	1.05E-02	See footnote	1.43E-03	See footnote	1.83E-02	2.78E-05	2.95E-04	0.20	0.45	1.00	1.47E-03	6.59E-04	2.95E-04
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	See footnote	5.21E-03	See footnote	6.46E-03	See footnote	3.92E-03	2.78E-05	1.60E-04	1.60	2.26	3.20	1.00E-04	7.09E-05	5.01E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	2.78E-05	5.66E-05	4.58	6.48	9.16	1.24E-05	8.73E-06	6.18E-06
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	See footnote	5.18E-03	See footnote	6.40E-03	See footnote	3.92E-03	2.78E-05	1.60E-04	1.60	2.26	3.20	9.97E-05	7.05E-05	4.99E-05
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	See footnote	2.24E-02	See footnote	2.50E-02	See footnote	1.96E-02	2.78E-05	6.80E-04	1.60	2.26	3.20	4.25E-04	3.01E-04	2.13E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	See footnote	6.17E-01	See footnote	6.14E-02	See footnote	1.06E+00	5.52E-05	1.66E-02	0.015	0.021	0.030	**1.11E+00**	7.82E-01	5.53E-01
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	See footnote	3.87E-01	See footnote	4.75E-01	See footnote	2.96E-01	2.78E-05	1.17E-02	0.15	0.34	0.75	7.83E-02	3.50E-02	1.57E-02
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	See footnote	5.37E-03	See footnote	5.08E-03	See footnote	5.67E-03	5.52E-05	1.67E-04	0.15	0.34	0.75	1.12E-03	4.99E-04	2.23E-04
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	See footnote	4.96E-02	See footnote	1.52E-02	See footnote	7.79E-02	5.52E-05	1.39E-03	0.184	0.411	0.920	7.56E-03	3.38E-03	1.51E-03
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	See footnote	8.39E-01	See footnote	2.34E-01	See footnote	1.30E+00	2.78E-05	2.28E-02	8.00	17.9	40.0	2.85E-03	1.28E-03	5.71E-04
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	See footnote	8.83E-03	See footnote	1.16E-03	See footnote	1.53E-02	2.78E-05	2.46E-04	4.58	6.48	9.16	5.37E-05	3.80E-05	2.68E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	See footnote	5.76E-03	See footnote	9.50E-04	See footnote	9.88E-03	2.78E-05	1.63E-04	0.20	0.45	1.00	8.16E-04	3.65E-04	1.63E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	See footnote	1.90E-02	See footnote	2.90E-03	See footnote	3.18E-02	2.78E-05	5.16E-04	0.20	0.45	1.00	2.58E-03	1.15E-03	5.16E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	See footnote	2.87E-02	See footnote	2.07E-02	See footnote	3.71E-02	2.78E-04	8.94E-04	4.00	5.66	8.00	2.24E-04	1.58E-04	1.12E-04
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	See footnote	1.02E-01	See footnote	5.82E-02	See footnote	1.47E-01	5.52E-04	3.14E-03	8.00	17.9	40.0	3.92E-04	1.75E-04	7.84E-05
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	See footnote	4.38E-03	See footnote	4.38E-03	See footnote	4.38E-03	1.00E-03	2.19E-04	76.0	170	380	2.88E-06	1.29E-06	5.76E-07
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	See footnote	1.88E-01	See footnote	2.43E-01	See footnote	1.44E-01	4.77E-03	6.32E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	See footnote	6.49E-01	See footnote	8.99E-01	See footnote	4.23E-01	1.00E-03	2.03E-02	53.0	75.0	106	3.83E-04	2.71E-04	1.91E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	See footnote	1.12E+00	See footnote	1.53E+00	See footnote	6.86E-01	5.00E-04	3.40E-02	85.7	192	429	3.96E-04	1.77E-04	7.93E-05
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	See footnote	1.07E+00	See footnote	1.44E+00	See footnote	6.82E-01	5.00E-04	3.24E-02	85.7	192	429	3.78E-04	1.69E-04	7.57E-05
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	See footnote	1.13E+00	See footnote	1.55E+00	See footnote	6.87E-01	5.00E-04	3.42E-02	30.0	52.0	90.0	1.14E-03	6.58E-04	3.80E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	See footnote	5.84E-01	See footnote	4.39E-01	See footnote	7.35E-01	4.77E-03	1.81E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	See footnote	5.95E-01	See footnote	4.58E-01	See footnote	7.36E-01	4.77E-03	1.84E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	2.75E-03	65.6	147	328	4.19E-05	1.88E-05	8.39E-06
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	1.28E-03	65.6	147	328	1.95E-05	8.74E-06	3.91E-06
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	2.08E-02	65.6	147	328	3.18E-04	1.42E-04	6.35E-05
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.09E-04	1.96E-02	0.62	1.37	3.07	3.18E-02	1.42E-02	6.38E-03
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.25E-04	1.77E-02	0.62	1.37	3.07	2.87E-02	1.29E-02	5.76E-03
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.37E-04	3.25E-02	0.62	1.37	3.07	5.28E-02	2.36E-02	1.06E-02
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.09E-04	1.44E-02	0.62	1.37	3.07	2.35E-02	1.05E-02	4.70E-03
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.06E-04	9.67E-03	0.62	1.37	3.07	1.57E-02	7.04E-03	3.15E-03
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	2.56E-02	0.62	1.37	3.07	4.16E-02	1.86E-02	8.33E-03
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	3.59E-03	0.62	1.37	3.07	5.84E-03	2.61E-03	1.17E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.55E-04	1.06E-01	65.6	147	328	1.62E-03	7.24E-04	3.24E-04

ATTACHMENT TABLE L-1-12

Summary of Red Fox Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.93E-05	4.06E-03	65.6	147	328	6.19E-05	2.77E-05	1.24E-05
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	See footnote	3.32E+00	See footnote	1.04E+00	See footnote	5.41E+00	9.61E-05	9.61E-02	2.00	2.83	4.00	4.81E-02	3.40E-02	2.40E-02
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	See footnote	6.26E-01	See footnote	5.18E-01	See footnote	7.39E-01	4.77E-03	1.94E-02	2.00	6.32	20.0	9.69E-03	3.07E-03	9.69E-04
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	See footnote	5.18E-01	See footnote	3.15E-01	See footnote	7.29E-01	4.77E-03	1.61E-02	75.0	168	375	2.15E-04	9.60E-05	4.29E-05
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	See footnote	4.32E+00	See footnote	5.01E+00	See footnote	3.60E+00	9.61E-05	1.31E-01	100	224	500	1.31E-03	5.86E-04	2.62E-04
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.26E-04	9.75E-03	0.62	1.37	3.07	1.59E-02	7.10E-03	3.18E-03
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	See footnote	1.63E+02	See footnote	9.84E+01	See footnote	2.05E+02	4.77E-04	4.54E+00	8.42	18.8	42.1	5.40E-01	2.41E-01	1.08E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	6.72E-02	65.6	147	328	1.02E-03	4.58E-04	2.05E-04
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.73E-04	1.01E-01	0.62	1.37	3.07	1.64E-01	7.36E-02	3.29E-02
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	4.69E-08	0.000001	0.000003	0.00001	4.69E-02	1.48E-02	4.69E-03

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1231 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.292 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.3494 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 4.06 = Body weight (kg)

ATTACHMENT TABLE L-1-13

Summary of American Robin Exposure Doses (Omnivore) - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	3.92E-01	2.46	4.26	7.38	1.59E-01	9.20E-02	5.31E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	8.36E-01	1.47	3.29	7.35	5.69E-01	2.54E-01	1.14E-01
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	5.09E-01	2.66	5.95	13.3	1.91E-01	8.56E-02	3.83E-02
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	1.80E+00	4.05	7.00	12.1	4.44E-01	2.57E-01	1.49E-01
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	8.27E-01	3.85	8.61	19.3	2.15E-01	9.61E-02	4.30E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	1.02E-02	0.49	0.77	1.20	2.07E-02	1.32E-02	8.46E-03
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	2.51E-01	6.71	15.0	33.6	3.74E-02	1.67E-02	7.48E-03
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	1.12E-01	0.44	0.81	1.50	2.55E-01	1.38E-01	7.47E-02
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	1.86E-02	4.04	9.03	20.2	4.61E-03	2.06E-03	9.22E-04
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	8.76E+00	66.1	148	331	1.32E-01	5.92E-02	2.65E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	1.11E-03	0.41	0.92	2.05	2.71E-03	1.21E-03	5.41E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	3.45E-03	0.41	0.92	2.05	8.42E-03	3.76E-03	1.68E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	1.47E-03	0.41	0.92	2.05	3.58E-03	1.60E-03	7.17E-04
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	7.38E-03	0.41	0.92	2.05	1.80E-02	8.05E-03	3.60E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	1.02E-03	0.41	0.92	2.05	2.50E-03	1.12E-03	5.00E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	9.42E-04	0.41	0.92	2.05	2.30E-03	1.03E-03	4.59E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	2.61E-02	0.41	0.92	2.05	6.37E-02	2.85E-02	1.27E-02
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	4.50E-02	0.41	0.92	2.05	1.10E-01	4.91E-02	2.20E-02
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	1.10E-02	0.50	1.58	5.00	2.21E-02	6.98E-03	2.21E-03
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	1.16E-02	0.50	1.58	5.00	2.31E-02	7.31E-03	2.31E-03
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	1.68E-02	0.50	1.58	5.00	3.36E-02	1.06E-02	3.36E-03
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	7.15E-04	0.07	0.16	0.35	1.02E-02	4.56E-03	2.04E-03
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	3.78E-04	0.56	1.12	2.25	6.75E-04	3.37E-04	1.68E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	1.36E-04	2.14	4.79	10.7	6.37E-05	2.85E-05	1.27E-05
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	3.76E-04	0.56	1.12	2.25	6.71E-04	3.35E-04	1.67E-04
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	1.61E-03	0.56	1.12	2.25	2.87E-03	1.43E-03	7.13E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	4.11E-02	0.07	0.52	3.78	5.80E-01	7.94E-02	1.09E-02
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	2.78E-02	10.0	22.4	50.0	2.78E-03	1.24E-03	5.56E-04
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	3.91E-04	10.0	22.4	50.0	3.91E-05	1.75E-05	7.81E-06
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	3.38E-03	0.021	0.047	0.104	1.63E-01	7.27E-02	3.25E-02
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	5.64E-02	4.00	8.94	20.0	1.41E-02	6.30E-03	2.82E-03
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	5.99E-04	2.14	4.79	10.7	2.80E-04	1.25E-04	5.60E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	3.94E-04	0.28	0.62	1.38	1.43E-03	6.41E-04	2.86E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	1.27E-03	0.28	0.62	1.38	4.63E-03	2.07E-03	9.26E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	2.08E-03	355	794	1,775	5.86E-06	2.62E-06	1.17E-06
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	7.30E-03	1.00	2.24	5.00	7.30E-03	3.27E-03	1.46E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	4.50E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	1.44E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	4.74E-02	80.4	180	402	5.90E-04	2.64E-04	1.18E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	8.06E-02	80.4	180	402	1.00E-03	4.48E-04	2.00E-04
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	7.69E-02	80.4	180	402	9.56E-04	4.28E-04	1.91E-04
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	8.11E-02	80.4	180	402	1.01E-03	4.51E-04	2.02E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	4.22E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	4.29E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-13

Summary of American Robin Exposure Doses (Omnivore) - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	3.14E-02	7.10	15.9	35.5	4.43E-03	1.98E-03	8.85E-04
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	1.65E-02	7.10	15.9	35.5	2.32E-03	1.04E-03	4.65E-04
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	2.80E-01	7.10	15.9	35.5	3.94E-02	1.76E-02	7.87E-03
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	2.17E-01	7.10	15.9	35.5	3.06E-02	1.37E-02	6.12E-03
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	2.32E-01	7.10	15.9	35.5	3.27E-02	1.46E-02	6.54E-03
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	4.11E-01	7.10	15.9	35.5	5.79E-02	2.59E-02	1.16E-02
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	1.91E-01	7.10	15.9	35.5	2.70E-02	1.21E-02	5.39E-03
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	1.04E-01	7.10	15.9	35.5	1.46E-02	6.54E-03	2.93E-03
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	3.58E-01	7.10	15.9	35.5	5.04E-02	2.26E-02	1.01E-02
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	5.43E-02	7.10	15.9	35.5	7.65E-03	3.42E-03	1.53E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	1.59E+00	7.10	15.9	35.5	2.24E-01	1.00E-01	4.48E-02
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	3.79E-02	7.10	15.9	35.5	5.33E-03	2.38E-03	1.07E-03
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	2.29E-01	0.113	0.253	0.565	**2.03E+00**	9.07E-01	4.06E-01
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	4.52E-02	3.39	7.58	17.0	1.33E-02	5.97E-03	2.67E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	3.74E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	3.10E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	1.37E-01	7.10	15.9	35.5	1.93E-02	8.63E-03	3.86E-03
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	1.11E+01	6.73	21.3	67.3	**1.66E+00**	5.24E-01	1.66E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	8.64E-01	7.10	15.9	35.5	1.22E-01	5.44E-02	2.43E-02
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	1.57E+00	7.10	15.9	35.5	2.21E-01	9.90E-02	4.43E-02
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	3.33E-06	0.000014	0.000044	0.00014	2.38E-01	7.52E-02	2.38E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

ATTACHMENT TABLE L-1-14

Summary of American Robin Exposure Doses (Invertivore) - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	4.42E-01	2.46	4.26	7.38	1.80E-01	1.04E-01	5.99E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	1.24E+00	1.47	3.29	7.35	8.45E-01	3.78E-01	1.69E-01
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	6.57E-01	2.66	5.95	13.3	2.47E-01	1.10E-01	4.94E-02
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	2.23E+00	4.05	7.00	12.1	5.50E-01	3.18E-01	1.84E-01
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	7.95E-01	3.85	8.61	19.3	2.07E-01	9.24E-02	4.13E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	6.94E-03	0.49	0.77	1.20	1.42E-02	9.05E-03	5.78E-03
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	3.06E-01	6.71	15.0	33.6	4.57E-02	2.04E-02	9.14E-03
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	1.55E-01	0.44	0.81	1.50	3.52E-01	1.91E-01	1.03E-01
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	1.91E-02	4.04	9.03	20.2	4.72E-03	2.11E-03	9.44E-04
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	9.65E+00	66.1	148	331	1.46E-01	6.53E-02	2.92E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	1.20E-03	0.41	0.92	2.05	2.92E-03	1.31E-03	5.84E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	3.13E-03	0.41	0.92	2.05	7.65E-03	3.42E-03	1.53E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	1.41E-03	0.41	0.92	2.05	3.43E-03	1.54E-03	6.87E-04
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	9.05E-03	0.41	0.92	2.05	2.21E-02	9.88E-03	4.42E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	1.23E-03	0.41	0.92	2.05	3.00E-03	1.34E-03	6.01E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	1.18E-03	0.41	0.92	2.05	2.87E-03	1.29E-03	5.75E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	3.72E-02	0.41	0.92	2.05	9.08E-02	4.06E-02	1.82E-02
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	6.51E-02	0.41	0.92	2.05	1.59E-01	7.10E-02	3.18E-02
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	1.63E-02	0.50	1.58	5.00	3.25E-02	1.03E-02	3.25E-03
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	1.73E-02	0.50	1.58	5.00	3.46E-02	1.09E-02	3.46E-03
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	2.50E-02	0.50	1.58	5.00	5.00E-02	1.58E-02	5.00E-03
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	1.02E-03	0.07	0.16	0.35	1.45E-02	6.50E-03	2.91E-03
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	1.92E-04	0.56	1.12	2.25	3.43E-04	1.71E-04	8.53E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	1.93E-04	2.14	4.79	10.7	9.04E-05	4.04E-05	1.81E-05
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	1.92E-04	0.56	1.12	2.25	3.43E-04	1.71E-04	8.53E-05
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	9.61E-04	0.56	1.12	2.25	1.72E-03	8.56E-04	4.27E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	6.04E-02	0.07	0.52	3.78	8.51E-01	1.17E-01	1.60E-02
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	1.42E-02	10.0	22.4	50.0	1.42E-03	6.36E-04	2.84E-04
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	2.90E-04	10.0	22.4	50.0	2.90E-05	1.30E-05	5.81E-06
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	4.32E-03	0.021	0.047	0.104	2.08E-01	9.29E-02	4.16E-02
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	7.37E-02	4.00	8.94	20.0	1.84E-02	8.24E-03	3.68E-03
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	8.56E-04	2.14	4.79	10.7	4.00E-04	1.79E-04	8.00E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	5.51E-04	0.28	0.62	1.38	2.00E-03	8.94E-04	4.00E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	1.81E-03	0.28	0.62	1.38	6.56E-03	2.93E-03	1.31E-03
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	1.92E-03	355	794	1,775	5.40E-06	2.42E-06	1.08E-06
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	7.62E-03	1.00	2.24	5.00	7.62E-03	3.41E-03	1.52E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	3.55E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	7.02E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	1.86E-02	80.4	180	402	2.32E-04	1.04E-04	4.63E-05
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	3.19E-02	80.4	180	402	3.97E-04	1.78E-04	7.95E-05
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	3.19E-02	80.4	180	402	3.97E-04	1.78E-04	7.95E-05
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	3.19E-02	80.4	180	402	3.97E-04	1.78E-04	7.95E-05
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	3.79E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	3.79E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-14

Summary of American Robin Exposure Doses (Invertivore) - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	4.10E-02	7.10	15.9	35.5	5.77E-03	2.58E-03	1.15E-03
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	9.20E-03	7.10	15.9	35.5	1.30E-03	5.80E-04	2.59E-04
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	2.32E-01	7.10	15.9	35.5	3.27E-02	1.46E-02	6.53E-03
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	2.62E-01	7.10	15.9	35.5	3.70E-02	1.65E-02	7.39E-03
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	2.33E-01	7.10	15.9	35.5	3.29E-02	1.47E-02	6.57E-03
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	2.36E-01	7.10	15.9	35.5	3.32E-02	1.48E-02	6.63E-03
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	6.27E-02	7.10	15.9	35.5	8.83E-03	3.95E-03	1.77E-03
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	9.75E-02	7.10	15.9	35.5	1.37E-02	6.14E-03	2.75E-03
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	4.67E-01	7.10	15.9	35.5	6.58E-02	2.94E-02	1.32E-02
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	5.93E-02	7.10	15.9	35.5	8.35E-03	3.73E-03	1.67E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	9.44E-01	7.10	15.9	35.5	1.33E-01	5.95E-02	2.66E-02
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	4.67E-02	7.10	15.9	35.5	6.58E-03	2.94E-03	1.32E-03
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	2.90E-01	0.113	0.253	0.565	**2.57E+00**	**1.15E+00**	5.14E-01
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	3.79E-02	3.39	7.58	17.0	1.12E-02	5.00E-03	2.23E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	3.79E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	1.75E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	1.48E-01	7.10	15.9	35.5	2.08E-02	9.30E-03	4.16E-03
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	1.14E+01	6.73	21.3	67.3	**1.70E+00**	5.37E-01	1.70E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	6.91E-01	7.10	15.9	35.5	9.73E-02	4.35E-02	1.95E-02
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	7.74E-01	7.10	15.9	35.5	1.09E-01	4.87E-02	2.18E-02
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	5.07E-06	0.000014	0.000044	0.00014	3.62E-01	1.14E-01	3.62E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0038 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

ATTACHMENT TABLE L-1-15

Summary of Mourning Dove Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	1.46E-02	3.82E-01	2.24	5.01	11.2	1.71E-01	7.63E-02	3.41E-02
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	4.29E-04	7.35E-02	1.47	3.29	7.35	5.00E-02	2.24E-02	1.00E-02
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	1.55E-03	2.89E-01	2.66	5.95	13.3	1.09E-01	4.86E-02	2.17E-02
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	9.20E-03	1.22E+00	4.05	7.00	12.1	3.01E-01	1.74E-01	1.01E-01
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	2.07E-03	1.14E+00	1.63	2.31	3.26	7.00E-01	4.95E-01	3.50E-01
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	1.00E-04	2.00E-02	0.45	0.64	0.90	4.45E-02	3.15E-02	2.22E-02
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	1.34E-03	1.84E-01	6.71	15.0	33.6	2.74E-02	1.22E-02	5.47E-03
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	1.30E-03	3.71E-02	0.29	0.41	0.58	1.28E-01	9.06E-02	6.41E-02
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	7.00E-05	2.32E-02	4.04	9.03	20.2	5.74E-03	2.57E-03	1.15E-03
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	2.76E-02	8.65E+00	66.1	148	331	1.31E-01	5.85E-02	2.62E-02
Polychlorinated Biphenyls													
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	2.84E-04	1.15E-03	0.36	0.80	1.80	3.19E-03	1.42E-03	6.37E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	3.97E-04	4.96E-03	0.36	0.80	1.80	1.38E-02	6.16E-03	2.75E-03
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	2.84E-04	1.94E-03	0.36	0.80	1.80	5.39E-03	2.41E-03	1.08E-03
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	3.41E-04	5.14E-03	0.36	0.80	1.80	1.43E-02	6.38E-03	2.85E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	3.97E-04	7.58E-04	0.36	0.80	1.80	2.10E-03	9.41E-04	4.21E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	2.84E-04	5.95E-04	0.36	0.80	1.80	1.65E-03	7.40E-04	3.31E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	3.41E-04	6.15E-03	0.36	0.80	1.80	1.71E-02	7.64E-03	3.42E-03
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	3.33E-04	8.17E-03	0.36	0.80	1.80	2.27E-02	1.01E-02	4.54E-03
Pesticides													
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	5.52E-05	1.25E-03	0.50	1.58	5.00	2.50E-03	7.90E-04	2.50E-04
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	5.52E-05	6.83E-04	0.50	1.58	5.00	1.37E-03	4.32E-04	1.37E-04
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	5.52E-05	1.27E-03	0.50	1.58	5.00	2.54E-03	8.03E-04	2.54E-04
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	2.78E-05	1.65E-04	0.07	0.16	0.35	2.36E-03	1.06E-03	4.72E-04
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	2.78E-05	8.98E-04	0.56	1.12	2.25	1.60E-03	8.00E-04	3.99E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.78E-05	3.17E-05	1.19	2.66	5.95	2.66E-05	1.19E-05	5.32E-06
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	2.78E-05	8.89E-04	0.56	1.12	2.25	1.59E-03	7.92E-04	3.95E-04
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	2.78E-05	3.47E-03	0.56	1.12	2.25	6.21E-03	3.10E-03	1.54E-03
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	5.52E-05	5.29E-03	0.07	0.52	3.78	7.46E-02	1.02E-02	1.40E-03
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	2.78E-05	6.58E-02	10.0	22.4	50.0	6.58E-03	2.94E-03	1.32E-03
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	5.52E-05	7.12E-04	10.0	22.4	50.0	7.12E-05	3.18E-05	1.42E-05
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	5.52E-05	1.94E-03	0.30	0.67	1.50	6.48E-03	2.90E-03	1.30E-03
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	2.78E-05	2.85E-02	4.00	8.94	20.0	7.12E-03	3.18E-03	1.42E-03
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	2.78E-05	1.31E-04	1.19	2.66	5.95	1.10E-04	4.92E-05	2.20E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	2.78E-05	1.17E-04	0.28	0.62	1.38	4.24E-04	1.90E-04	8.48E-05
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	2.78E-05	3.12E-04	0.28	0.62	1.38	1.14E-03	5.08E-04	2.27E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	2.78E-04	2.92E-03	355	794	1,775	8.23E-06	3.68E-06	1.65E-06
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	5.52E-04	8.23E-03	1.00	2.24	5.00	8.23E-03	3.68E-03	1.65E-03
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	1.00E-03	7.25E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	4.77E-03	3.46E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	1.00E-03	1.25E-01	80.4	180	402	1.56E-03	6.98E-04	3.12E-04
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	5.00E-04	2.12E-01	80.4	180	402	2.64E-03	1.18E-03	5.28E-04
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	5.00E-04	1.99E-01	80.4	180	402	2.48E-03	1.11E-03	4.96E-04
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	5.00E-04	2.14E-01	80.4	180	402	2.67E-03	1.19E-03	5.33E-04
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	4.77E-03	6.18E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	4.77E-03	6.44E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-15

Summary of Mourning Dove Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	6.90E-05	1.75E-02	7.10	15.9	35.5	2.46E-03	1.10E-03	4.93E-04
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	9.61E-05	3.76E-02	7.10	15.9	35.5	5.30E-03	2.37E-03	1.06E-03
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	9.61E-05	4.60E-01	7.10	15.9	35.5	6.49E-02	2.90E-02	1.30E-02
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	1.09E-04	1.69E-01	7.10	15.9	35.5	2.38E-02	1.07E-02	4.77E-03
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	1.25E-04	2.88E-01	7.10	15.9	35.5	4.06E-02	1.82E-02	8.12E-03
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	1.37E-04	9.22E-01	7.10	15.9	35.5	1.30E-01	5.81E-02	2.60E-02
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	1.09E-04	5.38E-01	7.10	15.9	35.5	7.58E-02	3.39E-02	1.52E-02
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	1.06E-04	1.46E-01	7.10	15.9	35.5	2.06E-02	9.22E-03	4.12E-03
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	8.00E-05	1.93E-01	7.10	15.9	35.5	2.72E-02	1.22E-02	5.44E-03
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	9.61E-05	5.61E-02	7.10	15.9	35.5	7.90E-03	3.53E-03	1.58E-03
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	1.55E-04	3.48E+00	7.10	15.9	35.5	4.90E-01	2.19E-01	9.80E-02
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	9.93E-05	2.78E-02	7.10	15.9	35.5	3.91E-03	1.75E-03	7.83E-04
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	9.61E-05	1.39E-01	0.113	0.253	0.565	**1.23E+00**	5.51E-01	2.46E-01
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	4.77E-03	7.26E-02	3.39	7.58	17.0	2.14E-02	9.58E-03	4.29E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	4.77E-03	4.47E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	9.61E-05	6.95E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	1.26E-04	1.46E-01	7.10	15.9	35.5	2.06E-02	9.21E-03	4.12E-03
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	4.77E-04	1.30E+01	6.73	21.3	67.3	**1.93E+00**	6.10E-01	1.93E-01
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	8.80E-05	1.48E+00	7.10	15.9	35.5	2.09E-01	9.35E-02	4.18E-02
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	1.73E-04	3.80E+00	7.10	15.9	35.5	5.36E-01	2.40E-01	1.07E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0176 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0148 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1265 = Body weight (kg)

ATTACHMENT TABLE L-1-16

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	3.54E+01	Measured	7.59E+00	Regresson	1.02E+00	Regresson	1.41E-01	Regresson	2.03E-01	Regresson	1.46E-01	1.46E-02	6.05E-03	2.46	4.26	7.38	2.46E-03	1.42E-03	8.20E-04
Cadmium	7.19E-01	Measured	2.62E+01	Regresson	5.19E-01	Regresson	1.78E-01	Regresson	2.43E-01	Regresson	1.64E+00	4.29E-04	2.19E-02	1.47	3.29	7.35	1.49E-02	6.66E-03	2.98E-03
Chromium	2.34E+01	Measured	1.28E+01	0.041	9.58E-01	Regresson	2.26E+00	Regresson	2.35E+00	Regresson	2.35E+00	1.55E-03	7.42E-02	2.66	5.95	13.3	2.79E-02	1.25E-02	5.58E-03
Copper	3.12E+01	Measured	4.55E+01	Regresson	7.58E+00	Regresson	1.08E+01	Regresson	1.27E+01	Regresson	1.51E+01	9.20E-03	4.12E-01	4.05	7.00	12.1	1.02E-01	5.89E-02	3.41E-02
Lead	9.82E+01	Measured	1.21E+01	Regresson	3.47E+00	Regresson	8.20E+00	Regresson	5.84E+00	Regresson	1.51E+01	2.07E-03	3.11E-01	3.85	8.61	19.3	8.07E-02	3.61E-02	1.61E-02
Mercury	1.74E-01	Measured	1.38E-01	Regresson	1.43E-01	0.054	9.43E-03	0.067	1.17E-02	0.067	1.17E-02	1.00E-04	3.55E-04	0.49	0.77	1.20	7.24E-04	4.62E-04	2.95E-04
Nickel	1.27E+01	Measured	5.86E+00	Regresson	7.23E-01	Regresson	2.55E+00	Regresson	2.55E+00	Regresson	2.55E+00	1.34E-03	8.17E-02	6.71	15.0	33.6	1.22E-02	5.45E-03	2.44E-03
Selenium	5.31E-01	Measured	3.24E+00	Regresson	2.52E-01	Regresson	5.20E-01	Regresson	5.20E-01	Regresson	5.20E-01	1.30E-03	1.67E-02	0.44	0.81	1.50	3.80E-02	2.06E-02	1.11E-02
Silver	2.64E+00	Measured	2.76E-01	0.014	3.69E-02	0.151	3.99E-01	0.006	1.50E-02	0.036	9.39E-02	7.00E-05	5.49E-03	4.04	9.03	20.2	1.36E-03	6.08E-04	2.72E-04
Zinc	9.51E+01	Measured	1.99E+02	Regresson	6.05E+01	Regresson	1.22E+02	Regresson	1.08E+02	Regresson	1.28E+02	2.76E-02	3.83E+00	66.1	148	331	5.79E-02	2.59E-02	1.16E-02
Polychlorinated Biphenyls																			
Aroclor-1016	2.25E-02	Regression	2.34E-02	0.323	7.26E-03	See footnote	1.51E-02	See footnote	7.95E-03	See footnote	2.25E-02	2.84E-04	5.03E-04	0.41	0.92	2.05	1.23E-03	5.48E-04	2.45E-04
Aroclor-1221	4.65E-02	Regression	6.29E-02	0.749	3.48E-02	See footnote	4.82E-02	See footnote	3.56E-02	See footnote	5.94E-02	3.97E-04	1.55E-03	0.41	0.92	2.05	3.78E-03	1.69E-03	7.56E-04
Aroclor-1232	2.54E-02	Regression	2.77E-02	0.515	1.31E-02	See footnote	2.02E-02	See footnote	1.37E-02	See footnote	2.67E-02	2.84E-04	6.63E-04	0.41	0.92	2.05	1.62E-03	7.23E-04	3.23E-04
Aroclor-1242	1.03E-01	Regression	1.85E-01	0.323	3.32E-02	See footnote	1.06E-01	See footnote	3.79E-02	See footnote	1.68E-01	3.41E-04	3.34E-03	0.41	0.92	2.05	8.15E-03	3.65E-03	1.63E-03
Aroclor-1248	2.28E-02	Regression	2.38E-02	0.184	4.19E-03	See footnote	1.38E-02	See footnote	5.03E-03	See footnote	2.27E-02	3.97E-04	4.65E-04	0.41	0.92	2.05	1.14E-03	5.08E-04	2.27E-04
Aroclor-1254	2.22E-02	Regression	2.30E-02	0.139	3.09E-03	See footnote	1.28E-02	See footnote	3.95E-03	See footnote	2.20E-02	2.84E-04	4.29E-04	0.41	0.92	2.05	1.05E-03	4.68E-04	2.09E-04
Aroclor-1260	2.93E-01	Regression	7.71E-01	0.105	3.09E-02	See footnote	3.84E-01	See footnote	5.20E-02	See footnote	6.74E-01	3.41E-04	1.19E-02	0.41	0.92	2.05	2.89E-02	1.29E-02	5.79E-03
PCB (total)	3.21E-01	Measured	1.36E+00	0.139	4.47E-02	See footnote	6.68E-01	See footnote	7.76E-02	See footnote	1.16E+00	3.33E-04	2.04E-02	0.41	0.92	2.05	4.97E-02	2.22E-02	9.95E-03
Pesticides																			
4,4'-DDD	4.06E-02	Regression	3.42E-01	Regresson	7.28E-03	See footnote	1.65E-01	See footnote	1.48E-02	See footnote	2.87E-01	5.52E-05	4.98E-03	0.08	0.18	0.40	6.23E-02	2.79E-02	1.25E-02
4,4'-DDE	1.91E-02	Regression	3.65E-01	Regresson	4.12E-03	See footnote	1.74E-01	See footnote	1.17E-02	See footnote	3.03E-01	5.52E-05	5.22E-03	0.08	0.18	0.40	6.52E-02	2.92E-02	1.30E-02
4,4'-DDT	4.14E-02	Regression	5.26E-01	Regresson	7.39E-03	See footnote	2.52E-01	See footnote	1.86E-02	See footnote	4.39E-01	5.52E-05	7.58E-03	0.08	0.18	0.40	9.47E-02	4.24E-02	1.89E-02
Aldrin	6.40E-03	3.300	2.11E-02	0.139	8.92E-04	See footnote	1.05E-02	See footnote	1.43E-03	See footnote	1.83E-02	2.78E-05	3.24E-04	0.07	0.16	0.35	4.62E-03	2.07E-03	9.24E-04
alpha-BHC	3.79E-03	1.000	3.79E-03	1.735	6.58E-03	See footnote	5.21E-03	See footnote	6.46E-03	See footnote	3.92E-03	2.78E-05	1.68E-04	0.56	1.12	2.25	3.00E-04	1.50E-04	7.46E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	2.78E-05	6.15E-05	2.14	4.79	10.7	2.88E-05	1.29E-05	5.75E-06
beta-BHC	3.79E-03	1.000	3.79E-03	1.719	6.52E-03	See footnote	5.18E-03	See footnote	6.40E-03	See footnote	3.92E-03	2.78E-05	1.67E-04	0.56	1.12	2.25	2.98E-04	1.49E-04	7.42E-05
delta-BHC	1.93E-02	1.000	1.93E-02	1.311	2.53E-02	See footnote	2.24E-02	See footnote	2.50E-02	See footnote	1.96E-02	2.78E-05	7.16E-04	0.56	1.12	2.25	1.28E-03	6.38E-04	3.18E-04
Dieldrin	8.65E-02	14.70	1.27E+00	0.410	3.55E-02	See footnote	6.17E-01	See footnote	6.14E-02	See footnote	1.06E+00	5.52E-05	1.86E-02	0.07	0.52	3.78	2.62E-01	3.58E-02	4.91E-03
Endosulfan I	2.87E-01	1.000	2.87E-01	1.687	4.83E-01	See footnote	3.87E-01	See footnote	4.75E-01	See footnote	2.96E-01	2.78E-05	1.23E-02	10.0	22.4	50.0	1.23E-03	5.52E-04	2.47E-04
Endosulfan II	5.70E-03	1.000	5.70E-03	0.886	5.05E-03	See footnote	5.37E-03	See footnote	5.08E-03	See footnote	5.67E-03	5.52E-05	1.75E-04	10.0	22.4	50.0	1.75E-05	7.83E-06	3.50E-06
Endrin	2.50E-02	3.600	9.00E-02	0.535	1.34E-02	See footnote	4.96E-02	See footnote	1.52E-02	See footnote	7.79E-02	5.52E-05	1.53E-03	0.021	0.047	0.104	7.34E-02	3.28E-02	1.47E-02
gamma-BHC (Lindane)	1.13E-01	13.70	1.55E+00	1.852	2.10E-01	See footnote	8.39E-01	See footnote	2.34E-01	See footnote	1.30E+00	2.78E-05	2.53E-02	4.00	8.94	20.0	6.34E-03	2.83E-03	1.27E-03
gamma-Chlordane	4.45E-03	4.000	1.78E-02	0.165	7.34E-04	See footnote	8.83E-03	See footnote	1.16E-03	See footnote	1.53E-02	2.78E-05	2.71E-04	2.14	4.79	10.7	1.27E-04	5.67E-05	2.53E-05
Heptachlor	3.79E-03	3.000	1.14E-02	0.174	6.61E-04	See footnote	5.76E-03	See footnote	9.50E-04	See footnote	9.88E-03	2.78E-05	1.79E-04	0.28	0.62	1.38	6.49E-04	2.90E-04	1.30E-04
Heptachlor epoxide	3.79E-03	10.00	3.79E-02	0.566	2.14E-03	See footnote	1.90E-02	See footnote	2.90E-03	See footnote	3.18E-02	2.78E-05	5.75E-04	0.28	0.62	1.38	2.09E-03	9.33E-04	4.17E-04
Methoxychlor	3.79E-02	1.000	3.79E-02	0.525	1.99E-02	See footnote	2.87E-02	See footnote	2.07E-02	See footnote	3.71E-02	2.78E-04	9.38E-04	355	794	1,775	2.64E-06	1.18E-06	5.29E-07
Toxaphene	1.52E-01	1.000	1.52E-01	0.355	5.39E-02	See footnote	1.02E-01	See footnote	5.82E-02	See footnote	1.47E-01	5.52E-04	3.31E-03	1.00	2.24	5.00	3.31E-03	1.48E-03	6.63E-04
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	4.38E-03	1.000	4.38E-03	1.000	4.38E-03	See footnote	4.38E-03	See footnote	4.38E-03	See footnote	4.38E-03	1.00E-03	1.97E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.45E-01	0.500	1.23E-01	1.000	2.45E-01	See footnote	1.88E-01	See footnote	2.43E-01	See footnote	1.44E-01	4.77E-03	6.40E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.43E-01	0.560	3.60E-01	1.426	9.16E-01	See footnote	6.49E-01	See footnote	8.99E-01	See footnote	4.23E-01	1.00E-03	2.11E-02	80.4	180	402	2.62E-04	1.17E-04	5.24E-05
1,2-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.452	1.58E+00	See footnote	1.12E+00	See footnote	1.53E+00	See footnote	6.86E-01	5.00E-04	3.56E-02	80.4	180	402	4.43E-04	1.98E-04	8.87E-05
1,3-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.296	1.48E+00	See footnote	1.07E+00	See footnote	1.44E+00	See footnote	6.82E-01	5.00E-04	3.40E-02	80.4	180	402	4.23E-04	1.89E-04	8.47E-05
1,4-Dichlorobenzene	6.43E-01	1.000	6.43E-01	2.475	1.59E+00	See footnote	1.13E+00	See footnote	1.55E+00	See footnote	6.87E-01	5.00E-04	3.59E-02	80.4	180	402	4.46E-04	2.00E-04	8.93E-05
4-Bromophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.566	4.24E-01	See footnote	5.84E-01	See footnote	4.39E-01	See footnote	7.35E-01	4.77E-03	1.90E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	7.50E-01	1.000	7.50E-01	0.593	4.45E-01	See footnote	5.95E-01	See footnote	4.58E-01	See footnote	7.36E-01	4.77E-03	1.93E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	2.49E+00	0.300	7.46E-01	Regresson	1.76E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	3.91E-06	7.10	15.9	35.5	5.51E-07	2.47E-07	1.10E-07
Acenaphthylene	7.24E-01	0.220	1.59E-01	Regresson	2.47E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	5.45E-06	7.10	15.9	35.5	7.68E-07	3.43E-07	1.54E-07
Anthracene	1.33E+01	0.320	4.26E+00	Regresson	2.79E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	5.45E-06	7.10	15.9	35.5	7.68E-07	3.43E-07	1.54E-07
Benzo(a)anthracene	1.74E+01	0.270	4.71E+00	Regresson	3.65E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.09E-04	6.17E-06	7.10	15.9	35.5	8.70E-07	3.89E-07	1.74E-07
Benzo(a)pyrene	1.27E+01	0.340	4.32E+00	Regresson	1.52E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.25E-04	7.10E-06	7.10	15.9	35.5	1.00E-06	4.47E-07	2.00E-07
Benzo(b)fluoranthene	1.93E+01	0.210	4.05E+00	0.310	5.97E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.37E-04	7.80E-06	7.10	15.9	35.5	1.10E-06	4.91E-07	2.20E-07
Benzo(g,h,i)perylene	6.68E+00	0.150	1.00E+00	Regresson	3.73E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.09E-04	6.20E-06	7.10	15.9	35.5	8.73E-07	3.90E-07	1.75E-07
Benzo(k)fluoranthene	7.98E+00	0.210	1.68E+00	Regresson	6.89E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.06E-04	6.03E-06	7.10	15.9	35.5	8.49E-07	3.80E-07	1.70E-07
Chrysene	2.02E+01	0.440	8.90E+00	Regresson	3.98E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	4.54E-06	7.10	15.9	35.5	6.39E-07	2.86E-07	1.28E-07
Dibenz(a,h)anthracene	2.33E+00	0.490	1.14E+00	0.130	3.02E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.61E-05	5.45E-06	7.10	15.9	35.5	7.68E-07	3.43E-07	1.54E-07
Fluoranthene	4.77E+01	0.370	1.77E+01	0.500	2.39E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.55E-04	8.78E-06	7.10	15.9	35.5	1.24E-06	5.53E-07	2.47E-07

ATTACHMENT TABLE L-1-16

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 7) - 95% UCL

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	3.98E+00	0.200	7.95E-01	Regresson	1.18E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.93E-05	5.63E-06	7.10	15.9	35.5	7.93E-07	3.55E-07	1.59E-07
Hexachlorobenzene	3.53E+00	1.690	5.97E+00	0.246	8.69E-01	See footnote	3.32E+00	See footnote	1.04E+00	See footnote	5.41E+00	9.61E-05	1.04E-01	0.113	0.253	0.565	9.22E-01	4.12E-01	1.84E-01
Hexachlorobutadiene	7.50E-01	1.000	7.50E-01	0.675	5.07E-01	See footnote	6.26E-01	See footnote	5.18E-01	See footnote	7.39E-01	4.77E-03	2.04E-02	3.39	7.58	17.0	6.00E-03	2.68E-03	1.20E-03
Hexachlorocyclopentadiene	7.50E-01	1.000	7.50E-01	0.393	2.95E-01	See footnote	5.18E-01	See footnote	3.15E-01	See footnote	7.29E-01	4.77E-03	1.69E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.53E+00	1.000	3.53E+00	1.439	5.08E+00	See footnote	4.32E+00	See footnote	5.01E+00	See footnote	3.60E+00	9.61E-05	1.38E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.81E+00	0.410	2.79E+00	0.110	7.49E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.26E-04	7.17E-06	7.10	15.9	35.5	1.01E-06	4.52E-07	2.02E-07
Pentachlorophenol	1.64E+01	14.63	2.41E+02	5.930	9.75E+01	See footnote	1.63E+02	See footnote	9.84E+01	See footnote	2.05E+02	4.77E-04	4.98E+00	6.73	21.3	67.3	7.39E-01	2.34E-01	7.39E-02
Phenanthrene	4.45E+01	0.280	1.25E+01	Regresson	8.91E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	4.99E-06	7.10	15.9	35.5	7.03E-07	3.14E-07	1.41E-07
Pyrene	3.73E+01	0.390	1.46E+01	0.720	2.69E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.73E-04	9.82E-06	7.10	15.9	35.5	1.38E-06	6.19E-07	2.77E-07
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0360 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.340 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0639 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.126 = Body weight (kg)

ATTACHMENT TABLE L-1-17

Summary of Meadow Vole Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	5.65E-02	0.252	0.56	1.26	2.24E-01	1.00E-01	4.48E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	4.58E-02	0.77	2.43	7.70	5.94E-02	1.88E-02	5.94E-03
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	7.17E-02	2.40	5.37	12.0	2.99E-02	1.34E-02	5.97E-03
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	3.72E-01	5.60	7.23	9.34	6.65E-02	5.15E-02	3.98E-02
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	1.87E-01	4.70	6.47	8.90	3.99E-02	2.90E-02	2.10E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	5.41E-03	0.032	0.072	0.16	1.69E-01	7.57E-02	3.38E-02
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	4.26E-02	1.70	2.40	3.40	2.51E-02	1.77E-02	1.25E-02
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	1.36E-02	0.20	0.26	0.33	6.78E-02	5.28E-02	4.11E-02
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	2.94E-03	12.0	26.9	60.2	2.44E-04	1.09E-04	4.88E-05
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	2.64E+00	75.4	169	377	3.50E-02	1.57E-02	7.01E-03
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	3.12E-04	0.136	0.304	0.680	2.30E-03	1.03E-03	4.59E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	1.22E-03	0.136	0.304	0.680	9.00E-03	4.03E-03	1.80E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	5.30E-04	0.136	0.304	0.680	3.90E-03	1.74E-03	7.79E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	8.53E-04	0.136	0.304	0.680	6.27E-03	2.81E-03	1.25E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	2.41E-04	0.136	0.304	0.680	1.77E-03	7.92E-04	3.54E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	1.81E-04	0.136	0.304	0.680	1.33E-03	5.96E-04	2.66E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	1.14E-03	0.136	0.304	0.680	8.36E-03	3.74E-03	1.67E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	2.48E-03	0.136	0.304	0.680	1.82E-02	8.16E-03	3.65E-03
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	4.03E-04	0.147	0.329	0.735	2.74E-03	1.23E-03	5.49E-04
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	3.69E-04	0.147	0.329	0.735	2.51E-03	1.12E-03	5.02E-04
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	5.50E-04	0.147	0.329	0.735	3.74E-03	1.67E-03	7.48E-04
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	4.27E-05	0.20	0.45	1.00	2.13E-04	9.54E-05	4.27E-05
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	1.86E-04	1.60	2.26	3.20	1.16E-04	8.24E-05	5.82E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	1.81E-05	4.58	6.48	9.16	3.95E-06	2.79E-06	1.98E-06
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	1.85E-04	1.60	2.26	3.20	1.15E-04	8.16E-05	5.77E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	5.05E-04	1.60	2.26	3.20	3.16E-04	2.23E-04	1.58E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	1.17E-03	0.015	0.021	0.030	7.77E-02	5.49E-02	3.88E-02
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	8.58E-03	0.15	0.34	0.75	5.72E-02	2.56E-02	1.14E-02
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	2.08E-04	0.15	0.34	0.75	1.39E-03	6.20E-04	2.77E-04
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	4.23E-04	0.184	0.411	0.920	2.30E-03	1.03E-03	4.60E-04
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	4.33E-03	8.00	17.9	40.0	5.41E-04	2.42E-04	1.08E-04
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	3.81E-05	4.58	6.48	9.16	8.32E-06	5.88E-06	4.16E-06
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	3.21E-05	0.20	0.45	1.00	1.60E-04	7.17E-05	3.21E-05
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	8.67E-05	0.20	0.45	1.00	4.33E-04	1.94E-04	8.67E-05
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	6.34E-04	4.00	5.66	8.00	1.59E-04	1.12E-04	7.93E-05
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	1.80E-03	8.00	17.9	40.0	2.25E-04	1.01E-04	4.50E-05
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	3.94E-04	76.0	170	380	5.19E-06	2.32E-06	1.04E-06
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	1.25E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	2.45E-02	53.0	75.0	106	4.63E-04	3.27E-04	2.32E-04
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	4.16E-02	85.7	192	429	4.86E-04	2.17E-04	9.72E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	3.91E-02	85.7	192	429	4.56E-04	2.04E-04	9.12E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	4.20E-02	30.0	52.0	90.0	1.40E-03	8.09E-04	4.67E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	1.49E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	1.55E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-17

Summary of Meadow Vole Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	1.76E-03	65.6	147	328	2.68E-05	1.20E-05	5.37E-06
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	8.08E-03	65.6	147	328	1.23E-04	5.51E-05	2.46E-05
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	6.94E-02	65.6	147	328	1.06E-03	4.73E-04	2.12E-04
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	1.97E-02	0.62	1.37	3.07	3.21E-02	1.44E-02	6.43E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	3.68E-02	0.62	1.37	3.07	5.98E-02	2.68E-02	1.20E-02
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	1.20E-01	0.62	1.37	3.07	1.95E-01	8.74E-02	3.91E-02
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	6.26E-02	0.62	1.37	3.07	1.02E-01	4.56E-02	2.04E-02
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	1.93E-02	0.62	1.37	3.07	3.14E-02	1.40E-02	6.28E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	2.34E-02	0.62	1.37	3.07	3.81E-02	1.70E-02	7.63E-03
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	8.03E-03	0.62	1.37	3.07	1.31E-02	5.85E-03	2.62E-03
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	4.59E-01	65.6	147	328	7.00E-03	3.13E-03	1.40E-03
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	2.38E-03	65.6	147	328	3.62E-05	1.62E-05	7.24E-06
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	2.19E-02	2.00	2.83	4.00	1.10E-02	7.74E-03	5.48E-03
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	1.74E-02	2.00	6.32	20.0	8.69E-03	2.75E-03	8.69E-04
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	1.10E-02	75.0	168	375	1.46E-04	6.54E-05	2.92E-05
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	1.06E-01	100	224	500	1.06E-03	4.74E-04	2.12E-04
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	1.87E-02	0.62	1.37	3.07	3.04E-02	1.36E-02	6.08E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	1.94E+00	8.42	18.8	42.1	2.31E-01	1.03E-01	4.61E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	2.53E-01	65.6	147	328	3.86E-03	1.73E-03	7.72E-04
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	5.10E-01	0.62	1.37	3.07	8.29E-01	3.71E-01	1.66E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	5.39E-08	0.000001	0.000003	0.00001	5.39E-02	1.70E-02	5.39E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0021 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.020 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.956 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.024 = Proportion of diet composed of soil
WIR = 0.0090 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0428 = Body weight (kg)

ATTACHMENT TABLE L-1-18

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	7.33E-01	0.252	0.56	1.26	**2.91E+00**	**1.30E+00**	5.82E-01
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	1.92E+00	0.77	2.43	7.70	**2.49E+00**	7.87E-01	2.49E-01
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	1.15E+00	2.40	5.37	12.0	4.80E-01	2.15E-01	9.61E-02
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	3.58E+00	5.60	7.23	9.34	6.40E-01	4.96E-01	3.84E-01
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	1.49E+00	4.70	6.47	8.90	3.17E-01	2.31E-01	1.68E-01
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	1.18E-02	0.032	0.072	0.16	3.68E-01	1.64E-01	7.35E-02
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	5.33E-01	1.70	2.40	3.40	3.14E-01	2.22E-01	1.57E-01
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	2.42E-01	0.20	0.26	0.33	**1.21E+00**	9.43E-01	7.34E-01
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	3.69E-02	12.0	26.9	60.2	3.07E-03	1.37E-03	6.13E-04
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	1.55E+01	75.4	169	377	2.06E-01	9.21E-02	4.12E-02
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	1.23E-03	0.136	0.304	0.680	9.06E-03	4.05E-03	1.81E-03
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	3.15E-03	0.136	0.304	0.680	2.31E-02	1.03E-02	4.63E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	1.58E-03	0.136	0.304	0.680	1.16E-02	5.19E-03	2.32E-03
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	5.00E-03	0.136	0.304	0.680	3.68E-02	1.65E-02	7.36E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	1.28E-03	0.136	0.304	0.680	9.39E-03	4.20E-03	1.88E-03
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	1.19E-03	0.136	0.304	0.680	8.76E-03	3.92E-03	1.75E-03
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	2.09E-02	0.136	0.304	0.680	1.54E-01	6.88E-02	3.08E-02
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	1.01E-01	0.136	0.304	0.680	7.41E-01	3.32E-01	1.48E-01
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	1.43E-02	0.147	0.329	0.735	9.72E-02	4.35E-02	1.94E-02
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	1.65E-02	0.147	0.329	0.735	1.12E-01	5.01E-02	2.24E-02
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	2.25E-02	0.147	0.329	0.735	1.53E-01	6.85E-02	3.06E-02
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	8.68E-04	0.20	0.45	1.00	4.34E-03	1.94E-03	8.68E-04
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	2.05E-04	1.60	2.26	3.20	1.28E-04	9.06E-05	6.41E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	3.06E-04	4.58	6.48	9.16	6.69E-05	4.73E-05	3.34E-05
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	2.05E-04	1.60	2.26	3.20	1.28E-04	9.06E-05	6.40E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	7.14E-04	1.60	2.26	3.20	4.46E-04	3.16E-04	2.23E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	3.61E-02	0.015	0.021	0.030	**2.41E+00**	**1.70E+00**	**1.20E+00**
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	9.69E-03	0.15	0.34	0.75	6.46E-02	2.89E-02	1.29E-02
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	4.10E-04	0.15	0.34	0.75	2.74E-03	1.22E-03	5.47E-04
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	3.85E-03	0.184	0.411	0.920	2.09E-02	9.35E-03	4.18E-03
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	4.35E-02	8.00	17.9	40.0	5.44E-03	2.43E-03	1.09E-03
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	7.82E-04	4.58	6.48	9.16	1.71E-04	1.21E-04	8.54E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	5.08E-04	0.20	0.45	1.00	2.54E-03	1.14E-03	5.08E-04
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	1.62E-03	0.20	0.45	1.00	8.10E-03	3.62E-03	1.62E-03
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	1.94E-03	4.00	5.66	8.00	4.85E-04	3.43E-04	2.43E-04
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	7.88E-03	8.00	17.9	40.0	9.84E-04	4.40E-04	1.97E-04
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	5.57E-04	76.0	170	380	7.33E-06	3.28E-06	1.47E-06
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	1.34E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	2.10E-02	53.0	75.0	106	3.96E-04	2.80E-04	1.98E-04
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	3.38E-02	85.7	192	429	3.94E-04	1.76E-04	7.89E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	3.36E-02	85.7	192	429	3.92E-04	1.75E-04	7.84E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	3.38E-02	30.0	52.0	90.0	1.13E-03	6.51E-04	3.76E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	4.33E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	4.33E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-18

Summary of Short-Tailed Shrew Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	3.60E-02	65.6	147	328	5.49E-04	2.45E-04	1.10E-04
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	1.22E-02	65.6	147	328	1.87E-04	8.35E-05	3.73E-05
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	1.83E-01	65.6	147	328	2.79E-03	1.25E-03	5.59E-04
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	2.16E-01	0.62	1.37	3.07	3.51E-01	1.57E-01	7.04E-02
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	1.88E-01	0.62	1.37	3.07	3.05E-01	1.36E-01	6.11E-02
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	2.13E-01	0.62	1.37	3.07	3.46E-01	1.55E-01	6.93E-02
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	6.54E-02	0.62	1.37	3.07	1.06E-01	4.76E-02	2.13E-02
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	8.82E-02	0.62	1.37	3.07	1.43E-01	6.42E-02	2.87E-02
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	3.47E-01	0.62	1.37	3.07	5.64E-01	2.53E-01	1.13E-01
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	4.96E-02	0.62	1.37	3.07	8.06E-02	3.61E-02	1.62E-02
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	7.48E-01	65.6	147	328	1.14E-02	5.10E-03	2.28E-03
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	4.27E-02	65.6	147	328	6.51E-04	2.91E-04	1.30E-04
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	2.07E-01	2.00	2.83	4.00	1.04E-01	7.33E-02	5.18E-02
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	4.35E-02	2.00	6.32	20.0	2.18E-02	6.88E-03	2.18E-03
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	4.29E-02	75.0	168	375	5.73E-04	2.56E-04	1.15E-04
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	1.38E-01	100	224	500	1.38E-03	6.18E-04	2.76E-04
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	1.16E-01	0.62	1.37	3.07	1.89E-01	8.47E-02	3.79E-02
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	7.32E+00	8.42	18.8	42.1	8.69E-01	3.89E-01	1.74E-01
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	5.61E-01	65.6	147	328	8.55E-03	3.82E-03	1.71E-03
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	6.22E-01	0.62	1.37	3.07	**1.01E+00**	4.53E-01	2.03E-01
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	4.02E-06	0.000001	0.000003	0.00001	**4.02E+00**	**1.27E+00**	4.02E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0015	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi =	0.823	= Proportion of diet composed of food item (soil invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi =	0.047	= Proportion of diet composed of food item (terrestrial plants)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.130	= Proportion of diet composed of soil
WIR =	0.0038	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0169	= Body weight (kg)

ATTACHMENT TABLE L-1-19

Summary of White-Footed Mouse Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	1.03E-01	0.252	0.56	1.26	4.08E-01	1.82E-01	8.16E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	3.01E-01	0.77	2.43	7.70	3.91E-01	1.24E-01	3.91E-02
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	1.63E-01	2.40	5.37	12.0	6.79E-02	3.04E-02	1.36E-02
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	6.04E-01	5.60	7.23	9.34	1.08E-01	8.36E-02	6.47E-02
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	1.91E-01	4.70	6.47	8.90	4.07E-02	2.96E-02	2.15E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	2.98E-03	0.032	0.072	0.16	9.32E-02	4.17E-02	1.86E-02
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	7.76E-02	1.70	2.40	3.40	4.56E-02	3.23E-02	2.28E-02
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	3.97E-02	0.20	0.26	0.33	1.98E-01	1.54E-01	1.20E-01
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	4.08E-03	12.0	26.9	60.2	3.39E-04	1.52E-04	6.78E-05
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	2.91E+00	75.4	169	377	3.85E-02	1.72E-02	7.71E-03
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	2.98E-04	0.136	0.304	0.680	2.19E-03	9.79E-04	4.38E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	8.13E-04	0.136	0.304	0.680	5.98E-03	2.67E-03	1.20E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	3.99E-04	0.136	0.304	0.680	2.94E-03	1.31E-03	5.87E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	9.69E-04	0.136	0.304	0.680	7.13E-03	3.19E-03	1.43E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	3.09E-04	0.136	0.304	0.680	2.27E-03	1.02E-03	4.55E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	2.59E-04	0.136	0.304	0.680	1.91E-03	8.53E-04	3.82E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	3.31E-03	0.136	0.304	0.680	2.44E-02	1.09E-02	4.87E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	1.57E-02	0.136	0.304	0.680	1.16E-01	5.17E-02	2.31E-02
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	2.25E-03	0.147	0.329	0.735	1.53E-02	6.84E-03	3.06E-03
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	2.58E-03	0.147	0.329	0.735	1.75E-02	7.85E-03	3.51E-03
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	3.52E-03	0.147	0.329	0.735	2.40E-02	1.07E-02	4.79E-03
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	1.42E-04	0.20	0.45	1.00	7.12E-04	3.18E-04	1.42E-04
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	7.96E-05	1.60	2.26	3.20	4.97E-05	3.52E-05	2.49E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	5.49E-05	4.58	6.48	9.16	1.20E-05	8.48E-06	6.00E-06
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	7.92E-05	1.60	2.26	3.20	4.95E-05	3.50E-05	2.47E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	2.27E-04	1.60	2.26	3.20	1.42E-04	1.00E-04	7.10E-05
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	5.72E-03	0.015	0.021	0.030	3.81E-01	2.70E-01	1.91E-01
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	3.44E-03	0.15	0.34	0.75	2.29E-02	1.03E-02	4.59E-03
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	1.18E-04	0.15	0.34	0.75	7.86E-04	3.51E-04	1.57E-04
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	6.77E-04	0.184	0.411	0.920	3.68E-03	1.65E-03	7.36E-04
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	7.61E-03	8.00	17.9	40.0	9.51E-04	4.25E-04	1.90E-04
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	1.30E-04	4.58	6.48	9.16	2.83E-05	2.00E-05	1.41E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	8.71E-05	0.20	0.45	1.00	4.36E-04	1.95E-04	8.71E-05
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	2.69E-04	0.20	0.45	1.00	1.35E-03	6.02E-04	2.69E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	4.74E-04	4.00	5.66	8.00	1.18E-04	8.37E-05	5.92E-05
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	1.61E-03	8.00	17.9	40.0	2.01E-04	9.00E-05	4.03E-05
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	3.91E-04	76.0	170	380	5.14E-06	2.30E-06	1.03E-06
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	5.76E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	8.94E-03	53.0	75.0	106	1.69E-04	1.19E-04	8.43E-05
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	1.50E-02	85.7	192	429	1.75E-04	7.84E-05	3.51E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	1.44E-02	85.7	192	429	1.67E-04	7.49E-05	3.35E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	1.51E-02	30.0	52.0	90.0	5.04E-04	2.91E-04	1.68E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	1.05E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	1.07E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-19

Summary of White-Footed Mouse Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	4.23E-03	65.6	147	328	6.45E-05	2.88E-05	1.29E-05
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	3.23E-03	65.6	147	328	4.93E-05	2.20E-05	9.86E-06
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	3.71E-02	65.6	147	328	5.66E-04	2.53E-04	1.13E-04
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	2.69E-02	0.62	1.37	3.07	4.38E-02	1.96E-02	8.77E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	2.96E-02	0.62	1.37	3.07	4.82E-02	2.16E-02	9.66E-03
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	5.03E-02	0.62	1.37	3.07	8.19E-02	3.66E-02	1.64E-02
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	2.13E-02	0.62	1.37	3.07	3.47E-02	1.55E-02	6.95E-03
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	1.31E-02	0.62	1.37	3.07	2.14E-02	9.56E-03	4.28E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	4.61E-02	0.62	1.37	3.07	7.49E-02	3.35E-02	1.50E-02
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	7.92E-03	0.62	1.37	3.07	1.29E-02	5.76E-03	2.58E-03
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	1.99E-01	65.6	147	328	3.03E-03	1.36E-03	6.06E-04
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	4.54E-03	65.6	147	328	6.92E-05	3.09E-05	1.38E-05
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	3.45E-02	2.00	2.83	4.00	1.72E-02	1.22E-02	8.62E-03
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	1.12E-02	2.00	6.32	20.0	5.58E-03	1.76E-03	5.58E-04
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	9.47E-03	75.0	168	375	1.26E-04	5.65E-05	2.53E-05
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	4.49E-02	100	224	500	4.49E-04	2.01E-04	8.98E-05
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	1.80E-02	0.62	1.37	3.07	2.92E-02	1.31E-02	5.86E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	1.58E+00	8.42	18.8	42.1	1.88E-01	8.40E-02	3.76E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	1.22E-01	65.6	147	328	1.85E-03	8.29E-04	3.71E-04
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	1.98E-01	0.62	1.37	3.07	3.23E-01	1.44E-01	6.47E-02
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	0.00E+00	6.23E-07	0.000001	0.000003	0.00001	6.23E-01	1.97E-01	6.23E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.00050	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi =	0.470	= Proportion of diet composed of food item (soil invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi =	0.510	= Proportion of diet composed of food item (terrestrial plants)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.020	= Proportion of diet composed of soil
WIR =	0.0062	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0208	= Body weight (kg)

ATTACHMENT TABLE L-1-20

Summary of Red Fox Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	Regresson	7.64E-02	Regresson	7.84E-02	Regresson	7.34E-02	6.88E-03	2.34E-02	1.04	1.31	1.66	2.25E-02	1.78E-02	1.41E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	Regresson	1.43E-01	Regresson	2.02E-01	Regresson	1.12E+00	3.24E-04	3.65E-02	0.77	2.43	7.70	4.75E-02	1.50E-02	4.75E-03
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	Regresson	1.95E+00	Regresson	2.02E+00	Regresson	2.02E+00	1.20E-03	8.18E-02	2.40	5.37	12.0	3.41E-02	1.52E-02	6.82E-03
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	Regresson	9.72E+00	Regresson	1.20E+01	Regresson	1.41E+01	6.03E-03	3.87E-01	11.7	13.3	15.1	3.30E-02	2.91E-02	2.56E-02
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	Regresson	6.21E+00	Regresson	4.22E+00	Regresson	1.11E+01	1.30E-03	2.50E-01	4.70	6.47	8.90	5.33E-02	3.87E-02	2.81E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	0.054	5.86E-03	0.067	7.24E-03	0.067	7.24E-03	1.00E-04	6.30E-04	0.15	0.19	0.25	4.20E-03	3.25E-03	2.52E-03
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	Regresson	2.18E+00	Regresson	2.18E+00	Regresson	2.18E+00	8.95E-04	7.16E-02	1.70	2.40	3.40	4.21E-02	2.98E-02	2.10E-02
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	Regresson	4.85E-01	Regresson	4.85E-01	Regresson	4.85E-01	1.30E-03	1.65E-02	0.20	0.26	0.33	8.26E-02	6.43E-02	5.01E-02
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	0.151	2.20E-01	0.006	8.26E-03	0.036	5.18E-02	7.00E-05	4.00E-03	12.0	26.9	60.2	3.32E-04	1.48E-04	6.64E-05
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	Regresson	1.20E+02	Regresson	1.06E+02	Regresson	1.23E+02	2.00E-02	3.41E+00	75.4	169	377	4.52E-02	2.02E-02	9.04E-03
Polychlorinated Biphenyls																			
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	See footnote	9.10E-03	See footnote	5.25E-03	See footnote	1.33E-02	2.65E-04	3.01E-04	1.37	2.17	3.43	2.20E-04	1.39E-04	8.78E-05
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	See footnote	2.92E-02	See footnote	2.35E-02	See footnote	3.46E-02	3.71E-04	9.09E-04	0.137	0.306	0.685	6.63E-03	2.97E-03	1.33E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	See footnote	1.33E-02	See footnote	9.71E-03	See footnote	1.72E-02	2.65E-04	4.28E-04	0.137	0.306	0.685	3.12E-03	1.40E-03	6.25E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	See footnote	3.64E-02	See footnote	1.61E-02	See footnote	5.57E-02	3.20E-04	1.10E-03	0.137	0.306	0.685	8.05E-03	3.60E-03	1.61E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	See footnote	8.24E-03	See footnote	3.34E-03	See footnote	1.35E-02	3.71E-04	2.84E-04	0.137	0.306	0.685	2.07E-03	9.27E-04	4.15E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	See footnote	7.50E-03	See footnote	2.57E-03	See footnote	1.28E-02	2.65E-04	2.53E-04	0.137	0.306	0.685	1.84E-03	8.25E-04	3.69E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	See footnote	1.34E-01	See footnote	2.19E-02	See footnote	2.36E-01	3.20E-04	3.85E-03	0.137	0.306	0.685	2.81E-02	1.26E-02	5.63E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	See footnote	6.52E-01	See footnote	4.95E-02	See footnote	1.14E+00	3.11E-04	1.76E-02	0.137	0.306	0.685	1.28E-01	5.74E-02	2.57E-02
Pesticides																			
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	See footnote	9.30E-02	See footnote	8.04E-03	See footnote	1.61E-01	5.17E-05	2.51E-03	0.147	0.329	0.735	1.71E-02	7.63E-03	3.41E-03
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	See footnote	1.07E-01	See footnote	7.34E-03	See footnote	1.86E-01	5.17E-05	2.86E-03	0.147	0.329	0.735	1.95E-02	8.70E-03	3.89E-03
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	See footnote	1.46E-01	See footnote	1.10E-02	See footnote	2.54E-01	5.17E-05	3.92E-03	0.147	0.329	0.735	2.67E-02	1.19E-02	5.34E-03
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	See footnote	5.61E-03	See footnote	7.62E-04	See footnote	9.74E-03	2.60E-05	1.58E-04	0.20	0.45	1.00	7.90E-04	3.53E-04	1.58E-04
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	See footnote	2.99E-03	See footnote	3.71E-03	See footnote	2.25E-03	2.60E-05	9.30E-05	1.60	2.26	3.20	5.81E-05	4.11E-05	2.91E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	2.60E-05	5.64E-05	4.58	6.48	9.16	1.23E-05	8.71E-06	6.16E-06
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	See footnote	2.97E-03	See footnote	3.67E-03	See footnote	2.25E-03	2.60E-05	9.24E-05	1.60	2.26	3.20	5.78E-05	4.09E-05	2.89E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	See footnote	9.14E-03	See footnote	1.02E-02	See footnote	8.01E-03	2.60E-05	2.79E-04	1.60	2.26	3.20	1.75E-04	1.23E-04	8.73E-05
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	See footnote	2.38E-01	See footnote	2.36E-02	See footnote	4.08E-01	5.17E-05	6.39E-03	0.015	0.021	0.030	4.26E-01	3.01E-01	2.13E-01
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	See footnote	1.43E-01	See footnote	1.76E-01	See footnote	1.09E-01	2.60E-05	4.34E-03	0.15	0.34	0.75	2.90E-02	1.29E-02	5.79E-03
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	See footnote	4.27E-03	See footnote	4.04E-03	See footnote	4.51E-03	5.17E-05	1.34E-04	0.15	0.34	0.75	8.92E-04	3.99E-04	1.78E-04
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	See footnote	2.76E-02	See footnote	8.44E-03	See footnote	4.33E-02	5.17E-05	7.75E-04	0.184	0.411	0.920	4.21E-03	1.88E-03	8.43E-04
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	See footnote	3.17E-01	See footnote	8.85E-02	See footnote	4.92E-01	2.60E-05	8.63E-03	8.00	17.9	40.0	1.08E-03	4.82E-04	2.16E-04
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	See footnote	5.07E-03	See footnote	6.69E-04	See footnote	8.77E-03	2.60E-05	1.42E-04	4.58	6.48	9.16	3.10E-05	2.19E-05	1.55E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	See footnote	3.31E-03	See footnote	5.45E-04	See footnote	5.67E-03	2.60E-05	9.46E-05	0.20	0.45	1.00	4.73E-04	2.11E-04	9.46E-05
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	See footnote	1.09E-02	See footnote	1.66E-03	See footnote	1.83E-02	2.60E-05	2.97E-04	0.20	0.45	1.00	1.49E-03	6.65E-04	2.97E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	See footnote	1.65E-02	See footnote	1.19E-02	See footnote	2.13E-02	2.60E-04	5.22E-04	4.00	5.66	8.00	1.30E-04	9.23E-05	6.52E-05
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	See footnote	6.07E-02	See footnote	3.46E-02	See footnote	8.77E-02	5.17E-04	1.88E-03	8.00	17.9	40.0	2.35E-04	1.05E-04	4.70E-05
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	See footnote	3.78E-03	See footnote	3.78E-03	See footnote	3.78E-03	1.00E-03	2.01E-04	76.0	170	380	2.64E-06	1.18E-06	5.28E-07
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	See footnote	1.82E-01	See footnote	2.35E-01	See footnote	1.40E-01	4.65E-03	6.13E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	See footnote	3.60E-01	See footnote	4.98E-01	See footnote	2.34E-01	1.00E-03	1.13E-02	53.0	75.0	106	2.13E-04	1.51E-04	1.07E-04
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	See footnote	6.20E-01	See footnote	8.51E-01	See footnote	3.81E-01	5.00E-04	1.89E-02	85.7	192	429	2.20E-04	9.84E-05	4.40E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	See footnote	5.92E-01	See footnote	7.98E-01	See footnote	3.78E-01	5.00E-04	1.80E-02	85.7	192	429	2.10E-04	9.39E-05	4.20E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	See footnote	6.24E-01	See footnote	8.59E-01	See footnote	3.81E-01	5.00E-04	1.90E-02	30.0	52.0	90.0	6.33E-04	3.65E-04	2.11E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	See footnote	3.79E-01	See footnote	2.85E-01	See footnote	4.77E-01	4.65E-03	1.19E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	See footnote	3.86E-01	See footnote	2.98E-01	See footnote	4.78E-01	4.65E-03	1.21E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	1.20E-03	65.6	147	328	1.83E-05	8.20E-06	3.67E-06
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	7.83E-04	65.6	147	328	1.19E-05	5.34E-06	2.39E-06
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	8.54E-03	65.6	147	328	1.30E-04	5.82E-05	2.60E-05
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.73E-05	7.90E-03	0.62	1.37	3.07	1.28E-02	5.75E-03	2.57E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.05E-04	7.13E-03	0.62	1.37	3.07	1.16E-02	5.19E-03	2.32E-03
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.11E-04	1.28E-02	0.62	1.37	3.07	2.08E-02	9.30E-03	4.16E-03
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.00E-04	5.31E-03	0.62	1.37	3.07	8.64E-03	3.87E-03	1.73E-03
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.76E-05	4.01E-03	0.62	1.37	3.07	6.52E-03	2.92E-03	1.31E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	1.02E-02	0.62	1.37	3.07	1.66E-02	7.43E-03	3.32E-03
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	1.61E-03	0.62	1.37	3.07	2.61E-03	1.17E-03	5.24E-04
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.23E-04	4.11E-02	65.6	147	328	6.26E-04	2.80E-04	1.25E-04

ATTACHMENT TABLE L-1-20

Summary of Red Fox Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.05E-05	1.68E-03	65.6	147	328	2.56E-05	1.15E-05	5.13E-06
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	See footnote	1.44E+00	See footnote	4.48E-01	See footnote	2.34E+00	9.54E-05	4.16E-02	2.00	2.83	4.00	2.08E-02	1.47E-02	1.04E-02
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	See footnote	4.07E-01	See footnote	3.36E-01	See footnote	4.80E-01	4.65E-03	1.27E-02	2.00	6.32	20.0	6.36E-03	2.01E-03	6.36E-04
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	See footnote	3.36E-01	See footnote	2.05E-01	See footnote	4.73E-01	4.65E-03	1.06E-02	75.0	168	375	1.41E-04	6.32E-05	2.82E-05
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	See footnote	1.87E+00	See footnote	2.17E+00	See footnote	1.56E+00	9.54E-05	5.67E-02	100	224	500	5.67E-04	2.54E-04	1.13E-04
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.07E-04	3.99E-03	0.62	1.37	3.07	6.49E-03	2.90E-03	1.30E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	See footnote	6.59E+01	See footnote	3.98E+01	See footnote	8.27E+01	4.73E-04	1.84E+00	8.42	18.8	42.1	2.18E-01	9.75E-02	4.36E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	2.88E-02	65.6	147	328	4.39E-04	1.96E-04	8.78E-05
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.34E-04	3.93E-02	0.62	1.37	3.07	6.39E-02	2.86E-02	1.28E-02
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	5.52E-05	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	4.69E-08	0.000001	0.000003	0.00001	4.69E-02	1.48E-02	4.69E-03

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1231 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.028 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.292 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.291 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.3494 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 4.06 = Body weight (kg)

ATTACHMENT TABLE L-1-21

Summary of American Robin Exposure Doses (Omnivore) - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	3.11E-01	2.46	4.26	7.38	1.26E-01	7.29E-02	4.21E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	8.32E-01	1.47	3.29	7.35	5.66E-01	2.53E-01	1.13E-01
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	4.89E-01	2.66	5.95	13.3	1.84E-01	8.22E-02	3.67E-02
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	1.72E+00	4.05	7.00	12.1	4.26E-01	2.46E-01	1.43E-01
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	6.38E-01	3.85	8.61	19.3	1.66E-01	7.41E-02	3.31E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	8.73E-03	0.49	0.77	1.20	1.78E-02	1.14E-02	7.28E-03
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	2.33E-01	6.71	15.0	33.6	3.47E-02	1.55E-02	6.94E-03
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	1.10E-01	0.44	0.81	1.50	2.50E-01	1.35E-01	7.33E-02
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	1.41E-02	4.04	9.03	20.2	3.50E-03	1.56E-03	6.99E-04
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	8.30E+00	66.1	148	331	1.26E-01	5.62E-02	2.51E-02
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	6.84E-04	0.41	0.92	2.05	1.67E-03	7.46E-04	3.34E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	2.12E-03	0.41	0.92	2.05	5.18E-03	2.31E-03	1.04E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	9.85E-04	0.41	0.92	2.05	2.40E-03	1.07E-03	4.81E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	2.59E-03	0.41	0.92	2.05	6.31E-03	2.82E-03	1.26E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	6.36E-04	0.41	0.92	2.05	1.55E-03	6.93E-04	3.10E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	5.68E-04	0.41	0.92	2.05	1.39E-03	6.20E-04	2.77E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	9.22E-03	0.41	0.92	2.05	2.25E-02	1.01E-02	4.50E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	4.35E-02	0.41	0.92	2.05	1.06E-01	4.75E-02	2.12E-02
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	6.21E-03	0.50	1.58	5.00	1.24E-02	3.93E-03	1.24E-03
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	7.10E-03	0.50	1.58	5.00	1.42E-02	4.49E-03	1.42E-03
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	9.73E-03	0.50	1.58	5.00	1.95E-02	6.15E-03	1.95E-03
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	3.83E-04	0.07	0.16	0.35	5.46E-03	2.44E-03	1.09E-03
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	2.18E-04	0.56	1.12	2.25	3.90E-04	1.95E-04	9.71E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	1.36E-04	2.14	4.79	10.7	6.35E-05	2.84E-05	1.27E-05
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	2.17E-04	0.56	1.12	2.25	3.88E-04	1.93E-04	9.65E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	6.58E-04	0.56	1.12	2.25	1.18E-03	5.87E-04	2.93E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	1.58E-02	0.07	0.52	3.78	2.23E-01	3.06E-02	4.19E-03
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	1.03E-02	10.0	22.4	50.0	1.03E-03	4.60E-04	2.06E-04
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	3.12E-04	10.0	22.4	50.0	3.12E-05	1.39E-05	6.23E-06
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	1.88E-03	0.021	0.047	0.104	9.06E-02	4.05E-02	1.81E-02
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	2.13E-02	4.00	8.94	20.0	5.33E-03	2.38E-03	1.07E-03
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	3.46E-04	2.14	4.79	10.7	1.61E-04	7.22E-05	3.23E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	2.28E-04	0.28	0.62	1.38	8.27E-04	3.70E-04	1.65E-04
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	7.33E-04	0.28	0.62	1.38	2.66E-03	1.19E-03	5.32E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	1.21E-03	355	794	1,775	3.40E-06	1.52E-06	6.80E-07
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	4.37E-03	1.00	2.24	5.00	4.37E-03	1.95E-03	8.74E-04
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	4.07E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	1.39E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	2.64E-02	80.4	180	402	3.28E-04	1.47E-04	6.56E-05
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	4.47E-02	80.4	180	402	5.56E-04	2.49E-04	1.11E-04
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	4.27E-02	80.4	180	402	5.31E-04	2.37E-04	1.06E-04
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	4.50E-02	80.4	180	402	5.60E-04	2.50E-04	1.12E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	2.76E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	2.81E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-21

Summary of American Robin Exposure Doses (Omnivore) - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	1.37E-02	7.10	15.9	35.5	1.94E-03	8.65E-04	3.87E-04
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	1.02E-02	7.10	15.9	35.5	1.44E-03	6.43E-04	2.88E-04
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	1.17E-01	7.10	15.9	35.5	1.64E-02	7.35E-03	3.29E-03
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	8.84E-02	7.10	15.9	35.5	1.25E-02	5.57E-03	2.49E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	9.38E-02	7.10	15.9	35.5	1.32E-02	5.91E-03	2.64E-03
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	1.61E-01	7.10	15.9	35.5	2.27E-02	1.02E-02	4.55E-03
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	6.83E-02	7.10	15.9	35.5	9.62E-03	4.30E-03	1.92E-03
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	4.36E-02	7.10	15.9	35.5	6.14E-03	2.74E-03	1.23E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	1.43E-01	7.10	15.9	35.5	2.02E-02	9.03E-03	4.04E-03
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	2.42E-02	7.10	15.9	35.5	3.41E-03	1.53E-03	6.83E-04
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	6.15E-01	7.10	15.9	35.5	8.66E-02	3.88E-02	1.73E-02
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	1.57E-02	7.10	15.9	35.5	2.21E-03	9.87E-04	4.41E-04
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	9.93E-02	0.113	0.253	0.565	8.79E-01	3.93E-01	1.76E-01
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	2.96E-02	3.39	7.58	17.0	8.73E-03	3.90E-03	1.75E-03
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	2.45E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	1.34E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	5.60E-02	7.10	15.9	35.5	7.88E-03	3.53E-03	1.58E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	4.50E+00	6.73	21.3	67.3	6.69E-01	2.12E-01	6.69E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	3.85E-01	7.10	15.9	35.5	5.42E-02	2.42E-02	1.08E-02
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	6.11E-01	7.10	15.9	35.5	8.60E-02	3.85E-02	1.72E-02
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	3.33E-06	0.000014	0.000044	0.00014	2.38E-01	7.52E-02	2.38E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0055 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.435 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.519 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

ATTACHMENT TABLE L-1-22

Summary of American Robin Exposure Doses (Invertivore) - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	3.95E-01	2.46	4.26	7.38	1.61E-01	9.27E-02	5.35E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	1.24E+00	1.47	3.29	7.35	8.44E-01	3.78E-01	1.69E-01
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	6.47E-01	2.66	5.95	13.3	2.43E-01	1.09E-01	4.87E-02
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	2.20E+00	4.05	7.00	12.1	5.44E-01	3.15E-01	1.82E-01
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	6.91E-01	3.85	8.61	19.3	1.79E-01	8.02E-02	3.59E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	6.79E-03	0.49	0.77	1.20	1.38E-02	8.85E-03	5.66E-03
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	2.98E-01	6.71	15.0	33.6	4.44E-02	1.99E-02	8.88E-03
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	1.55E-01	0.44	0.81	1.50	3.51E-01	1.90E-01	1.03E-01
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	1.64E-02	4.04	9.03	20.2	4.05E-03	1.81E-03	8.11E-04
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	9.59E+00	66.1	148	331	1.45E-01	6.49E-02	2.90E-02
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	7.08E-04	0.41	0.92	2.05	1.73E-03	7.72E-04	3.45E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	1.82E-03	0.41	0.92	2.05	4.44E-03	1.98E-03	8.87E-04
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	9.04E-04	0.41	0.92	2.05	2.21E-03	9.86E-04	4.41E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	2.98E-03	0.41	0.92	2.05	7.26E-03	3.25E-03	1.45E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	7.40E-04	0.41	0.92	2.05	1.81E-03	8.07E-04	3.61E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	6.90E-04	0.41	0.92	2.05	1.68E-03	7.53E-04	3.37E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	1.29E-02	0.41	0.92	2.05	3.14E-02	1.40E-02	6.27E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	6.47E-02	0.41	0.92	2.05	1.58E-01	7.06E-02	3.16E-02
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	9.18E-03	0.50	1.58	5.00	1.84E-02	5.80E-03	1.84E-03
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	1.06E-02	0.50	1.58	5.00	2.13E-02	6.72E-03	2.13E-03
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	1.45E-02	0.50	1.58	5.00	2.90E-02	9.16E-03	2.90E-03
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	5.45E-04	0.07	0.16	0.35	7.77E-03	3.47E-03	1.55E-03
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	1.12E-04	0.56	1.12	2.25	1.99E-04	9.93E-05	4.96E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	1.93E-04	2.14	4.79	10.7	9.03E-05	4.04E-05	1.81E-05
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	1.12E-04	0.56	1.12	2.25	1.99E-04	9.93E-05	4.96E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	3.95E-04	0.56	1.12	2.25	7.05E-04	3.52E-04	1.76E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	2.32E-02	0.07	0.52	3.78	3.28E-01	4.49E-02	6.15E-03
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	5.26E-03	10.0	22.4	50.0	5.26E-04	2.35E-04	1.05E-04
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	2.32E-04	10.0	22.4	50.0	2.32E-05	1.04E-05	4.64E-06
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	2.41E-03	0.021	0.047	0.104	1.16E-01	5.17E-02	2.31E-02
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	2.78E-02	4.00	8.94	20.0	6.96E-03	3.11E-03	1.39E-03
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	4.93E-04	2.14	4.79	10.7	2.31E-04	1.03E-04	4.61E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	3.17E-04	0.28	0.62	1.38	1.15E-03	5.16E-04	2.31E-04
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	1.04E-03	0.28	0.62	1.38	3.77E-03	1.69E-03	7.54E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	1.12E-03	355	794	1,775	3.14E-06	1.40E-06	6.28E-07
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	4.56E-03	1.00	2.24	5.00	4.56E-03	2.04E-03	9.11E-04
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	3.25E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	6.80E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	1.04E-02	80.4	180	402	1.29E-04	5.78E-05	2.59E-05
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	1.77E-02	80.4	180	402	2.21E-04	9.87E-05	4.41E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	1.77E-02	80.4	180	402	2.21E-04	9.87E-05	4.41E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	1.77E-02	80.4	180	402	2.21E-04	9.87E-05	4.41E-05
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	2.48E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	2.48E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-22

Summary of American Robin Exposure Doses (Invertivore) - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	1.78E-02	7.10	15.9	35.5	2.50E-03	1.12E-03	5.01E-04
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	5.34E-03	7.10	15.9	35.5	7.52E-04	3.36E-04	1.50E-04
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	8.90E-02	7.10	15.9	35.5	1.25E-02	5.60E-03	2.51E-03
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	1.04E-01	7.10	15.9	35.5	1.46E-02	6.55E-03	2.93E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	9.37E-02	7.10	15.9	35.5	1.32E-02	5.90E-03	2.64E-03
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	9.26E-02	7.10	15.9	35.5	1.30E-02	5.83E-03	2.61E-03
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	2.52E-02	7.10	15.9	35.5	3.54E-03	1.59E-03	7.09E-04
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	3.96E-02	7.10	15.9	35.5	5.58E-03	2.49E-03	1.12E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	1.84E-01	7.10	15.9	35.5	2.59E-02	1.16E-02	5.17E-03
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	2.65E-02	7.10	15.9	35.5	3.73E-03	1.67E-03	7.45E-04
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	3.65E-01	7.10	15.9	35.5	5.14E-02	2.30E-02	1.03E-02
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	1.92E-02	7.10	15.9	35.5	2.71E-03	1.21E-03	5.42E-04
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	1.26E-01	0.113	0.253	0.565	**1.11E+00**	4.98E-01	2.23E-01
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	2.48E-02	3.39	7.58	17.0	7.32E-03	3.27E-03	1.46E-03
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	2.48E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	7.58E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	6.03E-02	7.10	15.9	35.5	8.50E-03	3.80E-03	1.70E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	4.61E+00	6.73	21.3	67.3	6.86E-01	2.17E-01	6.86E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	2.63E-01	7.10	15.9	35.5	3.71E-02	1.66E-02	7.41E-03
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	3.01E-01	7.10	15.9	35.5	4.23E-02	1.89E-02	8.47E-03
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	5.07E-06	0.000014	0.000044	0.00014	3.62E-01	1.14E-01	3.62E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0038 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.954 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0106 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.077 = Body weight (kg)

ATTACHMENT TABLE L-1-23

Summary of Mourning Dove Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	6.88E-03	1.91E-01	2.24	5.01	11.2	8.54E-02	3.82E-02	1.71E-02
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	3.24E-04	5.86E-02	1.47	3.29	7.35	3.99E-02	1.78E-02	7.98E-03
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	1.20E-03	2.36E-01	2.66	5.95	13.3	8.88E-02	3.97E-02	1.78E-02
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	6.03E-03	1.00E+00	4.05	7.00	12.1	2.47E-01	1.43E-01	8.26E-02
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	1.30E-03	6.86E-01	1.63	2.31	3.26	4.21E-01	2.98E-01	2.10E-01
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	1.00E-04	1.53E-02	0.45	0.64	0.90	3.39E-02	2.40E-02	1.70E-02
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	8.95E-04	1.37E-01	6.71	15.0	33.6	2.04E-02	9.10E-03	4.07E-03
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	1.30E-03	3.04E-02	0.29	0.41	0.58	1.05E-01	7.42E-02	5.25E-02
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	7.00E-05	1.28E-02	4.04	9.03	20.2	3.17E-03	1.42E-03	6.34E-04
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	2.00E-02	7.16E+00	66.1	148	331	1.08E-01	4.84E-02	2.17E-02
Polychlorinated Biphenyls													
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	2.65E-04	7.73E-04	0.36	0.80	1.80	2.15E-03	9.61E-04	4.30E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	3.71E-04	3.30E-03	0.36	0.80	1.80	9.16E-03	4.10E-03	1.83E-03
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	2.65E-04	1.39E-03	0.36	0.80	1.80	3.86E-03	1.73E-03	7.72E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	3.20E-04	2.26E-03	0.36	0.80	1.80	6.27E-03	2.80E-03	1.25E-03
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	3.71E-04	5.21E-04	0.36	0.80	1.80	1.45E-03	6.47E-04	2.89E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	2.65E-04	4.03E-04	0.36	0.80	1.80	1.12E-03	5.01E-04	2.24E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	3.20E-04	2.82E-03	0.36	0.80	1.80	7.83E-03	3.50E-03	1.57E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	3.11E-04	3.63E-03	0.36	0.80	1.80	1.01E-02	4.50E-03	2.01E-03
Pesticides													
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	5.17E-05	6.48E-04	0.50	1.58	5.00	1.30E-03	4.10E-04	1.30E-04
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	5.17E-05	4.41E-04	0.50	1.58	5.00	8.82E-04	2.79E-04	8.82E-05
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	5.17E-05	7.68E-04	0.50	1.58	5.00	1.54E-03	4.85E-04	1.54E-04
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	2.60E-05	8.95E-05	0.07	0.16	0.35	1.28E-03	5.71E-04	2.55E-04
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	2.60E-05	5.16E-04	0.56	1.12	2.25	9.22E-04	4.60E-04	2.29E-04
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	2.60E-05	3.14E-05	1.19	2.66	5.95	2.64E-05	1.18E-05	5.28E-06
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	2.60E-05	5.12E-04	0.56	1.12	2.25	9.14E-04	4.56E-04	2.27E-04
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	2.60E-05	1.42E-03	0.56	1.12	2.25	2.54E-03	1.27E-03	6.32E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	5.17E-05	2.04E-03	0.07	0.52	3.78	2.88E-02	3.94E-03	5.39E-04
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	2.60E-05	2.43E-02	10.0	22.4	50.0	2.43E-03	1.09E-03	4.87E-04
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	5.17E-05	5.67E-04	10.0	22.4	50.0	5.67E-05	2.54E-05	1.13E-05
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	5.17E-05	1.08E-03	0.30	0.67	1.50	3.61E-03	1.61E-03	7.22E-04
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	2.60E-05	1.08E-02	4.00	8.94	20.0	2.69E-03	1.20E-03	5.38E-04
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	2.60E-05	7.64E-05	1.19	2.66	5.95	6.42E-05	2.87E-05	1.28E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	2.60E-05	6.82E-05	0.28	0.62	1.38	2.48E-04	1.11E-04	4.95E-05
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	2.60E-05	1.81E-04	0.28	0.62	1.38	6.56E-04	2.93E-04	1.31E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	2.60E-04	1.69E-03	355	794	1,775	4.76E-06	2.13E-06	9.51E-07
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	5.17E-04	4.92E-03	1.00	2.24	5.00	4.92E-03	2.20E-03	9.84E-04
Volatile/Semivolatile Organics													
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	1.00E-03	6.41E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	4.65E-03	3.36E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	1.00E-03	6.96E-02	80.4	180	402	8.66E-04	3.87E-04	1.73E-04
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	5.00E-04	1.18E-01	80.4	180	402	1.47E-03	6.55E-04	2.93E-04
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	5.00E-04	1.11E-01	80.4	180	402	1.37E-03	6.15E-04	2.75E-04
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	5.00E-04	1.19E-01	80.4	180	402	1.48E-03	6.61E-04	2.96E-04
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	4.65E-03	4.03E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	4.65E-03	4.20E-02	NA	NA	NA	NA	NA	NA

ATTACHMENT TABLE L-1-23

Summary of Mourning Dove Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	6.90E-05	7.97E-03	7.10	15.9	35.5	1.12E-03	5.02E-04	2.24E-04
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	9.54E-05	2.41E-02	7.10	15.9	35.5	3.39E-03	1.52E-03	6.78E-04
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	9.54E-05	2.10E-01	7.10	15.9	35.5	2.96E-02	1.32E-02	5.92E-03
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	9.73E-05	7.57E-02	7.10	15.9	35.5	1.07E-02	4.77E-03	2.13E-03
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	1.05E-04	1.18E-01	7.10	15.9	35.5	1.66E-02	7.41E-03	3.31E-03
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	1.11E-04	3.62E-01	7.10	15.9	35.5	5.10E-02	2.28E-02	1.02E-02
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	1.00E-04	1.86E-01	7.10	15.9	35.5	2.61E-02	1.17E-02	5.23E-03
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	9.76E-05	6.44E-02	7.10	15.9	35.5	9.07E-03	4.06E-03	1.81E-03
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	8.00E-05	8.54E-02	7.10	15.9	35.5	1.20E-02	5.38E-03	2.40E-03
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	9.54E-05	2.50E-02	7.10	15.9	35.5	3.53E-03	1.58E-03	7.05E-04
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	1.23E-04	1.35E+00	7.10	15.9	35.5	1.90E-01	8.48E-02	3.79E-02
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	9.05E-05	1.17E-02	7.10	15.9	35.5	1.65E-03	7.38E-04	3.30E-04
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	9.54E-05	6.03E-02	0.113	0.253	0.565	5.34E-01	2.39E-01	1.07E-01
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	4.65E-03	4.74E-02	3.39	7.58	17.0	1.40E-02	6.25E-03	2.79E-03
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	4.65E-03	2.92E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	9.54E-05	3.01E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	1.07E-04	5.97E-02	7.10	15.9	35.5	8.41E-03	3.76E-03	1.68E-03
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	4.73E-04	5.24E+00	6.73	21.3	67.3	7.79E-01	2.46E-01	7.79E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	8.80E-05	7.64E-01	7.10	15.9	35.5	1.08E-01	4.81E-02	2.15E-02
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	1.34E-04	1.48E+00	7.10	15.9	35.5	2.08E-01	9.31E-02	4.16E-02
Dioxin-Like PCB Congeners													
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0176 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0148 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1265 = Body weight (kg)

ATTACHMENT TABLE L-1-24

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals																			
Arsenic	1.53E+01	Measured	7.59E+00	Regresson	6.36E-01	Regresson	7.64E-02	Regresson	7.84E-02	Regresson	7.34E-02	6.88E-03	2.82E-03	2.46	4.26	7.38	1.15E-03	6.63E-04	3.83E-04
Cadmium	4.85E-01	Measured	2.62E+01	Regresson	4.18E-01	Regresson	1.43E-01	Regresson	2.02E-01	Regresson	1.12E+00	3.24E-04	1.56E-02	1.47	3.29	7.35	1.06E-02	4.74E-03	2.12E-03
Chromium	1.91E+01	Measured	1.28E+01	0.041	7.84E-01	Regresson	1.95E+00	Regresson	2.02E+00	Regresson	2.02E+00	1.20E-03	6.40E-02	2.66	5.95	13.3	2.41E-02	1.08E-02	4.81E-03
Copper	2.09E+01	Measured	4.55E+01	Regresson	6.47E+00	Regresson	9.72E+00	Regresson	1.20E+01	Regresson	1.41E+01	6.03E-03	3.81E-01	4.05	7.00	12.1	9.41E-02	5.45E-02	3.15E-02
Lead	5.24E+01	Measured	1.21E+01	Regresson	2.44E+00	Regresson	6.21E+00	Regresson	4.22E+00	Regresson	1.11E+01	1.30E-03	2.30E-01	3.85	8.61	19.3	5.97E-02	2.67E-02	1.19E-02
Mercury	1.08E-01	Measured	1.38E-01	Regresson	1.10E-01	0.054	5.86E-03	0.067	7.24E-03	0.067	7.24E-03	1.00E-04	2.22E-04	0.49	0.77	1.20	4.54E-04	2.90E-04	1.85E-04
Nickel	9.01E+00	Measured	5.86E+00	Regresson	5.60E-01	Regresson	2.18E+00	Regresson	2.18E+00	Regresson	2.18E+00	8.95E-04	6.97E-02	6.71	15.0	33.6	1.04E-02	4.65E-03	2.08E-03
Selenium	4.42E-01	Measured	3.24E+00	Regresson	2.06E-01	Regresson	4.85E-01	Regresson	4.85E-01	Regresson	4.85E-01	1.30E-03	1.56E-02	0.44	0.81	1.50	3.54E-02	1.92E-02	1.04E-02
Silver	1.45E+00	Measured	2.76E-01	0.014	2.04E-02	0.151	2.20E-01	0.006	8.26E-03	0.036	5.18E-02	7.00E-05	3.03E-03	4.04	9.03	20.2	7.51E-04	3.36E-04	1.50E-04
Zinc	6.89E+01	Measured	1.99E+02	Regresson	5.06E+01	Regresson	1.20E+02	Regresson	1.06E+02	Regresson	1.23E+02	2.00E-02	3.71E+00	66.1	148	331	5.62E-02	2.51E-02	1.12E-02
Polychlorinated Biphenyls																			
Aroclor-1016	1.50E-02	Regression	1.35E-02	0.323	4.84E-03	See footnote	9.10E-03	See footnote	5.25E-03	See footnote	1.33E-02	2.65E-04	3.10E-04	0.41	0.92	2.05	7.55E-04	3.38E-04	1.51E-04
Aroclor-1221	3.08E-02	Regression	3.59E-02	0.749	2.30E-02	See footnote	2.92E-02	See footnote	2.35E-02	See footnote	3.46E-02	3.71E-04	9.53E-04	0.41	0.92	2.05	2.32E-03	1.04E-03	4.65E-04
Aroclor-1232	1.81E-02	Regression	1.75E-02	0.515	9.34E-03	See footnote	1.33E-02	See footnote	9.71E-03	See footnote	1.72E-02	2.65E-04	4.44E-04	0.41	0.92	2.05	1.08E-03	4.84E-04	2.17E-04
Aroclor-1242	4.48E-02	Regression	5.98E-02	0.323	1.45E-02	See footnote	3.64E-02	See footnote	1.61E-02	See footnote	5.57E-02	3.20E-04	1.17E-03	0.41	0.92	2.05	2.86E-03	1.28E-03	5.72E-04
Aroclor-1248	1.53E-02	Regression	1.38E-02	0.184	2.82E-03	See footnote	8.24E-03	See footnote	3.34E-03	See footnote	1.35E-02	3.71E-04	2.89E-04	0.41	0.92	2.05	7.04E-04	3.15E-04	1.41E-04
Aroclor-1254	1.47E-02	Regression	1.31E-02	0.139	2.05E-03	See footnote	7.50E-03	See footnote	2.57E-03	See footnote	1.28E-02	2.65E-04	2.59E-04	0.41	0.92	2.05	6.32E-04	2.82E-04	1.26E-04
Aroclor-1260	1.34E-01	Regression	2.64E-01	0.105	1.41E-02	See footnote	1.34E-01	See footnote	2.19E-02	See footnote	2.36E-01	3.20E-04	4.20E-03	0.41	0.92	2.05	1.02E-02	4.58E-03	2.05E-03
PCB (total)	1.42E-01	Measured	1.36E+00	0.139	1.97E-02	See footnote	6.52E-01	See footnote	4.95E-02	See footnote	1.14E+00	3.11E-04	1.97E-02	0.41	0.92	2.05	4.79E-02	2.14E-02	9.59E-03
Pesticides																			
4,4'-DDD	1.79E-02	Regression	1.93E-01	Regresson	3.93E-03	See footnote	9.30E-02	See footnote	8.04E-03	See footnote	1.61E-01	5.17E-05	2.80E-03	0.08	0.18	0.40	3.50E-02	1.57E-02	7.01E-03
4,4'-DDE	1.10E-02	Regression	2.24E-01	Regresson	2.72E-03	See footnote	1.07E-01	See footnote	7.34E-03	See footnote	1.86E-01	5.17E-05	3.21E-03	0.08	0.18	0.40	4.01E-02	1.79E-02	8.01E-03
4,4'-DDT	2.21E-02	Regression	3.05E-01	Regresson	4.61E-03	See footnote	1.46E-01	See footnote	1.10E-02	See footnote	2.54E-01	5.17E-05	4.39E-03	0.08	0.18	0.40	5.49E-02	2.46E-02	1.10E-02
Aldrin	3.41E-03	3.300	1.13E-02	0.139	4.76E-04	See footnote	5.61E-03	See footnote	7.62E-04	See footnote	9.74E-03	2.60E-05	1.73E-04	0.07	0.16	0.35	2.47E-03	1.11E-03	4.95E-04
alpha-BHC	2.18E-03	1.000	2.18E-03	1.735	3.78E-03	See footnote	2.99E-03	See footnote	3.71E-03	See footnote	2.25E-03	2.60E-05	9.69E-05	0.56	1.12	2.25	1.73E-04	8.64E-05	4.31E-05
alpha-Chlordane	9.90E-04	4.000	3.96E-03	0.165	1.63E-04	See footnote	1.96E-03	See footnote	2.59E-04	See footnote	3.40E-03	2.60E-05	6.14E-05	2.14	4.79	10.7	2.87E-05	1.28E-05	5.74E-06
beta-BHC	2.18E-03	1.000	2.18E-03	1.719	3.74E-03	See footnote	2.97E-03	See footnote	3.67E-03	See footnote	2.25E-03	2.60E-05	9.64E-05	0.56	1.12	2.25	1.72E-04	8.59E-05	4.28E-05
delta-BHC	7.89E-03	1.000	7.89E-03	1.311	1.03E-02	See footnote	9.14E-03	See footnote	1.02E-02	See footnote	8.01E-03	2.60E-05	2.94E-04	0.56	1.12	2.25	5.24E-04	2.62E-04	1.30E-04
Dieldrin	3.33E-02	14.70	4.90E-01	0.410	1.37E-02	See footnote	2.38E-01	See footnote	2.36E-02	See footnote	4.08E-01	5.17E-05	7.15E-03	0.07	0.52	3.78	1.01E-01	1.38E-02	1.89E-03
Endosulfan I	1.06E-01	1.000	1.06E-01	1.687	1.79E-01	See footnote	1.43E-01	See footnote	1.76E-01	See footnote	1.09E-01	2.60E-05	4.57E-03	10.0	22.4	50.0	4.57E-04	2.04E-04	9.14E-05
Endosulfan II	4.53E-03	1.000	4.53E-03	0.886	4.01E-03	See footnote	4.27E-03	See footnote	4.04E-03	See footnote	4.51E-03	5.17E-05	1.40E-04	10.0	22.4	50.0	1.40E-05	6.24E-06	2.79E-06
Endrin	1.39E-02	3.600	5.00E-02	0.535	7.43E-03	See footnote	2.76E-02	See footnote	8.44E-03	See footnote	4.33E-02	5.17E-05	8.50E-04	0.021	0.047	0.104	4.09E-02	1.83E-02	8.17E-03
gamma-BHC (Lindane)	4.28E-02	13.70	5.86E-01	1.852	7.93E-02	See footnote	3.17E-01	See footnote	8.85E-02	See footnote	4.92E-01	2.60E-05	9.58E-03	4.00	8.94	20.0	2.39E-03	1.07E-03	4.79E-04
gamma-Chlordane	2.56E-03	4.000	1.02E-02	0.165	4.21E-04	See footnote	5.07E-03	See footnote	6.69E-04	See footnote	8.77E-03	2.60E-05	1.56E-04	2.14	4.79	10.7	7.31E-05	3.27E-05	1.46E-05
Heptachlor	2.18E-03	3.000	6.53E-03	0.174	3.79E-04	See footnote	3.31E-03	See footnote	5.45E-04	See footnote	5.67E-03	2.60E-05	1.03E-04	0.28	0.62	1.38	3.75E-04	1.68E-04	7.49E-05
Heptachlor epoxide	2.18E-03	10.00	2.18E-02	0.566	1.23E-03	See footnote	1.09E-02	See footnote	1.66E-03	See footnote	1.83E-02	2.60E-05	3.30E-04	0.28	0.62	1.38	1.20E-03	5.37E-04	2.40E-04
Methoxychlor	2.18E-02	1.000	2.18E-02	0.525	1.14E-02	See footnote	1.65E-02	See footnote	1.19E-02	See footnote	2.13E-02	2.60E-04	5.44E-04	355	794	1,775	1.53E-06	6.86E-07	3.07E-07
Toxaphene	9.04E-02	1.000	9.04E-02	0.355	3.21E-02	See footnote	6.07E-02	See footnote	3.46E-02	See footnote	8.77E-02	5.17E-04	1.98E-03	1.00	2.24	5.00	1.98E-03	8.86E-04	3.96E-04
Volatile/Semivolatile Organics																			
1,1,2,2-Tetrachloroethane	3.78E-03	1.000	3.78E-03	1.000	3.78E-03	See footnote	3.78E-03	See footnote	3.78E-03	See footnote	3.78E-03	1.00E-03	1.78E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.38E-01	0.500	1.19E-01	1.000	2.38E-01	See footnote	1.82E-01	See footnote	2.35E-01	See footnote	1.40E-01	4.65E-03	6.20E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	3.56E-01	0.560	2.00E-01	1.426	5.08E-01	See footnote	3.60E-01	See footnote	4.98E-01	See footnote	2.34E-01	1.00E-03	1.17E-02	80.4	180	402	1.46E-04	6.52E-05	2.91E-05
1,2-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.452	8.74E-01	See footnote	6.20E-01	See footnote	8.51E-01	See footnote	3.81E-01	5.00E-04	1.98E-02	80.4	180	402	2.46E-04	1.10E-04	4.92E-05
1,3-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.296	8.18E-01	See footnote	5.92E-01	See footnote	7.98E-01	See footnote	3.78E-01	5.00E-04	1.89E-02	80.4	180	402	2.35E-04	1.05E-04	4.70E-05
1,4-Dichlorobenzene	3.56E-01	1.000	3.56E-01	2.475	8.82E-01	See footnote	6.24E-01	See footnote	8.59E-01	See footnote	3.81E-01	5.00E-04	1.99E-02	80.4	180	402	2.48E-04	1.11E-04	4.95E-05
4-Bromophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.566	2.76E-01	See footnote	3.79E-01	See footnote	2.85E-01	See footnote	4.77E-01	4.65E-03	1.24E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.87E-01	1.000	4.87E-01	0.593	2.89E-01	See footnote	3.86E-01	See footnote	2.98E-01	See footnote	4.78E-01	4.65E-03	1.27E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.08E+00	0.300	3.23E-01	Regresson	3.60E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	6.90E-05	3.91E-06	7.10	15.9	35.5	5.51E-07	2.47E-07	1.10E-07
Acenaphthylene	4.20E-01	0.220	9.23E-02	Regresson	1.60E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	5.41E-06	7.10	15.9	35.5	7.62E-07	3.41E-07	1.52E-07
Anthracene	5.11E+00	0.320	1.63E+00	Regresson	1.32E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	5.41E-06	7.10	15.9	35.5	7.62E-07	3.41E-07	1.52E-07
Benzo(a)anthracene	6.90E+00	0.270	1.86E+00	Regresson	2.10E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.73E-05	5.52E-06	7.10	15.9	35.5	7.78E-07	3.48E-07	1.56E-07
Benzo(a)pyrene	5.10E+00	0.340	1.73E+00	Regresson	6.23E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.05E-04	5.95E-06	7.10	15.9	35.5	8.38E-07	3.75E-07	1.68E-07
Benzo(b)fluoranthene	7.57E+00	0.210	1.59E+00	0.310	2.35E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.11E-04	6.28E-06	7.10	15.9	35.5	8.85E-07	3.96E-07	1.77E-07
Benzo(g,h,i)perylene	2.68E+00	0.150	4.02E-01	Regresson	1.27E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.00E-04	5.70E-06	7.10	15.9	35.5	8.02E-07	3.59E-07	1.60E-07
Benzo(k)fluoranthene	3.24E+00	0.210	6.80E-01	Regresson	3.17E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.76E-05	5.54E-06	7.10	15.9	35.5	7.80E-07	3.49E-07	1.56E-07
Chrysene	7.95E+00	0.440	3.50E+00	Regresson	2.29E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.00E-05	4.54E-06	7.10	15.9	35.5	6.39E-07	2.86E-07	1.28E-07
Dibenz(a,h)anthracene	1.04E+00	0.490	5.09E-01	0.130	1.35E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.54E-05	5.41E-06	7.10	15.9	35.5	7.62E-07	3.41E-07	1.52E-07
Fluoranthene	1.85E+01	0.370	6.83E+00	0.500	9.23E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.23E-04	6.98E-06	7.10	15.9	35.5	9.83E-07	4.40E-07	1.97E-07

ATTACHMENT TABLE L-1-24

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 7) - Mean

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Omnivore Soil-Mammal BAF	Omnivore Small Mammal Concentration (mg/kg dw)	Herbivore Soil-Mammal BAF	Herbivore Small Mammal Concentration (mg/kg dw)	Insectivore Soil-Mammal BAF	Insectivore Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Fluorene	1.64E+00	0.200	3.28E-01	Regresson	2.52E-03	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	9.05E-05	5.13E-06	7.10	15.9	35.5	7.23E-07	3.23E-07	1.45E-07
Hexachlorobenzene	1.53E+00	1.690	2.58E+00	0.246	3.76E-01	See footnote	1.44E+00	See footnote	4.48E-01	See footnote	2.34E+00	9.54E-05	4.51E-02	0.113	0.253	0.565	3.99E-01	1.79E-01	7.98E-02
Hexachlorobutadiene	4.87E-01	1.000	4.87E-01	0.675	3.29E-01	See footnote	4.07E-01	See footnote	3.36E-01	See footnote	4.80E-01	4.65E-03	1.33E-02	3.39	7.58	17.0	3.93E-03	1.76E-03	7.85E-04
Hexachlorocyclopentadiene	4.87E-01	1.000	4.87E-01	0.393	1.91E-01	See footnote	3.36E-01	See footnote	2.05E-01	See footnote	4.73E-01	4.65E-03	1.11E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.53E+00	1.000	1.53E+00	1.439	2.20E+00	See footnote	1.87E+00	See footnote	2.17E+00	See footnote	1.56E+00	9.54E-05	5.98E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.78E+00	0.410	1.14E+00	0.110	3.06E-01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.07E-04	6.04E-06	7.10	15.9	35.5	8.51E-07	3.81E-07	1.70E-07
Pentachlorophenol	6.64E+00	14.63	9.72E+01	5.930	3.94E+01	See footnote	6.59E+01	See footnote	3.98E+01	See footnote	8.27E+01	4.73E-04	2.01E+00	6.73	21.3	67.3	2.99E-01	9.45E-02	2.99E-02
Phenanthrene	1.69E+01	0.280	4.74E+00	Regresson	4.90E+00	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	8.80E-05	4.99E-06	7.10	15.9	35.5	7.03E-07	3.14E-07	1.41E-07
Pyrene	1.45E+01	0.390	5.65E+00	0.720	1.04E+01	0.000	0.00E+00	0.000	0.00E+00	0.000	0.00E+00	1.34E-04	7.59E-06	7.10	15.9	35.5	1.07E-06	4.78E-07	2.14E-07
Dioxin-Like PCB Congeners																			
2,3,7,8 TCDD (TEQ)	0.00E+00	Measured	1.07E-04	0.135	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	Regresson	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0360 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (omnivorous small mammals, dry weight basis)
PDFi = 0.340 = Proportion of diet composed of food item (omnivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (herbivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (herbivorous small mammals)
FCxi = Chemical-specific = Concentration of chemical in food item (insectivorous small mammals, dry weight basis)
PDFi = 0.330 = Proportion of diet composed of food item (insectivorous small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0639 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.126 = Body weight (kg)

ATTACHMENT TABLE L-2-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	3.90E+00	5.80E-02	1.84E+00	5.14	8.12	12.8	3.59E-01	2.27E-01	1.44E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	3.56E-01	8.20E-04	1.15E-01	1.47	3.29	7.35	7.80E-02	3.49E-02	1.56E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	1.72E+00	6.30E-03	5.40E-01	2.66	5.95	13.3	2.03E-01	9.08E-02	4.06E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.22E+01	2.59E-02	5.47E+01	4.05	7.00	12.1	**1.35E+01**	**7.81E+00**	**4.52E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	1.95E+00	5.90E-03	8.71E-01	3.85	8.61	19.3	2.26E-01	1.01E-01	4.53E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	1.19E-01	2.00E-04	9.66E-02	0.026	0.045	0.078	**3.71E+00**	**2.14E+00**	**1.24E+00**
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.59E+00	3.50E-03	4.00E-01	6.71	15.0	33.6	5.97E-02	2.67E-02	1.19E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.46E+00	1.30E-03	4.74E-01	1.80	4.02	9.00	2.63E-01	1.18E-01	5.26E-02
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	1.17E+00	7.00E-05	2.43E-01	4.04	9.03	20.2	6.03E-02	2.70E-02	1.21E-02
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.47E+02	6.54E-02	4.93E+01	66.1	148	331	7.46E-01	3.34E-01	1.49E-01
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	2.87E-01	1.50	3.35	7.50	1.91E-01	8.55E-02	3.82E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	6.83E-01	1.50	3.35	7.50	4.56E-01	2.04E-01	9.11E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	4.53E-01	1.50	3.35	7.50	3.02E-01	1.35E-01	6.04E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	5.24E-02	1.50	3.35	7.50	3.49E-02	1.56E-02	6.98E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	1.91E-02	1.50	3.35	7.50	1.27E-02	5.68E-03	2.54E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	2.30E+01	1.50	3.35	7.50	**1.53E+01**	**6.84E+00**	**3.06E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	2.53E+00	1.50	3.35	7.50	**1.69E+00**	7.54E-01	3.37E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	8.43E+00	7.81E-04	5.31E+00	1.50	3.35	7.50	**3.54E+00**	**1.58E+00**	7.08E-01
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	3.11E-01	0.30	0.95	3.00	**1.04E+00**	3.28E-01	1.04E-01
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	5.14E+00	0.30	0.95	3.00	**1.71E+01**	**5.42E+00**	**1.71E+00**
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	2.88E+00	0.30	0.95	3.00	**9.59E+00**	**3.03E+00**	9.59E-01
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	9.15E-04	0.155	0.347	0.775	5.90E-03	2.64E-03	1.18E-03
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	6.05E-02	0.56	1.12	2.25	1.08E-01	5.39E-02	2.69E-02
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	2.29E-02	0.80	1.79	4.00	2.87E-02	1.28E-02	5.73E-03
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	6.05E-02	0.56	1.12	2.25	1.08E-01	5.39E-02	2.69E-02
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	6.05E-02	0.56	1.12	2.25	1.08E-01	5.39E-02	2.69E-02
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	3.95E+00	0.071	0.518	3.780	**5.57E+01**	**7.63E+00**	**1.05E+00**
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	5.15E-02	10.0	22.4	50.0	5.15E-03	2.31E-03	1.03E-03
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	7.37E-01	10.0	22.4	50.0	7.37E-02	3.30E-02	1.47E-02
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	1.09E+00	0.30	0.67	1.50	**3.62E+00**	**1.62E+00**	7.25E-01
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	7.53E-04	4.00	8.9	20.0	1.88E-04	8.42E-05	3.77E-05
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	8.38E-01	0.80	1.79	4.00	**1.05E+00**	4.69E-01	2.10E-01
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	1.52E-03	0.48	1.07	2.40	3.17E-03	1.42E-03	6.34E-04
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	4.85E-01	0.48	1.07	2.40	**1.01E+00**	4.52E-01	2.02E-01
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	4.78E-01	355	794	1,775	1.35E-03	6.03E-04	2.69E-04
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	1.20E+00	1.00	2.24	5.00	**1.20E+00**	5.35E-01	2.39E-01
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	5.87E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	7.12E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	1.64E-01	80.4	180	402	2.04E-03	9.12E-04	4.08E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	1.42E-01	80.4	180	402	1.77E-03	7.90E-04	3.53E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	6.96E-02	80.4	180	402	8.65E-04	3.87E-04	1.73E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	6.48E-02	80.4	180	402	8.06E-04	3.61E-04	1.61E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	1.58E-02	7.10	15.9	35.5	2.22E-03	9.94E-04	4.44E-04
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	6.79E-03	7.10	15.9	35.5	9.57E-04	4.28E-04	1.91E-04
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	1.32E-02	7.10	15.9	35.5	1.86E-03	8.32E-04	3.72E-04
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	4.55E-02	7.10	15.9	35.5	6.41E-03	2.87E-03	1.28E-03

ATTACHMENT TABLE L-2-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	1.10E-01	7.10	15.9	35.5	1.55E-02	6.94E-03	3.10E-03
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	7.78E-02	7.10	15.9	35.5	1.10E-02	4.90E-03	2.19E-03
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	7.37E-02	7.10	15.9	35.5	1.04E-02	4.64E-03	2.08E-03
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	2.75E-02	7.10	15.9	35.5	3.88E-03	1.73E-03	7.75E-04
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	7.81E-02	7.10	15.9	35.5	1.10E-02	4.92E-03	2.20E-03
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	6.33E-03	7.10	15.9	35.5	8.91E-04	3.99E-04	1.78E-04
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	3.09E-02	7.10	15.9	35.5	4.35E-03	1.95E-03	8.70E-04
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	5.25E-02	7.10	15.9	35.5	7.39E-03	3.31E-03	1.48E-03
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	1.17E-01	0.113	0.253	0.565	**1.04E+00**	4.64E-01	2.08E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	6.29E-02	3.39	7.58	17.0	1.85E-02	8.29E-03	3.71E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	3.36E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	7.97E-02	7.10	15.9	35.5	1.12E-02	5.02E-03	2.24E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	2.74E-02	6.73	21.3	67.3	4.07E-03	1.29E-03	4.07E-04
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	3.02E-02	7.10	15.9	35.5	4.26E-03	1.90E-03	8.52E-04
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	5.03E-01	7.10	15.9	35.5	7.09E-02	3.17E-02	1.42E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.18E-04	0.00E+00	7.35E-05	0.000014	0.000044	0.00014	**5.25E+00**	**1.66E+00**	5.25E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0262	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.160	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.840	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0211	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.125	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	6.88E+00	5.80E-02	4.48E-01	5.14	8.12	12.8	8.71E-02	5.51E-02	3.49E-02
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	5.86E-01	8.20E-04	3.79E-02	1.47	3.29	7.35	2.58E-02	1.15E-02	5.16E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	2.81E+00	6.30E-03	1.82E-01	2.66	5.95	13.3	6.84E-02	3.06E-02	1.37E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.89E+01	2.59E-02	1.22E+00	4.05	7.00	12.1	3.01E-01	1.74E-01	1.01E-01
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	3.14E+00	5.90E-03	2.03E-01	3.85	8.61	19.3	5.27E-02	2.36E-02	1.05E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	1.13E-01	2.00E-04	7.28E-03	0.026	0.045	0.078	2.80E-01	1.62E-01	9.33E-02
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.75E+00	3.50E-03	1.13E-01	6.71	15.0	33.6	1.68E-02	7.53E-03	3.37E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.83E+00	1.30E-03	1.18E-01	1.80	4.02	9.00	6.56E-02	2.93E-02	1.31E-02
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.26E-01	7.00E-05	5.98E-02	4.04	9.03	20.2	1.48E-02	6.62E-03	2.96E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.22E+02	6.54E-02	1.44E+01	66.1	148	331	2.17E-01	9.72E-02	4.35E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	9.36E-02	1.50	3.35	7.50	6.24E-02	2.79E-02	1.25E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	2.21E-01	1.50	3.35	7.50	1.47E-01	6.58E-02	2.94E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	1.47E-01	1.50	3.35	7.50	9.81E-02	4.39E-02	1.96E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	1.74E-02	1.50	3.35	7.50	1.16E-02	5.19E-03	2.32E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	6.40E-03	1.50	3.35	7.50	4.27E-03	1.91E-03	8.53E-04
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	7.02E+00	1.50	3.35	7.50	**4.68E+00**	**2.09E+00**	9.36E-01
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	8.02E-01	1.50	3.35	7.50	5.35E-01	2.39E-01	1.07E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	6.56E+00	7.81E-04	4.24E-01	1.50	3.35	7.50	2.83E-01	1.26E-01	5.65E-02
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	1.06E-01	0.30	0.95	3.00	3.52E-01	1.11E-01	3.52E-02
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	1.87E+00	0.30	0.95	3.00	**6.24E+00**	**1.97E+00**	6.24E-01
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	1.04E+00	0.30	0.95	3.00	**3.47E+00**	**1.10E+00**	3.47E-01
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	3.29E-04	0.155	0.347	0.775	2.12E-03	9.48E-04	4.24E-04
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	2.15E-02	0.56	1.12	2.25	3.83E-02	1.91E-02	9.54E-03
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	8.02E-03	0.80	1.79	4.00	1.00E-02	4.49E-03	2.01E-03
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	2.15E-02	0.56	1.12	2.25	3.83E-02	1.91E-02	9.54E-03
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	2.15E-02	0.56	1.12	2.25	3.83E-02	1.91E-02	9.54E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	1.37E+00	0.071	0.518	3.780	**1.93E+01**	**2.64E+00**	3.61E-01
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	1.89E-02	10.0	22.4	50.0	1.89E-03	8.44E-04	3.77E-04
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	2.70E-01	10.0	22.4	50.0	2.70E-02	1.21E-02	5.40E-03
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	3.90E-01	0.30	0.67	1.50	**1.30E+00**	5.82E-01	2.60E-01
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	2.57E-04	4.00	8.9	20.0	6.43E-05	2.88E-05	1.29E-05
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	2.82E-01	0.80	1.79	4.00	3.53E-01	1.58E-01	7.06E-02
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	5.56E-04	0.48	1.07	2.40	1.16E-03	5.18E-04	2.32E-04
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	1.76E-01	0.48	1.07	2.40	3.66E-01	1.64E-01	7.32E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	1.69E-01	355	794	1,775	4.76E-04	2.13E-04	9.53E-05
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	4.23E-01	1.00	2.24	5.00	4.23E-01	1.89E-01	8.46E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.81E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	1.22E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	5.07E-02	80.4	180	402	6.31E-04	2.82E-04	1.26E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	3.24E-02	80.4	180	402	4.03E-04	1.80E-04	8.07E-05
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	5.83E-03	80.4	180	402	7.26E-05	3.24E-05	1.45E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	4.10E-03	80.4	180	402	5.10E-05	2.28E-05	1.02E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	2.33E-03	7.10	15.9	35.5	3.28E-04	1.47E-04	6.55E-05
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	5.86E-04	7.10	15.9	35.5	8.26E-05	3.69E-05	1.65E-05
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	6.27E-04	7.10	15.9	35.5	8.83E-05	3.95E-05	1.77E-05
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	8.43E-03	7.10	15.9	35.5	1.19E-03	5.31E-04	2.37E-04

ATTACHMENT TABLE L-2-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	1.35E-03	7.10	15.9	35.5	1.91E-04	8.52E-05	3.81E-05
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	2.81E-03	7.10	15.9	35.5	3.96E-04	1.77E-04	7.92E-05
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	1.95E-02	7.10	15.9	35.5	2.74E-03	1.23E-03	5.49E-04
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	1.06E-03	7.10	15.9	35.5	1.49E-04	6.68E-05	2.99E-05
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	1.09E-02	7.10	15.9	35.5	1.54E-03	6.87E-04	3.07E-04
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	4.44E-04	7.10	15.9	35.5	6.25E-05	2.79E-05	1.25E-05
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	3.14E-03	7.10	15.9	35.5	4.43E-04	1.98E-04	8.86E-05
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	9.45E-03	7.10	15.9	35.5	1.33E-03	5.95E-04	2.66E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	2.62E-02	0.113	0.253	0.565	2.32E-01	1.04E-01	4.63E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	1.09E-02	3.39	7.58	17.0	3.22E-03	1.44E-03	6.45E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	1.04E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	2.02E-02	7.10	15.9	35.5	2.85E-03	1.27E-03	5.70E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	8.62E-03	6.73	21.3	67.3	1.28E-03	4.05E-04	1.28E-04
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	6.66E-03	7.10	15.9	35.5	9.38E-04	4.20E-04	1.88E-04
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	3.17E-02	7.10	15.9	35.5	4.47E-03	2.00E-03	8.94E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	3.33E-04	0.00E+00	2.15E-05	0.000014	0.000044	0.00014	**1.54E+00**	4.86E-01	1.54E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1356 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1090 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.10 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	5.80E-02	1.76E+00	5.14	8.12	12.8	3.42E-01	2.16E-01	1.37E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	2.72E-01	1.47	3.29	7.35	1.85E-01	8.28E-02	3.70E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	7.90E-01	2.66	5.95	13.3	2.97E-01	1.33E-01	5.94E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	2.07E+01	4.05	7.00	12.1	**5.11E+00**	**2.96E+00**	**1.71E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	2.59E+00	1.63	2.31	3.26	**1.59E+00**	**1.12E+00**	7.95E-01
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	2.00E-04	6.24E-02	0.026	0.045	0.078	**2.40E+00**	**1.39E+00**	8.00E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	2.78E-01	6.71	15.0	33.6	4.14E-02	1.85E-02	8.28E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	1.30E-03	5.07E-01	0.40	0.57	0.80	**1.27E+00**	8.96E-01	6.33E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	5.92E-02	4.04	9.03	20.2	1.46E-02	6.55E-03	2.93E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	2.20E+01	66.1	148	331	3.32E-01	1.49E-01	6.65E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	2.14E-02	1.50	3.35	7.50	1.43E-02	6.39E-03	2.86E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	8.16E-02	1.50	3.35	7.50	5.44E-02	2.43E-02	1.09E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	4.31E-02	1.50	3.35	7.50	2.88E-02	1.29E-02	5.75E-03
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	3.73E-03	1.50	3.35	7.50	2.49E-03	1.11E-03	4.97E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	1.12E-03	1.50	3.35	7.50	7.45E-04	3.33E-04	1.49E-04
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	1.72E+00	1.50	3.35	7.50	**1.14E+00**	5.12E-01	2.29E-01
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	1.55E-01	1.50	3.35	7.50	1.04E-01	4.63E-02	2.07E-02
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	7.81E-04	1.72E+00	1.50	3.35	7.50	**1.14E+00**	5.12E-01	2.29E-01
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	1.38E-02	0.12	0.27	0.60	1.15E-01	5.16E-02	2.31E-02
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	2.12E-02	0.12	0.27	0.60	1.76E-01	7.89E-02	3.53E-02
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	4.62E-02	0.60	0.95	1.50	7.71E-02	4.87E-02	3.08E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	3.34E-05	0.155	0.347	0.775	2.15E-04	9.63E-05	4.31E-05
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	1.26E-02	0.56	1.12	2.25	2.25E-02	1.12E-02	5.60E-03
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	7.34E-04	0.80	1.79	4.00	9.17E-04	4.10E-04	1.83E-04
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	1.25E-02	0.56	1.12	2.25	2.23E-02	1.11E-02	5.55E-03
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	9.76E-03	0.56	1.12	2.25	1.74E-02	8.69E-03	4.34E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	2.99E-01	0.071	0.518	3.780	**4.22E+00**	5.78E-01	7.92E-02
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	1.02E-02	10.0	22.4	50.0	1.02E-03	4.57E-04	2.04E-04
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	7.86E-02	10.0	22.4	50.0	7.86E-03	3.51E-03	1.57E-03
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	7.83E-02	0.30	0.67	1.50	2.61E-01	1.17E-01	5.22E-02
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	1.77E-04	4.00	8.9	20.0	4.42E-05	1.98E-05	8.84E-06
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	4.03E-02	0.80	1.79	4.00	5.04E-02	2.25E-02	1.01E-02
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	4.75E-05	0.48	1.07	2.40	9.89E-05	4.42E-05	1.98E-05
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	3.55E-02	0.48	1.07	2.40	7.39E-02	3.30E-02	1.48E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	3.59E-02	355	794	1,775	1.01E-04	4.52E-05	2.02E-05
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	6.72E-02	1.00	2.24	5.00	6.72E-02	3.01E-02	1.34E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	3.37E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	1.66E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	2.47E-01	80.4	180	402	3.07E-03	1.37E-03	6.15E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	4.23E-01	80.4	180	402	5.27E-03	2.35E-03	1.05E-03
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	3.98E-01	80.4	180	402	4.95E-03	2.21E-03	9.90E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	4.27E-01	80.4	180	402	5.31E-03	2.38E-03	1.06E-03
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.18E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.23E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	5.56E-03	7.10	15.9	35.5	7.83E-04	3.50E-04	1.57E-04
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	8.35E-03	7.10	15.9	35.5	1.18E-03	5.26E-04	2.35E-04
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	1.83E-02	7.10	15.9	35.5	2.58E-03	1.15E-03	5.15E-04
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	2.23E-02	7.10	15.9	35.5	3.15E-03	1.41E-03	6.29E-04

ATTACHMENT TABLE L-2-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	7.20E-02	7.10	15.9	35.5	1.01E-02	4.53E-03	2.03E-03
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	2.30E-01	7.10	15.9	35.5	3.24E-02	1.45E-02	6.47E-03
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	1.00E-01	7.10	15.9	35.5	1.41E-02	6.30E-03	2.82E-03
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	3.24E-02	7.10	15.9	35.5	4.56E-03	2.04E-03	9.12E-04
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	3.96E-02	7.10	15.9	35.5	5.57E-03	2.49E-03	1.11E-03
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	1.98E-02	7.10	15.9	35.5	2.79E-03	1.25E-03	5.57E-04
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	8.74E-01	7.10	15.9	35.5	1.23E-01	5.50E-02	2.46E-02
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	1.18E-02	7.10	15.9	35.5	1.66E-03	7.44E-04	3.33E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	6.27E-02	0.113	0.253	0.565	5.55E-01	2.48E-01	1.11E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	1.29E-01	3.39	7.58	17.0	3.80E-02	1.70E-02	7.60E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	9.01E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	2.59E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	6.21E-02	7.10	15.9	35.5	8.74E-03	3.91E-03	1.75E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	3.39E-01	6.73	21.3	67.3	5.04E-02	1.59E-02	5.04E-03
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	6.85E-02	7.10	15.9	35.5	9.65E-03	4.31E-03	1.93E-03
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	1.09E+00	7.10	15.9	35.5	1.53E-01	6.84E-02	3.06E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0717	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.100	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.867	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.033	= Proportion of diet composed of sediment
WIR =	0.0850	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.612	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	1.44E+00	5.80E-02	1.11E-01	5.14	8.12	12.8	2.17E-02	1.37E-02	8.67E-03
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	6.65E-01	8.20E-04	4.95E-02	1.47	3.29	7.35	3.37E-02	1.51E-02	6.74E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	7.76E-01	6.30E-03	5.82E-02	2.66	5.95	13.3	2.19E-02	9.78E-03	4.38E-03
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	2.89E+00	2.59E-02	2.17E-01	4.05	7.00	12.1	5.36E-02	3.10E-02	1.79E-02
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	9.09E-01	5.90E-03	6.80E-02	3.85	8.61	19.3	1.77E-02	7.90E-03	3.53E-03
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	2.95E-01	2.00E-04	2.20E-02	0.49	0.77	1.20	4.48E-02	2.86E-02	1.83E-02
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	9.09E-01	3.50E-03	6.78E-02	6.71	15.0	33.6	1.01E-02	4.52E-03	2.02E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	8.86E-01	1.30E-03	6.60E-02	1.80	4.02	9.00	3.67E-02	1.64E-02	7.33E-03
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.09E-01	7.00E-05	6.76E-02	4.04	9.03	20.2	1.67E-02	7.48E-03	3.35E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	8.25E+01	6.54E-02	6.14E+00	66.1	148	331	9.29E-02	4.15E-02	1.86E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	Measured	1.05E-01	6.70E-04	7.87E-03	0.41	0.92	2.05	1.92E-02	8.58E-03	3.84E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	Measured	1.05E-01	9.30E-04	7.89E-03	0.41	0.92	2.05	1.92E-02	8.60E-03	3.85E-03
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	Measured	1.23E-01	6.70E-04	9.20E-03	0.41	0.92	2.05	2.24E-02	1.00E-02	4.49E-03
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	Measured	1.05E-01	8.00E-04	7.88E-03	0.41	0.92	2.05	1.92E-02	8.59E-03	3.84E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	Measured	1.05E-01	9.30E-04	7.89E-03	0.41	0.92	2.05	1.92E-02	8.60E-03	3.85E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	5.94E-01	6.70E-04	4.43E-02	0.41	0.92	2.05	1.08E-01	4.83E-02	2.16E-02
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	Measured	3.20E+00	8.00E-04	2.38E-01	0.41	0.92	2.05	5.80E-01	2.60E-01	1.16E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	1.07E+01	7.81E-04	7.93E-01	0.41	0.92	2.05	**1.93E+00**	8.65E-01	3.87E-01
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	1.22E-01	0.30	0.95	3.00	4.05E-01	1.28E-01	4.05E-02
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	2.16E+00	0.30	0.95	3.00	**7.19E+00**	**2.27E+00**	7.19E-01
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	1.20E+00	0.30	0.95	3.00	**4.00E+00**	**1.27E+00**	4.00E-01
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	3.79E-04	0.155	0.347	0.775	2.45E-03	1.09E-03	4.89E-04
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	2.47E-02	0.56	1.12	2.25	4.42E-02	2.20E-02	1.10E-02
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	9.24E-03	0.80	1.79	4.00	1.16E-02	5.17E-03	2.31E-03
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	2.47E-02	0.56	1.12	2.25	4.42E-02	2.20E-02	1.10E-02
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	2.47E-02	0.56	1.12	2.25	4.42E-02	2.20E-02	1.10E-02
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	1.57E+00	0.071	0.518	3.780	**2.22E+01**	**3.04E+00**	4.16E-01
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	2.17E-02	10.0	22.4	50.0	2.17E-03	9.72E-04	4.35E-04
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	3.11E-01	10.0	22.4	50.0	3.11E-02	1.39E-02	6.22E-03
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	4.49E-01	0.021	0.047	0.104	**2.16E+01**	**9.66E+00**	**4.32E+00**
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	2.97E-04	4.00	8.9	20.0	7.42E-05	3.32E-05	1.48E-05
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	3.25E-01	0.80	1.79	4.00	4.06E-01	1.82E-01	8.13E-02
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	6.41E-04	0.48	1.07	2.40	1.34E-03	5.98E-04	2.67E-04
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	2.02E-01	0.48	1.07	2.40	4.21E-01	1.88E-01	8.43E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	1.95E-01	355	794	1,775	5.49E-04	2.45E-04	1.10E-04
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	4.87E-01	1.00	2.24	5.00	4.87E-01	2.18E-01	9.74E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	2.10E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	1.42E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	5.84E-02	80.4	180	402	7.26E-04	3.25E-04	1.45E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	3.74E-02	80.4	180	402	4.65E-04	2.08E-04	9.29E-05
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	6.73E-03	80.4	180	402	8.37E-05	3.74E-05	1.67E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	4.73E-03	80.4	180	402	5.88E-05	2.63E-05	1.18E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	2.68E-03	7.10	15.9	35.5	3.77E-04	1.69E-04	7.55E-05
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	6.77E-04	7.10	15.9	35.5	9.54E-05	4.27E-05	1.91E-05
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	7.24E-04	7.10	15.9	35.5	1.02E-04	4.56E-05	2.04E-05
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	9.71E-03	7.10	15.9	35.5	1.37E-03	6.12E-04	2.74E-04

ATTACHMENT TABLE L-2-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	1.56E-03	7.10	15.9	35.5	2.20E-04	9.83E-05	4.40E-05
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	3.24E-03	7.10	15.9	35.5	4.57E-04	2.04E-04	9.14E-05
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	2.24E-02	7.10	15.9	35.5	3.16E-03	1.41E-03	6.32E-04
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	1.22E-03	7.10	15.9	35.5	1.72E-04	7.70E-05	3.44E-05
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	1.26E-02	7.10	15.9	35.5	1.77E-03	7.91E-04	3.54E-04
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	5.13E-04	7.10	15.9	35.5	7.22E-05	3.23E-05	1.44E-05
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	3.63E-03	7.10	15.9	35.5	5.11E-04	2.28E-04	1.02E-04
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	1.09E-02	7.10	15.9	35.5	1.53E-03	6.86E-04	3.07E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	3.02E-02	0.113	0.253	0.565	2.67E-01	1.19E-01	5.34E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	1.27E-02	3.39	7.58	17.0	3.74E-03	1.67E-03	7.48E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	1.19E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	2.33E-02	7.10	15.9	35.5	3.28E-03	1.47E-03	6.56E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	1.00E-02	6.73	21.3	67.3	1.49E-03	4.70E-04	1.49E-04
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	7.67E-03	7.10	15.9	35.5	1.08E-03	4.83E-04	2.16E-04
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	3.66E-02	7.10	15.9	35.5	5.15E-03	2.30E-03	1.03E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.42E-04	0.00E+00	3.29E-05	0.000014	0.000044	0.00014	**2.35E+00**	7.42E-01	2.35E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0919	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0858	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.235	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	5.80E-02	2.64E+00	2.46	4.26	7.38	**1.07E+00**	6.19E-01	3.57E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	1.19E-01	1.47	3.29	7.35	8.06E-02	3.61E-02	1.61E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	5.43E-01	2.66	5.95	13.3	2.04E-01	9.13E-02	4.08E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	1.20E+02	4.05	7.00	12.1	**2.96E+01**	**1.71E+01**	**9.89E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	1.20E+00	3.85	8.61	19.3	3.12E-01	1.40E-01	6.24E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	2.00E-04	1.72E-01	0.026	0.045	0.078	**6.63E+00**	**3.83E+00**	**2.21E+00**
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	2.76E-01	6.71	15.0	33.6	4.12E-02	1.84E-02	8.24E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	1.30E-03	4.95E-01	0.40	0.57	0.80	**1.24E+00**	8.75E-01	6.19E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	8.39E-02	4.04	9.03	20.2	2.08E-02	9.28E-03	4.15E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	1.34E+01	66.1	148	331	2.02E-01	9.04E-02	4.04E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	1.20E+01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	9.20E-01	1.50	3.35	7.50	6.13E-01	2.74E-01	1.23E-01
Aroclor-1221	6.60E-01	Regression	2.69E+01	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	2.06E+00	1.50	3.35	7.50	**1.37E+00**	6.14E-01	2.74E-01
Aroclor-1232	4.40E-01	Regression	1.84E+01	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	1.41E+00	1.50	3.35	7.50	9.38E-01	4.19E-01	1.88E-01
Aroclor-1242	5.20E-02	Regression	2.48E+00	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	1.90E-01	1.50	3.35	7.50	1.26E-01	5.65E-02	2.53E-02
Aroclor-1248	1.90E-02	Regression	9.63E-01	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	7.39E-02	1.50	3.35	7.50	4.92E-02	2.20E-02	9.85E-03
Aroclor-1254	2.10E+01	Regression	6.94E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	5.30E+01	1.50	3.35	7.50	**3.53E+01**	**1.58E+01**	**7.07E+00**
Aroclor-1260	2.40E+00	Regression	9.06E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	6.92E+00	1.50	3.35	7.50	**4.61E+00**	**2.06E+00**	9.22E-01
PCB (total)	2.10E+01	Regression	6.94E+02	0.139	2.93E+00	5.17	1.09E+02	7.81E-04	5.30E+01	1.50	3.35	7.50	**3.53E+01**	**1.58E+01**	**7.07E+00**
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	5.46E-02	0.12	0.27	0.60	4.55E-01	2.04E-01	9.10E-02
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	8.62E-02	0.12	0.27	0.60	7.18E-01	3.21E-01	1.44E-01
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	8.64E-02	0.60	0.95	1.50	1.44E-01	9.11E-02	5.76E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	6.11E-05	0.155	0.347	0.775	3.94E-04	1.76E-04	7.89E-05
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	4.62E-03	0.56	1.12	2.25	8.24E-03	4.11E-03	2.05E-03
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	2.46E-03	2.14	4.79	10.7	1.15E-03	5.15E-04	2.30E-04
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	4.62E-03	0.56	1.12	2.25	8.24E-03	4.11E-03	2.05E-03
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	4.62E-03	0.56	1.12	2.25	8.24E-03	4.11E-03	2.05E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	5.26E-01	0.071	0.518	3.780	**7.42E+00**	**1.02E+00**	1.39E-01
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	3.44E-04	10.0	22.4	50.0	3.44E-05	1.54E-05	6.87E-06
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	4.65E-03	10.0	22.4	50.0	4.65E-04	2.08E-04	9.30E-05
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	5.50E-02	0.30	0.67	1.50	1.83E-01	8.20E-02	3.67E-02
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	1.38E-04	4.00	8.9	20.0	3.45E-05	1.54E-05	6.90E-06
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	1.58E-01	2.14	4.79	10.7	7.38E-02	3.30E-02	1.48E-02
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	3.14E-05	0.48	1.07	2.40	6.54E-05	2.92E-05	1.31E-05
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	1.54E-02	0.48	1.07	2.40	3.20E-02	1.43E-02	6.40E-03
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	3.99E-02	355	794	1,775	1.12E-04	5.03E-05	2.25E-05
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	9.97E-02	1.00	2.24	5.00	9.97E-02	4.46E-02	1.99E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	2.66E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	8.90E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	5.95E-02	80.4	180	402	7.41E-04	3.31E-04	1.48E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	2.15E-02	7.10	15.9	35.5	3.03E-03	1.36E-03	6.06E-04
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	1.19E-02	7.10	15.9	35.5	1.67E-03	7.49E-04	3.35E-04
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	2.63E-02	7.10	15.9	35.5	3.70E-03	1.65E-03	7.40E-04
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	5.15E-02	7.10	15.9	35.5	7.25E-03	3.24E-03	1.45E-03

ATTACHMENT TABLE L-2-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	2.43E-01	7.10	15.9	35.5	3.42E-02	1.53E-02	6.84E-03
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	1.60E-01	7.10	15.9	35.5	2.25E-02	1.01E-02	4.51E-03
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	4.71E-02	7.10	15.9	35.5	6.64E-03	2.97E-03	1.33E-03
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	5.62E-02	7.10	15.9	35.5	7.91E-03	3.54E-03	1.58E-03
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	1.10E-01	7.10	15.9	35.5	1.55E-02	6.95E-03	3.11E-03
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	1.17E-02	7.10	15.9	35.5	1.65E-03	7.38E-04	3.30E-04
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	5.09E-02	7.10	15.9	35.5	7.17E-03	3.21E-03	1.43E-03
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	6.10E-02	7.10	15.9	35.5	8.59E-03	3.84E-03	1.72E-03
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	1.06E-01	0.113	0.253	0.565	9.35E-01	4.18E-01	1.87E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	7.80E-02	3.39	7.58	17.0	2.30E-02	1.03E-02	4.60E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	1.23E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	5.60E-02	7.10	15.9	35.5	7.88E-03	3.53E-03	1.58E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	1.13E-02	6.73	21.3	67.3	1.68E-03	5.31E-04	1.68E-04
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	2.76E-02	7.10	15.9	35.5	3.88E-03	1.74E-03	7.76E-04
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	9.50E-01	7.10	15.9	35.5	1.34E-01	5.98E-02	2.68E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0012 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0050 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0156 = Body weight (kg)

ATTACHMENT TABLE L-2-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	3.90E+00	5.80E-02	1.90E-01	1.04	1.31	1.66	1.82E-01	1.44E-01	1.14E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	3.56E-01	8.20E-04	1.71E-02	0.77	2.43	7.70	2.23E-02	7.04E-03	2.23E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	1.72E+00	6.30E-03	8.28E-02	2.40	5.37	12.0	3.45E-02	1.54E-02	6.90E-03
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.22E+01	2.59E-02	5.90E-01	11.7	13.3	15.1	5.04E-02	4.43E-02	3.90E-02
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	1.95E+00	5.90E-03	9.43E-02	4.70	6.47	8.90	2.01E-02	1.46E-02	1.06E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	1.19E-01	2.00E-04	5.72E-03	0.150	0.192	0.247	3.81E-02	2.97E-02	2.32E-02
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.59E+00	3.50E-03	7.64E-02	1.70	2.40	3.40	4.50E-02	3.18E-02	2.25E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.46E+00	1.30E-03	7.01E-02	0.20	0.26	0.33	3.50E-01	2.73E-01	2.12E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	1.17E+00	7.00E-05	5.65E-02	12.0	26.9	60.2	4.69E-03	2.10E-03	9.39E-04
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.47E+02	6.54E-02	1.19E+01	75.4	169	377	1.58E-01	7.05E-02	3.15E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	6.97E-02	1.37	2.17	3.43	5.09E-02	3.22E-02	2.03E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	1.64E-01	0.137	0.306	0.685	**1.20E+00**	5.37E-01	2.40E-01
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	1.10E-01	0.137	0.306	0.685	8.00E-01	3.58E-01	1.60E-01
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	1.30E-02	0.137	0.306	0.685	9.47E-02	4.24E-02	1.89E-02
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	4.77E-03	0.137	0.306	0.685	3.48E-02	1.56E-02	6.96E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	5.23E+00	0.137	0.306	0.685	**3.82E+01**	**1.71E+01**	**7.63E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	5.98E-01	0.137	0.306	0.685	**4.36E+00**	**1.95E+00**	8.72E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	8.43E+00	7.81E-04	4.06E-01	0.137	0.306	0.685	**2.96E+00**	**1.32E+00**	5.92E-01
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	7.86E-02	0.147	0.329	0.735	5.35E-01	2.39E-01	1.07E-01
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	1.39E+00	0.147	0.329	0.735	**9.49E+00**	**4.24E+00**	**1.90E+00**
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	7.76E-01	0.147	0.329	0.735	**5.28E+00**	**2.36E+00**	**1.06E+00**
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	2.45E-04	0.20	0.45	1.00	1.22E-03	5.48E-04	2.45E-04
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	1.60E-02	1.60	2.26	3.20	1.00E-02	7.07E-03	5.00E-03
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	5.98E-03	4.58	6.48	9.16	1.31E-03	9.23E-04	6.53E-04
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	1.60E-02	1.60	2.26	3.20	1.00E-02	7.07E-03	5.00E-03
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	1.60E-02	1.60	2.26	3.20	1.00E-02	7.07E-03	5.00E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	1.02E+00	0.015	0.021	0.030	**6.78E+01**	**4.80E+01**	**3.39E+01**
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	1.41E-02	0.15	0.34	0.75	9.37E-02	4.19E-02	1.87E-02
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	2.01E-01	0.15	0.34	0.75	**1.34E+00**	6.00E-01	2.68E-01
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	2.91E-01	0.184	0.411	0.920	**1.58E+00**	7.07E-01	3.16E-01
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	1.92E-04	8.00	17.9	40.0	2.40E-05	1.07E-05	4.79E-06
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	2.10E-01	4.58	6.48	9.16	4.59E-02	3.25E-02	2.30E-02
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	4.15E-04	0.20	0.45	1.00	2.07E-03	9.27E-04	4.15E-04
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	1.31E-01	0.20	0.45	1.00	6.54E-01	2.93E-01	1.31E-01
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	1.26E-01	4.00	5.66	8.00	3.15E-02	2.23E-02	1.58E-02
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	3.15E-01	8.00	17.9	40.0	3.94E-02	1.76E-02	7.88E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.35E-03	76.0	170	380	1.78E-05	7.94E-06	3.55E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	9.12E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	3.78E-02	53.0	75.0	106	7.13E-04	5.04E-04	3.56E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	2.42E-02	85.7	192	429	2.82E-04	1.26E-04	5.64E-05
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	4.35E-03	85.7	192	429	5.07E-05	2.27E-05	1.01E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	3.05E-03	30.0	52.0	90.0	1.02E-04	5.88E-05	3.39E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	7.74E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	7.74E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	1.73E-03	65.6	147	328	2.64E-05	1.18E-05	5.28E-06
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	4.37E-04	65.6	147	328	6.66E-06	2.98E-06	1.33E-06
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	4.67E-04	65.6	147	328	7.12E-06	3.18E-06	1.42E-06
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	6.28E-03	0.62	1.37	3.07	1.02E-02	4.57E-03	2.05E-03

ATTACHMENT TABLE L-2-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	1.01E-03	0.62	1.37	3.07	1.64E-03	7.34E-04	3.28E-04
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	2.09E-03	0.62	1.37	3.07	3.41E-03	1.52E-03	6.82E-04
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	1.45E-02	0.62	1.37	3.07	2.36E-02	1.06E-02	4.73E-03
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	7.90E-04	0.62	1.37	3.07	1.28E-03	5.75E-04	2.57E-04
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	8.12E-03	0.62	1.37	3.07	1.32E-02	5.91E-03	2.64E-03
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	3.31E-04	0.62	1.37	3.07	5.37E-04	2.41E-04	1.08E-04
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	2.34E-03	65.6	147	328	3.57E-05	1.60E-05	7.14E-06
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	7.04E-03	65.6	147	328	1.07E-04	4.80E-05	2.15E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	1.95E-02	2.00	2.83	4.00	9.75E-03	6.89E-03	4.88E-03
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	8.15E-03	2.00	6.32	20.0	4.07E-03	1.29E-03	4.07E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	7.74E-02	75.0	168	375	1.03E-03	4.61E-04	2.06E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	7.71E-02	100	224	500	7.71E-04	3.45E-04	1.54E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	1.51E-02	0.62	1.37	3.07	2.45E-02	1.10E-02	4.91E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	6.42E-03	8.42	18.8	42.1	7.63E-04	3.41E-04	1.53E-04
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	4.96E-03	65.6	147	328	7.57E-05	3.38E-05	1.51E-05
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	2.37E-02	0.62	1.37	3.07	3.85E-02	1.72E-02	7.70E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.49E-04	0.00E+00	7.17E-06	0.000001	0.000003	0.00001	**7.17E+00**	**2.27E+00**	7.17E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0349 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0286 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.726 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	5.80E-02	2.85E+00	0.25	0.56	1.26	**1.13E+01**	**5.05E+00**	**2.26E+00**
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	2.90E-01	0.77	2.43	7.70	3.76E-01	1.19E-01	3.76E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	9.90E-01	2.40	5.37	12.0	4.12E-01	1.84E-01	8.25E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	3.34E+00	5.60	7.23	9.34	5.96E-01	4.62E-01	3.58E-01
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	4.72E+00	4.70	6.47	8.90	**1.00E+00**	7.30E-01	5.31E-01
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	2.00E-04	3.75E-02	0.032	0.072	0.160	**1.17E+00**	5.25E-01	2.35E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	3.80E-01	1.70	2.40	3.40	2.23E-01	1.58E-01	1.12E-01
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	1.30E-03	4.32E-01	0.20	0.26	0.33	**2.16E+00**	**1.68E+00**	**1.31E+00**
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	7.92E-02	12.0	26.9	60.2	6.58E-03	2.94E-03	1.32E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	2.19E+01	75.4	169	377	2.91E-01	1.30E-01	5.82E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	1.12E-02	0.136	0.304	0.680	8.21E-02	3.67E-02	1.64E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	5.22E-02	0.136	0.304	0.680	3.84E-01	1.72E-01	7.67E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	2.53E-02	0.136	0.304	0.680	1.86E-01	8.32E-02	3.72E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	2.20E-03	0.136	0.304	0.680	1.62E-02	7.24E-03	3.24E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	6.83E-04	0.136	0.304	0.680	5.02E-03	2.24E-03	1.00E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	4.72E-01	0.136	0.304	0.680	**3.47E+00**	**1.55E+00**	6.94E-01
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	4.65E-02	0.136	0.304	0.680	3.42E-01	1.53E-01	6.84E-02
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	7.81E-04	4.72E-01	0.136	0.304	0.680	**3.47E+00**	**1.55E+00**	6.94E-01
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	7.29E-03	0.147	0.329	0.735	4.96E-02	2.22E-02	9.92E-03
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	1.09E-02	0.147	0.329	0.735	7.40E-02	3.31E-02	1.48E-02
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	5.01E-02	0.147	0.329	0.735	3.41E-01	1.52E-01	6.81E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	3.52E-05	0.20	0.45	1.00	1.76E-04	7.87E-05	3.52E-05
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	1.12E-02	1.60	2.26	3.20	7.02E-03	4.96E-03	3.51E-03
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	4.35E-04	4.58	6.48	9.16	9.49E-05	6.71E-05	4.75E-05
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	1.11E-02	1.60	2.26	3.20	6.96E-03	4.92E-03	3.48E-03
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	8.64E-03	1.60	2.26	3.20	5.40E-03	3.82E-03	2.70E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	2.08E-01	0.015	0.021	0.030	**1.38E+01**	**9.78E+00**	**6.92E+00**
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	9.61E-03	0.15	0.34	0.75	6.41E-02	2.87E-02	1.28E-02
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	7.59E-02	0.15	0.34	0.75	5.06E-01	2.26E-01	1.01E-01
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	7.08E-02	0.184	0.411	0.920	3.85E-01	1.72E-01	7.70E-02
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	1.54E-04	8.00	17.9	40.0	1.92E-05	8.59E-06	3.84E-06
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	1.94E-02	4.58	6.48	9.16	4.23E-03	2.99E-03	2.11E-03
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	5.64E-05	0.20	0.45	1.00	2.82E-04	1.26E-04	5.64E-05
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	3.34E-02	0.20	0.45	1.00	1.67E-01	7.47E-02	3.34E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	3.03E-02	4.00	5.66	8.00	7.58E-03	5.36E-03	3.79E-03
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	5.53E-02	8.00	17.9	40.0	6.91E-03	3.09E-03	1.38E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	3.07E-03	76.0	170	380	4.04E-05	1.81E-05	8.09E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	1.51E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	2.27E-01	53.0	75.0	106	4.28E-03	3.02E-03	2.14E-03
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	3.78E-01	85.7	192	429	4.41E-03	1.97E-03	8.82E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	3.55E-01	85.7	192	429	4.14E-03	1.85E-03	8.29E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	3.81E-01	30.0	52.0	90.0	1.27E-02	7.34E-03	4.24E-03
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.01E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.05E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	3.88E-03	65.6	147	328	5.92E-05	2.65E-05	1.18E-05
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	6.69E-03	65.6	147	328	1.02E-04	4.56E-05	2.04E-05
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	1.46E-02	65.6	147	328	2.22E-04	9.94E-05	4.45E-05
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	2.23E-02	0.62	1.37	3.07	3.62E-02	1.62E-02	7.26E-03

ATTACHMENT TABLE L-2-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	4.44E-02	0.62	1.37	3.07	7.22E-02	3.23E-02	1.45E-02
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	2.10E-01	0.62	1.37	3.07	3.42E-01	1.53E-01	6.86E-02
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	9.61E-02	0.62	1.37	3.07	1.56E-01	6.99E-02	3.13E-02
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	3.14E-02	0.62	1.37	3.07	5.10E-02	2.28E-02	1.02E-02
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	3.70E-02	0.62	1.37	3.07	6.02E-02	2.69E-02	1.21E-02
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	2.04E-02	0.62	1.37	3.07	3.32E-02	1.48E-02	6.64E-03
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	7.99E-01	65.6	147	328	1.22E-02	5.45E-03	2.44E-03
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	4.81E-03	65.6	147	328	7.33E-05	3.28E-05	1.47E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	5.23E-02	2.00	2.83	4.00	2.62E-02	1.85E-02	1.31E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	1.17E-01	2.00	6.32	20.0	5.86E-02	1.85E-02	5.86E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	7.53E-02	75.0	168	375	1.00E-03	4.49E-04	2.01E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	2.29E-01	100	224	500	2.29E-03	1.02E-03	4.57E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	6.57E-02	0.62	1.37	3.07	1.07E-01	4.78E-02	2.14E-02
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	3.09E-01	8.42	18.8	42.1	3.67E-02	1.64E-02	7.33E-03
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	6.21E-02	65.6	147	328	9.46E-04	4.23E-04	1.89E-04
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	8.79E-01	0.62	1.37	3.07	**1.43E+00**	6.40E-01	2.86E-01
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0765 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1426 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.750 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	6.88E+00	5.80E-02	1.29E+00	1.04	1.31	1.66	**1.24E+00**	9.85E-01	7.79E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	5.86E-01	8.20E-04	7.65E-02	0.77	2.43	7.70	9.94E-02	3.14E-02	9.94E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	2.81E+00	6.30E-03	3.27E-01	2.40	5.37	12.0	1.36E-01	6.09E-02	2.72E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.89E+01	2.59E-02	2.19E+01	11.7	13.3	15.1	**1.87E+00**	**1.65E+00**	**1.45E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	3.14E+00	5.90E-03	1.53E+00	4.70	6.47	8.90	3.25E-01	2.36E-01	1.72E-01
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	1.13E-01	2.00E-04	3.70E-02	0.150	0.192	0.247	2.46E-01	1.92E-01	1.50E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.75E+00	3.50E-03	1.48E-01	1.70	2.40	3.40	8.69E-02	6.14E-02	4.34E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.83E+00	1.30E-03	1.60E-01	0.20	0.26	0.33	7.98E-01	6.21E-01	4.84E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.26E-01	7.00E-05	3.73E-02	12.0	26.9	60.2	3.10E-03	1.38E-03	6.19E-04
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.22E+02	6.54E-02	6.79E+00	75.4	169	377	9.01E-02	4.03E-02	1.80E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.17	1.45E+00	6.70E-04	1.79E-02	1.37	2.17	3.43	1.31E-02	8.26E-03	5.22E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.17	3.42E+00	9.30E-04	4.86E-02	0.137	0.306	0.685	3.55E-01	1.59E-01	7.09E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.17	2.28E+00	6.70E-04	3.02E-02	0.137	0.306	0.685	2.20E-01	9.85E-02	4.40E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.17	2.69E-01	8.00E-04	3.02E-03	0.137	0.306	0.685	2.21E-02	9.87E-03	4.41E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	9.30E-04	1.09E-03	0.137	0.306	0.685	7.95E-03	3.55E-03	1.59E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.17	1.09E+02	6.70E-04	1.87E+00	0.137	0.306	0.685	**1.37E+01**	**6.11E+00**	**2.73E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.17	1.24E+01	8.00E-04	1.76E-01	0.137	0.306	0.685	**1.28E+00**	5.73E-01	2.56E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	6.56E+00	7.81E-04	1.65E+00	0.137	0.306	0.685	**1.20E+01**	**5.38E+00**	**2.41E+00**
Pesticides															
4,4'-DDD	3.80E-01	1.88	7.15E-01	Regresson	3.92E-02	4.30	1.63E+00	1.30E-04	1.48E-02	0.147	0.329	0.735	1.00E-01	4.49E-02	2.01E-02
4,4'-DDE	6.00E-01	1.88	1.13E+00	Regresson	5.52E-02	48.3	2.90E+01	1.30E-04	8.03E-02	0.147	0.329	0.735	5.46E-01	2.44E-01	1.09E-01
4,4'-DDT	3.30E+00	0.343	1.13E+00	Regresson	1.99E-01	4.89	1.61E+01	1.30E-04	6.22E-02	0.147	0.329	0.735	4.23E-01	1.89E-01	8.46E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	6.70E-05	3.21E-05	0.20	0.45	1.00	1.61E-04	7.18E-05	3.21E-05
alpha-BHC	6.60E-02	0.912	6.02E-02	1.735	1.15E-01	5.03	3.32E-01	6.70E-05	3.15E-03	1.60	2.26	3.20	1.97E-03	1.39E-03	9.83E-04
alpha-Chlordane	1.70E-02	1.88	3.20E-02	0.165	2.80E-03	7.30	1.24E-01	6.70E-05	7.93E-04	4.58	6.48	9.16	1.73E-04	1.22E-04	8.66E-05
beta-BHC	6.60E-02	0.912	6.02E-02	1.719	1.13E-01	5.03	3.32E-01	6.70E-05	3.13E-03	1.60	2.26	3.20	1.96E-03	1.38E-03	9.79E-04
delta-BHC	6.60E-02	0.912	6.02E-02	1.311	8.65E-02	5.03	3.32E-01	6.70E-05	2.80E-03	1.60	2.26	3.20	1.75E-03	1.24E-03	8.75E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	15.1	2.11E+01	1.30E-04	1.69E-01	0.015	0.021	0.030	**1.12E+01**	**7.95E+00**	**5.62E+00**
Endosulfan I	5.80E-02	0.073	4.22E-03	1.687	9.79E-02	5.03	2.92E-01	6.70E-05	2.08E-03	0.15	0.34	0.75	1.38E-02	6.19E-03	2.77E-03
Endosulfan II	8.30E-01	0.073	6.03E-02	0.886	7.35E-01	5.03	4.18E+00	1.30E-04	2.14E-02	0.15	0.34	0.75	1.42E-01	6.37E-02	2.85E-02
Endrin	1.20E+00	0.600	7.20E-01	0.535	6.42E-01	5.03	6.04E+00	1.30E-04	3.42E-02	0.184	0.411	0.920	1.86E-01	8.31E-02	3.72E-02
gamma-BHC (Lindane)	7.80E-04	1.95	1.52E-03	1.852	1.44E-03	5.03	3.93E-03	6.70E-05	5.88E-05	8.00	17.9	40.0	7.35E-06	3.29E-06	1.47E-06
gamma-Chlordane	7.80E-01	2.65	2.07E+00	0.165	1.29E-01	5.60	4.37E+00	6.70E-05	4.12E-02	4.58	6.48	9.16	8.99E-03	6.36E-03	4.49E-03
Heptachlor	1.70E-03	0.075	1.28E-04	0.174	2.96E-04	5.03	8.56E-03	6.70E-05	3.85E-05	0.20	0.45	1.00	1.92E-04	8.60E-05	3.85E-05
Heptachlor epoxide	5.40E-01	0.372	2.01E-01	0.566	3.05E-01	5.03	2.72E+00	6.70E-05	1.39E-02	0.20	0.45	1.00	6.97E-02	3.12E-02	1.39E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.03	2.62E+00	6.70E-04	1.76E-02	4.00	5.66	8.00	4.41E-03	3.12E-03	2.21E-03
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	5.03	6.55E+00	1.30E-03	4.13E-02	8.00	17.9	40.0	5.17E-03	2.31E-03	1.03E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.10E-03	76.0	170	380	1.45E-05	6.49E-06	2.90E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.101	1.81E-01	1.00E-02	3.98E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.490	7.83E-01	2.00E-03	4.52E-02	53.0	75.0	106	8.53E-04	6.03E-04	4.27E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.313	5.01E-01	1.00E-03	7.59E-02	85.7	192	429	8.86E-04	3.96E-04	1.77E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.056	8.95E-02	1.00E-03	7.19E-02	85.7	192	429	8.39E-04	3.75E-04	1.68E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.039	6.27E-02	1.00E-03	7.54E-02	30.0	52.0	90.0	2.51E-03	1.45E-03	8.38E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	4.23E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	4.28E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	0.939	2.82E-01	Regresson	1.08E-02	0.120	3.60E-02	6.90E-05	4.88E-03	65.6	147	328	7.45E-05	3.33E-05	1.49E-05
Acenaphthylene	1.20E-01	1.290	1.55E-01	Regresson	5.95E-02	0.074	8.92E-03	2.00E-04	3.22E-03	65.6	147	328	4.90E-05	2.19E-05	9.81E-06
Anthracene	2.60E-01	1.320	3.43E-01	Regresson	1.30E-01	0.037	9.54E-03	2.00E-04	7.04E-03	65.6	147	328	1.07E-04	4.80E-05	2.15E-05
Benzo(a)anthracene	1.50E+00	0.448	6.73E-01	Regresson	8.49E-02	0.087	1.30E-01	3.40E-04	1.48E-02	0.62	1.37	3.07	2.41E-02	1.08E-02	4.82E-03

ATTACHMENT TABLE L-2-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.513	3.18E+00	Regresson	2.62E-01	0.010	2.08E-02	2.40E-04	5.22E-02	0.62	1.37	3.07	8.49E-02	3.80E-02	1.70E-02
Benzo(b)fluoranthene	3.90E+00	0.537	2.09E+00	0.480	1.87E+00	0.011	4.31E-02	5.80E-04	6.28E-02	0.62	1.37	3.07	1.02E-01	4.57E-02	2.05E-02
Benzo(g,h,i)perylene	1.90E+00	0.324	6.16E-01	Regresson	8.42E-01	0.159	3.01E-01	1.60E-04	2.49E-02	0.62	1.37	3.07	4.05E-02	1.81E-02	8.11E-03
Benzo(k)fluoranthene	1.60E+00	0.459	7.35E-01	Regresson	1.73E-01	0.010	1.63E-02	1.50E-04	1.67E-02	0.62	1.37	3.07	2.72E-02	1.22E-02	5.45E-03
Chrysene	2.70E+00	0.535	1.44E+00	Regresson	1.20E-01	0.062	1.69E-01	8.00E-05	2.92E-02	0.62	1.37	3.07	4.74E-02	2.12E-02	9.50E-03
Dibenz(a,h)anthracene	6.60E-01	0.231	1.53E-01	0.230	1.52E-01	0.010	6.71E-03	2.00E-04	5.89E-03	0.62	1.37	3.07	9.58E-03	4.29E-03	1.92E-03
Fluoranthene	1.80E+00	0.370	6.66E-01	4.700	8.46E+00	0.027	4.84E-02	3.20E-04	1.19E-01	65.6	147	328	1.81E-03	8.10E-04	3.62E-04
Fluorene	4.20E-01	1.90	7.98E-01	Regresson	8.07E-03	0.348	1.46E-01	2.00E-04	1.24E-02	65.6	147	328	1.89E-04	8.46E-05	3.78E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.252	4.03E-01	3.00E-03	2.93E-02	2.00	2.83	4.00	1.46E-02	1.04E-02	7.32E-03
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.101	1.61E-01	1.00E-02	3.30E-02	2.00	6.32	20.0	1.65E-02	5.21E-03	1.65E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	3.89E-02	75.0	168	375	5.18E-04	2.32E-04	1.04E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	3.00E-03	5.85E-02	100	224	500	5.85E-04	2.62E-04	1.17E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.261	7.32E-01	0.150	4.20E-01	0.112	3.13E-01	2.40E-04	2.39E-02	0.62	1.37	3.07	3.88E-02	1.74E-02	7.78E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.147	1.26E-01	9.00E-03	4.43E-02	8.42	18.8	42.1	5.26E-03	2.35E-03	1.05E-03
Phenanthrene	5.90E-01	0.611	3.61E-01	Regresson	6.10E-01	0.175	1.03E-01	8.80E-05	1.43E-02	65.6	147	328	2.19E-04	9.78E-05	4.37E-05
Pyrene	3.80E+00	3.27	1.24E+01	2.400	9.12E+00	0.129	4.91E-01	2.90E-04	2.92E-01	0.62	1.37	3.07	4.75E-01	2.13E-01	9.52E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.19E-04	0.00E+00	2.56E-07	0.000001	0.000003	0.00001	2.56E-01	8.10E-02	2.56E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.1307	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.436	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.400	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.070	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.094	= Proportion of diet composed of sediment
WIR =	0.6092	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	4.23	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	Measured	1.73E+00	1.03E-02	3.31E-01	5.14	8.12	12.8	6.44E-02	4.07E-02	2.58E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	Measured	3.22E-01	8.20E-04	4.81E-02	1.47	3.29	7.35	3.27E-02	1.46E-02	6.55E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	Measured	1.20E+00	1.53E-03	2.25E-01	2.66	5.95	13.3	8.45E-02	3.78E-02	1.69E-02
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	Measured	8.17E+00	6.66E-03	1.65E+00	4.05	7.00	12.1	4.08E-01	2.36E-01	1.37E-01
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	Measured	1.09E+00	1.55E-03	2.04E-01	3.85	8.61	19.3	5.30E-02	2.37E-02	1.06E-02
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	Measured	8.03E-02	9.18E-05	1.12E-02	0.026	0.045	0.078	4.33E-01	2.50E-01	1.44E-01
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	Measured	6.80E-01	1.27E-03	1.05E-01	6.71	15.0	33.6	1.57E-02	7.00E-03	3.13E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	Measured	1.25E+00	1.30E-03	1.54E-01	1.80	4.02	9.00	8.56E-02	3.83E-02	1.71E-02
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	Measured	5.01E-01	7.00E-05	5.48E-02	4.04	9.03	20.2	1.36E-02	6.07E-03	2.71E-03
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	Measured	1.70E+02	2.15E-02	2.03E+01	66.1	148	331	3.07E-01	1.37E-01	6.15E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	2.18E-02	1.50	3.35	7.50	1.45E-02	6.51E-03	2.91E-03
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	3.31E-02	1.50	3.35	7.50	2.20E-02	9.85E-03	4.41E-03
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	2.58E-02	1.50	3.35	7.50	1.72E-02	7.70E-03	3.44E-03
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	2.25E-02	1.50	3.35	7.50	1.50E-02	6.70E-03	2.99E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	1.10E-02	1.50	3.35	7.50	7.35E-03	3.29E-03	1.47E-03
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	8.66E-01	1.50	3.35	7.50	5.77E-01	2.58E-01	1.15E-01
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	3.68E-01	1.50	3.35	7.50	2.45E-01	1.10E-01	4.90E-02
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	Measured	6.37E+00	3.11E-04	8.02E-01	1.50	3.35	7.50	5.35E-01	2.39E-01	1.07E-01
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	1.87E-02	0.30	0.95	3.00	6.23E-02	1.97E-02	6.23E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	2.97E-02	0.30	0.95	3.00	9.90E-02	3.13E-02	9.90E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	9.56E-02	0.30	0.95	3.00	3.19E-01	1.01E-01	3.19E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	5.28E-04	0.155	0.347	0.775	3.41E-03	1.52E-03	6.82E-04
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	6.54E-03	0.56	1.12	2.25	1.17E-02	5.83E-03	2.91E-03
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	4.21E-03	0.80	1.79	4.00	5.26E-03	2.35E-03	1.05E-03
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	6.54E-03	0.56	1.12	2.25	1.17E-02	5.83E-03	2.91E-03
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	6.54E-03	0.56	1.12	2.25	1.17E-02	5.83E-03	2.91E-03
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	4.60E-02	0.071	0.518	3.780	6.48E-01	8.88E-02	1.22E-02
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	8.09E-03	10.0	22.4	50.0	8.09E-04	3.62E-04	1.62E-04
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	4.81E-02	10.0	22.4	50.0	4.81E-03	2.15E-03	9.62E-04
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	6.62E-02	0.30	0.67	1.50	2.21E-01	9.87E-02	4.41E-02
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	6.42E-03	4.00	8.9	20.0	1.60E-03	7.18E-04	3.21E-04
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	3.20E-02	0.80	1.79	4.00	4.00E-02	1.79E-02	8.01E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	8.81E-04	0.48	1.07	2.40	1.83E-03	8.20E-04	3.67E-04
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	3.17E-02	0.48	1.07	2.40	6.59E-02	2.95E-02	1.32E-02
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	3.51E-02	355	794	1,775	9.90E-05	4.43E-05	1.98E-05
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	1.39E-01	1.00	2.24	5.00	1.39E-01	6.22E-02	2.78E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	7.18E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	7.42E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	5.64E-03	80.4	180	402	7.02E-05	3.14E-05	1.40E-05
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	6.73E-03	80.4	180	402	8.37E-05	3.74E-05	1.67E-05
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	3.32E-03	80.4	180	402	4.13E-05	1.85E-05	8.26E-06
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	3.10E-03	80.4	180	402	3.85E-05	1.72E-05	7.70E-06
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	4.57E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	4.57E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	1.27E-03	7.10	15.9	35.5	1.79E-04	8.03E-05	3.59E-05
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	7.65E-04	7.10	15.9	35.5	1.08E-04	4.82E-05	2.15E-05
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	1.94E-03	7.10	15.9	35.5	2.73E-04	1.22E-04	5.47E-05
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	1.29E-03	7.10	15.9	35.5	1.82E-04	8.13E-05	3.64E-05

ATTACHMENT TABLE L-2-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	6.78E-04	7.10	15.9	35.5	9.54E-05	4.27E-05	1.91E-05
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	5.11E-04	7.10	15.9	35.5	7.19E-05	3.22E-05	1.44E-05
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	2.65E-04	7.10	15.9	35.5	3.73E-05	1.67E-05	7.47E-06
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	1.56E-03	7.10	15.9	35.5	2.19E-04	9.81E-05	4.39E-05
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	2.25E-03	7.10	15.9	35.5	3.17E-04	1.42E-04	6.34E-05
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	2.23E-04	7.10	15.9	35.5	3.14E-05	1.40E-05	6.28E-06
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	1.91E-03	7.10	15.9	35.5	2.69E-04	1.20E-04	5.37E-05
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	2.33E-03	7.10	15.9	35.5	3.29E-04	1.47E-04	6.57E-05
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	9.84E-03	0.113	0.253	0.565	8.71E-02	3.90E-02	1.74E-02
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	7.10E-03	3.39	7.58	17.0	2.10E-03	9.37E-04	4.19E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	4.57E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	3.33E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	2.77E-04	7.10	15.9	35.5	3.90E-05	1.74E-05	7.79E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	1.53E-02	6.73	21.3	67.3	2.28E-03	7.20E-04	2.28E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	2.51E-03	7.10	15.9	35.5	3.53E-04	1.58E-04	7.06E-05
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	7.11E-03	7.10	15.9	35.5	1.00E-03	4.48E-04	2.00E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.17E-04	0.00E+00	2.22E-05	0.000014	0.000044	0.00014	**1.58E+00**	5.01E-01	1.58E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0180	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.160	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.840	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0164	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.1480	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	Measured	2.83E+00	1.03E-02	1.60E-01	5.14	8.12	12.8	3.11E-02	1.97E-02	1.24E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	Measured	5.19E-01	8.20E-04	2.93E-02	1.47	3.29	7.35	1.99E-02	8.90E-03	3.98E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	Measured	1.79E+00	1.53E-03	1.01E-01	2.66	5.95	13.3	3.78E-02	1.69E-02	7.57E-03
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	Measured	1.18E+01	6.66E-03	6.62E-01	4.05	7.00	12.1	1.64E-01	9.46E-02	5.47E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	Measured	1.63E+00	1.55E-03	9.18E-02	3.85	8.61	19.3	2.39E-02	1.07E-02	4.77E-03
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	Measured	7.99E-02	9.18E-05	4.50E-03	0.026	0.045	0.078	1.73E-01	9.99E-02	5.77E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	Measured	8.21E-01	1.27E-03	4.62E-02	6.71	15.0	33.6	6.89E-03	3.08E-03	1.38E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	Measured	1.42E+00	1.30E-03	8.00E-02	1.80	4.02	9.00	4.44E-02	1.99E-02	8.89E-03
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	Measured	4.77E-01	7.00E-05	2.68E-02	4.04	9.03	20.2	6.64E-03	2.97E-03	1.33E-03
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	Measured	1.53E+02	2.15E-02	8.63E+00	66.1	148	331	1.31E-01	5.84E-02	2.61E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	1.09E-02	1.50	3.35	7.50	7.27E-03	3.25E-03	1.45E-03
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	1.65E-02	1.50	3.35	7.50	1.10E-02	4.90E-03	2.19E-03
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	1.29E-02	1.50	3.35	7.50	8.59E-03	3.84E-03	1.72E-03
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	1.12E-02	1.50	3.35	7.50	7.48E-03	3.34E-03	1.50E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	5.55E-03	1.50	3.35	7.50	3.70E-03	1.65E-03	7.40E-04
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	4.14E-01	1.50	3.35	7.50	2.76E-01	1.24E-01	5.52E-02
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	1.78E-01	1.50	3.35	7.50	1.19E-01	5.31E-02	2.37E-02
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	Measured	4.73E+00	3.11E-04	2.66E-01	1.50	3.35	7.50	1.77E-01	7.94E-02	3.55E-02
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	8.76E-03	0.30	0.95	3.00	2.92E-02	9.24E-03	2.92E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	1.48E-02	0.30	0.95	3.00	4.92E-02	1.56E-02	4.92E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	5.15E-02	0.30	0.95	3.00	1.72E-01	5.43E-02	1.72E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	2.84E-04	0.155	0.347	0.775	1.83E-03	8.21E-04	3.67E-04
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	3.48E-03	0.56	1.12	2.25	6.21E-03	3.10E-03	1.54E-03
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	2.06E-03	0.80	1.79	4.00	2.57E-03	1.15E-03	5.14E-04
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	3.48E-03	0.56	1.12	2.25	6.21E-03	3.10E-03	1.54E-03
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	3.48E-03	0.56	1.12	2.25	6.21E-03	3.10E-03	1.54E-03
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	1.76E-02	0.071	0.518	3.780	2.48E-01	3.40E-02	4.65E-03
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	4.43E-03	10.0	22.4	50.0	4.43E-04	1.98E-04	8.86E-05
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	2.64E-02	10.0	22.4	50.0	2.64E-03	1.18E-03	5.28E-04
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	3.56E-02	0.30	0.67	1.50	1.19E-01	5.31E-02	2.37E-02
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	3.47E-03	4.00	8.9	20.0	8.68E-04	3.88E-04	1.74E-04
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	1.52E-02	0.80	1.79	4.00	1.90E-02	8.50E-03	3.80E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	4.83E-04	0.48	1.07	2.40	1.01E-03	4.50E-04	2.01E-04
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.72E-02	0.48	1.07	2.40	3.58E-02	1.60E-02	7.15E-03
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.86E-02	355	794	1,775	5.24E-05	2.34E-05	1.05E-05
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	7.37E-02	1.00	2.24	5.00	7.37E-02	3.29E-02	1.47E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	3.26E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	2.38E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	2.73E-03	80.4	180	402	3.40E-05	1.52E-05	6.79E-06
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	2.30E-03	80.4	180	402	2.87E-05	1.28E-05	5.73E-06
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	4.30E-04	80.4	180	402	5.35E-06	2.39E-06	1.07E-06
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	3.08E-04	80.4	180	402	3.83E-06	1.71E-06	7.66E-07
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	2.11E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	2.11E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	6.22E-04	7.10	15.9	35.5	8.76E-05	3.92E-05	1.75E-05
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	2.38E-04	7.10	15.9	35.5	3.35E-05	1.50E-05	6.70E-06
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	1.62E-04	7.10	15.9	35.5	2.29E-05	1.02E-05	4.57E-06
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	1.09E-04	7.10	15.9	35.5	1.54E-05	6.87E-06	3.07E-06

ATTACHMENT TABLE L-2-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	1.10E-04	7.10	15.9	35.5	1.55E-05	6.92E-06	3.10E-06
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	2.47E-04	7.10	15.9	35.5	3.47E-05	1.55E-05	6.94E-06
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	1.36E-04	7.10	15.9	35.5	1.92E-05	8.58E-06	3.84E-06
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	9.34E-05	7.10	15.9	35.5	1.32E-05	5.88E-06	2.63E-06
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	1.83E-04	7.10	15.9	35.5	2.58E-05	1.16E-05	5.17E-06
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	5.49E-05	7.10	15.9	35.5	7.73E-06	3.46E-06	1.55E-06
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	1.95E-04	7.10	15.9	35.5	2.74E-05	1.23E-05	5.49E-06
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	4.53E-04	7.10	15.9	35.5	6.38E-05	2.85E-05	1.28E-05
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	3.90E-03	0.113	0.253	0.565	3.45E-02	1.54E-02	6.91E-03
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	2.30E-03	3.39	7.58	17.0	6.80E-04	3.04E-04	1.36E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	2.11E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	1.54E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	1.37E-04	7.10	15.9	35.5	1.92E-05	8.60E-06	3.85E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	7.21E-03	6.73	21.3	67.3	1.07E-03	3.39E-04	1.07E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	2.60E-04	7.10	15.9	35.5	3.67E-05	1.64E-05	7.33E-06
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	2.98E-04	7.10	15.9	35.5	4.19E-05	1.88E-05	8.39E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.74E-04	0.00E+00	9.77E-06	0.000014	0.000044	0.00014	6.98E-01	2.21E-01	6.98E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1254 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1010 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.230 = Body weight (kg)

ATTACHMENT TABLE L-2-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	0.126	4.72E+00	1.03E-02	1.41E-01	5.14	8.12	12.8	2.75E-02	1.74E-02	1.10E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	0.164	4.07E-01	8.20E-04	5.01E-02	1.47	3.29	7.35	3.41E-02	1.52E-02	6.82E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	0.038	9.30E-01	1.53E-03	1.05E-01	2.66	5.95	13.3	3.96E-02	1.77E-02	7.93E-03
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	0.100	5.08E+00	6.66E-03	6.63E-01	4.05	7.00	12.1	1.64E-01	9.47E-02	5.48E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	0.070	4.64E+00	1.55E-03	2.43E-01	1.63	2.31	3.26	1.49E-01	1.06E-01	7.47E-02
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	3.250	4.25E-01	9.18E-05	6.03E-03	0.026	0.045	0.078	2.32E-01	1.34E-01	7.73E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	1.000	1.01E+01	1.27E-03	5.01E-02	6.71	15.0	33.6	7.47E-03	3.34E-03	1.49E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	1.000	1.33E+00	1.30E-03	3.74E-02	0.40	0.57	0.80	9.36E-02	6.62E-02	4.68E-02
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	1.000	1.01E+00	7.00E-05	3.05E-03	4.04	9.03	20.2	7.55E-04	3.38E-04	1.51E-04
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	0.147	3.07E+01	2.15E-02	4.95E+00	66.1	148	331	7.49E-02	3.35E-02	1.50E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	1.06E-03	1.50	3.35	7.50	7.09E-04	3.17E-04	1.42E-04
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	2.63E-03	1.50	3.35	7.50	1.76E-03	7.85E-04	3.51E-04
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	1.62E-03	1.50	3.35	7.50	1.08E-03	4.82E-04	2.16E-04
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	1.10E-03	1.50	3.35	7.50	7.31E-04	3.27E-04	1.46E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	4.25E-04	1.50	3.35	7.50	2.83E-04	1.27E-04	5.67E-05
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	3.81E-02	1.50	3.35	7.50	2.54E-02	1.14E-02	5.08E-03
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	1.45E-02	1.50	3.35	7.50	9.64E-03	4.31E-03	1.93E-03
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	5.17	9.55E+00	3.11E-04	5.04E-02	1.50	3.35	7.50	3.36E-02	1.50E-02	6.72E-03
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	1.28E-03	0.12	0.27	0.60	1.07E-02	4.78E-03	2.14E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	1.31E-03	0.12	0.27	0.60	1.09E-02	4.89E-03	2.19E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	2.87E-03	0.60	0.95	1.50	4.78E-03	3.02E-03	1.91E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	1.14E-05	0.155	0.347	0.775	7.33E-05	3.28E-05	1.47E-05
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	9.59E-04	0.56	1.12	2.25	1.71E-03	8.54E-04	4.26E-04
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	2.26E-04	0.80	1.79	4.00	2.82E-04	1.26E-04	5.64E-05
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	9.51E-04	0.56	1.12	2.25	1.70E-03	8.47E-04	4.23E-04
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	7.43E-04	0.56	1.12	2.25	1.33E-03	6.62E-04	3.30E-04
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	6.15E-03	0.071	0.518	3.780	8.68E-02	1.19E-02	1.63E-03
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	1.13E-03	10.0	22.4	50.0	1.13E-04	5.05E-05	2.26E-05
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	3.61E-03	10.0	22.4	50.0	3.61E-04	1.62E-04	7.22E-05
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	3.36E-03	0.30	0.67	1.50	1.12E-02	5.00E-03	2.24E-03
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	9.90E-04	4.00	8.9	20.0	2.47E-04	1.11E-04	4.95E-05
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	1.80E-03	0.80	1.79	4.00	2.24E-03	1.00E-03	4.49E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	1.70E-05	0.48	1.07	2.40	3.54E-05	1.58E-05	7.07E-06
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.63E-03	0.48	1.07	2.40	3.40E-03	1.52E-03	6.79E-04
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.86E-03	355	794	1,775	5.25E-06	2.35E-06	1.05E-06
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	5.52E-03	1.00	2.24	5.00	5.52E-03	2.47E-03	1.10E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	2.94E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	1.42E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	8.09E-03	80.4	180	402	1.01E-04	4.50E-05	2.01E-05
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	1.40E-02	80.4	180	402	1.75E-04	7.81E-05	3.49E-05
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	1.32E-02	80.4	180	402	1.64E-04	7.35E-05	3.29E-05
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	1.42E-02	80.4	180	402	1.76E-04	7.88E-05	3.52E-05
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	1.13E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	1.18E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	1.25E-03	7.10	15.9	35.5	1.77E-04	7.90E-05	3.53E-05
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	2.53E-03	7.10	15.9	35.5	3.56E-04	1.59E-04	7.12E-05
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	3.58E-03	7.10	15.9	35.5	5.04E-04	2.25E-04	1.01E-04
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	2.02E-03	7.10	15.9	35.5	2.85E-04	1.28E-04	5.70E-05

ATTACHMENT TABLE L-2-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	2.40E-03	7.10	15.9	35.5	3.38E-04	1.51E-04	6.76E-05
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	8.85E-03	7.10	15.9	35.5	1.25E-03	5.57E-04	2.49E-04
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	2.89E-03	7.10	15.9	35.5	4.06E-04	1.82E-04	8.13E-05
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	2.10E-03	7.10	15.9	35.5	2.95E-04	1.32E-04	5.91E-05
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	2.83E-03	7.10	15.9	35.5	3.99E-04	1.78E-04	7.98E-05
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	1.08E-03	7.10	15.9	35.5	1.52E-04	6.81E-05	3.04E-05
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	9.68E-03	7.10	15.9	35.5	1.36E-03	6.10E-04	2.73E-04
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	1.54E-03	7.10	15.9	35.5	2.17E-04	9.72E-05	4.35E-05
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	3.94E-03	0.113	0.253	0.565	3.49E-02	1.56E-02	6.97E-03
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	1.19E-02	3.39	7.58	17.0	3.52E-03	1.58E-03	7.05E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	8.68E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	1.81E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	2.10E-03	7.10	15.9	35.5	2.96E-04	1.32E-04	5.92E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	2.80E-02	6.73	21.3	67.3	4.15E-03	1.31E-03	4.15E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	1.36E-02	7.10	15.9	35.5	1.92E-03	8.59E-04	3.84E-04
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	1.87E-02	7.10	15.9	35.5	2.63E-03	1.17E-03	5.25E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0564	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.100	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.867	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.033	= Proportion of diet composed of sediment
WIR =	0.0658	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.177	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	Measured	1.12E+00	1.03E-02	5.96E-02	5.14	8.12	12.8	1.16E-02	7.33E-03	4.64E-03
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	Measured	1.12E+00	8.20E-04	5.88E-02	1.47	3.29	7.35	4.00E-02	1.79E-02	8.01E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	Measured	7.76E-01	1.53E-03	4.08E-02	2.66	5.95	13.3	1.54E-02	6.87E-03	3.07E-03
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	Measured	2.89E+00	6.66E-03	1.52E-01	4.05	7.00	12.1	3.76E-02	2.17E-02	1.26E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	Measured	1.47E+00	1.55E-03	7.70E-02	3.85	8.61	19.3	2.00E-02	8.94E-03	4.00E-03
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	Measured	2.95E-01	9.18E-05	1.55E-02	0.49	0.77	1.20	3.16E-02	2.02E-02	1.29E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	Measured	1.14E+00	1.27E-03	5.97E-02	6.71	15.0	33.6	8.90E-03	3.98E-03	1.78E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	Measured	8.86E-01	1.30E-03	4.66E-02	1.80	4.02	9.00	2.59E-02	1.16E-02	5.17E-03
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	Measured	1.47E+00	7.00E-05	7.72E-02	4.04	9.03	20.2	1.91E-02	8.54E-03	3.82E-03
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	Measured	8.25E+01	2.15E-02	4.33E+00	66.1	148	331	6.55E-02	2.93E-02	1.31E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	5.39E-02	2.73E-04	2.84E-03	0.41	0.92	2.05	6.93E-03	3.10E-03	1.39E-03
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	5.39E-02	3.61E-04	2.85E-03	0.41	0.92	2.05	6.94E-03	3.11E-03	1.39E-03
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	6.50E-02	2.73E-04	3.43E-03	0.41	0.92	2.05	8.36E-03	3.74E-03	1.67E-03
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	5.39E-02	3.17E-04	2.84E-03	0.41	0.92	2.05	6.94E-03	3.10E-03	1.39E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	5.39E-02	3.61E-04	2.85E-03	0.41	0.92	2.05	6.94E-03	3.11E-03	1.39E-03
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	5.94E-01	2.73E-04	3.12E-02	0.41	0.92	2.05	7.61E-02	3.40E-02	1.52E-02
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.20E+00	3.17E-04	1.68E-01	0.41	0.92	2.05	4.10E-01	1.83E-01	8.19E-02
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	Measured	1.07E+01	3.11E-04	5.59E-01	0.41	0.92	2.05	**1.36E+00**	6.10E-01	2.73E-01
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	8.18E-03	0.30	0.95	3.00	2.73E-02	8.62E-03	2.73E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	1.38E-02	0.30	0.95	3.00	4.59E-02	1.45E-02	4.59E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	4.80E-02	0.30	0.95	3.00	1.60E-01	5.06E-02	1.60E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	2.66E-04	0.155	0.347	0.775	1.71E-03	7.67E-04	3.43E-04
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	3.24E-03	0.56	1.12	2.25	5.79E-03	2.89E-03	1.44E-03
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	1.92E-03	0.80	1.79	4.00	2.40E-03	1.07E-03	4.80E-04
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	3.24E-03	0.56	1.12	2.25	5.79E-03	2.89E-03	1.44E-03
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	3.24E-03	0.56	1.12	2.25	5.79E-03	2.89E-03	1.44E-03
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	1.64E-02	0.071	0.518	3.780	2.32E-01	3.17E-02	4.34E-03
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	4.14E-03	10.0	22.4	50.0	4.14E-04	1.85E-04	8.27E-05
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	2.46E-02	10.0	22.4	50.0	2.46E-03	1.10E-03	4.93E-04
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	3.32E-02	0.021	0.047	0.104	**1.60E+00**	7.14E-01	3.19E-01
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	3.24E-03	4.00	8.9	20.0	8.10E-04	3.62E-04	1.62E-04
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	1.42E-02	0.80	1.79	4.00	1.77E-02	7.93E-03	3.55E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	4.51E-04	0.48	1.07	2.40	9.39E-04	4.20E-04	1.88E-04
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.60E-02	0.48	1.07	2.40	3.34E-02	1.49E-02	6.67E-03
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.74E-02	355	794	1,775	4.89E-05	2.19E-05	9.79E-06
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	6.88E-02	1.00	2.24	5.00	6.88E-02	3.08E-02	1.38E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	3.13E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	2.26E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	2.56E-03	80.4	180	402	3.18E-05	1.42E-05	6.36E-06
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	2.15E-03	80.4	180	402	2.68E-05	1.20E-05	5.36E-06
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	4.06E-04	80.4	180	402	5.05E-06	2.26E-06	1.01E-06
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	2.92E-04	80.4	180	402	3.63E-06	1.62E-06	7.26E-07
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	1.97E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	1.97E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	5.81E-04	7.10	15.9	35.5	8.19E-05	3.66E-05	1.64E-05
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	2.23E-04	7.10	15.9	35.5	3.14E-05	1.40E-05	6.27E-06
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	1.52E-04	7.10	15.9	35.5	2.15E-05	9.60E-06	4.29E-06
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	1.03E-04	7.10	15.9	35.5	1.45E-05	6.47E-06	2.89E-06

ATTACHMENT TABLE L-2-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	1.04E-04	7.10	15.9	35.5	1.46E-05	6.52E-06	2.92E-06
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	2.31E-04	7.10	15.9	35.5	3.26E-05	1.46E-05	6.51E-06
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	1.28E-04	7.10	15.9	35.5	1.80E-05	8.06E-06	3.61E-06
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	8.80E-05	7.10	15.9	35.5	1.24E-05	5.55E-06	2.48E-06
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	1.72E-04	7.10	15.9	35.5	2.42E-05	1.08E-05	4.84E-06
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	5.21E-05	7.10	15.9	35.5	7.34E-06	3.28E-06	1.47E-06
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	1.83E-04	7.10	15.9	35.5	2.58E-05	1.15E-05	5.15E-06
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	4.23E-04	7.10	15.9	35.5	5.96E-05	2.67E-05	1.19E-05
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	3.65E-03	0.113	0.253	0.565	3.23E-02	1.44E-02	6.46E-03
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	2.19E-03	3.39	7.58	17.0	6.47E-04	2.89E-04	1.29E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	1.97E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	1.44E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	1.28E-04	7.10	15.9	35.5	1.81E-05	8.09E-06	3.62E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	6.75E-03	6.73	21.3	67.3	1.00E-03	3.17E-04	1.00E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	2.44E-04	7.10	15.9	35.5	3.43E-05	1.54E-05	6.87E-06
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	2.79E-04	7.10	15.9	35.5	3.93E-05	1.76E-05	7.87E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.42E-04	0.00E+00	2.32E-05	0.000014	0.000044	0.00014	**1.66E+00**	5.24E-01	1.66E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0780	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0769	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.486	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	0.126	4.72E+00	1.03E-02	3.70E-01	2.46	4.26	7.38	1.50E-01	8.68E-02	5.01E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	0.164	4.07E-01	8.20E-04	3.65E-02	1.47	3.29	7.35	2.48E-02	1.11E-02	4.96E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	0.038	9.30E-01	1.53E-03	2.44E-01	2.66	5.95	13.3	9.18E-02	4.11E-02	1.84E-02
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	0.100	5.08E+00	6.66E-03	1.97E+00	4.05	7.00	12.1	4.85E-01	2.81E-01	1.62E-01
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	0.070	4.64E+00	1.55E-03	2.22E-01	3.85	8.61	19.3	5.76E-02	2.58E-02	1.15E-02
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	3.250	4.25E-01	9.18E-05	7.30E-03	0.026	0.045	0.078	2.81E-01	1.62E-01	9.35E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	1.000	1.01E+01	1.27E-03	8.53E-02	6.71	15.0	33.6	1.27E-02	5.68E-03	2.54E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	1.000	1.33E+00	1.30E-03	6.26E-02	0.40	0.57	0.80	1.57E-01	1.11E-01	7.83E-02
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	1.000	1.01E+00	7.00E-05	8.51E-03	4.04	9.03	20.2	2.11E-03	9.42E-04	4.21E-04
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	0.147	3.07E+01	2.15E-02	7.14E+00	66.1	148	331	1.08E-01	4.83E-02	2.16E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.82E+00	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	8.54E-02	1.50	3.35	7.50	5.70E-02	2.55E-02	1.14E-02
Aroclor-1221	5.65E-02	Regression	2.68E+00	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	1.26E-01	1.50	3.35	7.50	8.38E-02	3.75E-02	1.68E-02
Aroclor-1232	4.42E-02	Regression	2.13E+00	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	1.00E-01	1.50	3.35	7.50	6.67E-02	2.98E-02	1.33E-02
Aroclor-1242	3.85E-02	Regression	1.87E+00	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	8.77E-02	1.50	3.35	7.50	5.85E-02	2.62E-02	1.17E-02
Aroclor-1248	1.90E-02	Regression	9.63E-01	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	4.53E-02	1.50	3.35	7.50	3.02E-02	1.35E-02	6.03E-03
Aroclor-1254	1.42E+00	Regression	5.55E+01	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	2.60E+00	1.50	3.35	7.50	**1.73E+00**	7.75E-01	3.47E-01
Aroclor-1260	6.11E-01	Regression	2.51E+01	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	1.18E+00	1.50	3.35	7.50	7.84E-01	3.51E-01	1.57E-01
PCB (total)	1.84E+00	Regression	7.07E+01	0.139	2.57E-01	5.17	9.55E+00	3.11E-04	3.32E+00	1.50	3.35	7.50	**2.21E+00**	9.89E-01	4.42E-01
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	6.66E-03	0.12	0.27	0.60	5.55E-02	2.48E-02	1.11E-02
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	6.82E-03	0.12	0.27	0.60	5.68E-02	2.54E-02	1.14E-02
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	4.79E-03	0.60	0.95	1.50	7.98E-03	5.05E-03	3.19E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	3.00E-05	0.155	0.347	0.775	1.94E-04	8.67E-05	3.88E-05
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	5.30E-04	0.56	1.12	2.25	9.47E-04	4.72E-04	2.36E-04
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	1.14E-03	2.14	4.79	10.7	5.32E-04	2.38E-04	1.06E-04
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	5.30E-04	0.56	1.12	2.25	9.47E-04	4.72E-04	2.36E-04
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	5.30E-04	0.56	1.12	2.25	9.47E-04	4.72E-04	2.36E-04
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	3.36E-02	0.071	0.518	3.780	4.74E-01	6.50E-02	8.90E-03
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	5.91E-05	10.0	22.4	50.0	5.91E-06	2.64E-06	1.18E-06
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	3.28E-04	10.0	22.4	50.0	3.28E-05	1.47E-05	6.56E-06
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	3.55E-03	0.30	0.67	1.50	1.18E-02	5.29E-03	2.36E-03
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	2.53E-04	4.00	8.9	20.0	6.32E-05	2.82E-05	1.26E-05
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	1.06E-02	2.14	4.79	10.7	4.93E-03	2.21E-03	9.87E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	1.03E-05	0.48	1.07	2.40	2.15E-05	9.60E-06	4.29E-06
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.06E-03	0.48	1.07	2.40	2.21E-03	9.91E-04	4.43E-04
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	3.13E-03	355	794	1,775	8.81E-06	3.94E-06	1.76E-06
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	1.23E-02	1.00	2.24	5.00	1.23E-02	5.50E-03	2.46E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	4.37E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	8.10E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	1.76E-03	80.4	180	402	2.19E-05	9.79E-06	4.38E-06
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	6.18E-03	80.4	180	402	7.68E-05	3.44E-05	1.54E-05
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	6.18E-03	80.4	180	402	7.68E-05	3.44E-05	1.54E-05
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	6.18E-03	80.4	180	402	7.68E-05	3.44E-05	1.54E-05
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	1.84E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	1.84E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	3.54E-04	7.10	15.9	35.5	4.98E-05	2.23E-05	9.97E-06
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	8.13E-04	7.10	15.9	35.5	1.15E-04	5.12E-05	2.29E-05
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	3.97E-03	7.10	15.9	35.5	5.59E-04	2.50E-04	1.12E-04
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	2.64E-03	7.10	15.9	35.5	3.72E-04	1.66E-04	7.44E-05

ATTACHMENT TABLE L-2-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	1.16E-03	7.10	15.9	35.5	1.64E-04	7.34E-05	3.28E-05
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	1.66E-04	7.10	15.9	35.5	2.33E-05	1.04E-05	4.67E-06
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	5.53E-05	7.10	15.9	35.5	7.79E-06	3.48E-06	1.56E-06
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	3.35E-03	7.10	15.9	35.5	4.72E-04	2.11E-04	9.45E-05
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	4.62E-03	7.10	15.9	35.5	6.51E-04	2.91E-04	1.30E-04
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	3.09E-04	7.10	15.9	35.5	4.35E-05	1.94E-05	8.70E-06
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	3.75E-03	7.10	15.9	35.5	5.29E-04	2.36E-04	1.06E-04
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	3.65E-03	7.10	15.9	35.5	5.14E-04	2.30E-04	1.03E-04
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	6.73E-03	0.113	0.253	0.565	5.95E-02	2.66E-02	1.19E-02
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	7.66E-03	3.39	7.58	17.0	2.26E-03	1.01E-03	4.52E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	1.84E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	1.30E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	8.33E-05	7.10	15.9	35.5	1.17E-05	5.25E-06	2.35E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	5.70E-03	6.73	21.3	67.3	8.46E-04	2.68E-04	8.46E-05
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	4.90E-03	7.10	15.9	35.5	6.90E-04	3.09E-04	1.38E-04
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	1.58E-02	7.10	15.9	35.5	2.23E-03	9.96E-04	4.46E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

ATTACHMENT TABLE L-2-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	Measured	1.73E+00	1.03E-02	5.96E-02	1.04	1.31	1.66	5.73E-02	4.53E-02	3.59E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	Measured	3.22E-01	8.20E-04	1.11E-02	0.77	2.43	7.70	1.44E-02	4.54E-03	1.44E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	Measured	1.20E+00	1.53E-03	4.13E-02	2.40	5.37	12.0	1.72E-02	7.70E-03	3.44E-03
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	Measured	8.17E+00	6.66E-03	2.80E-01	11.7	13.3	15.1	2.39E-02	2.10E-02	1.85E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	Measured	1.09E+00	1.55E-03	3.75E-02	4.70	6.47	8.90	7.98E-03	5.80E-03	4.22E-03
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	Measured	8.03E-02	9.18E-05	2.75E-03	0.150	0.192	0.247	1.84E-02	1.43E-02	1.11E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	Measured	6.80E-01	1.27E-03	2.33E-02	1.70	2.40	3.40	1.37E-02	9.71E-03	6.86E-03
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	Measured	1.25E+00	1.30E-03	4.29E-02	0.20	0.26	0.33	2.14E-01	1.67E-01	1.30E-01
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	Measured	5.01E-01	7.00E-05	1.72E-02	12.0	26.9	60.2	1.43E-03	6.38E-04	2.85E-04
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	Measured	1.70E+02	2.15E-02	5.81E+00	75.4	169	377	7.70E-02	3.45E-02	1.54E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	6.64E-03	1.37	2.17	3.43	4.85E-03	3.06E-03	1.94E-03
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	1.00E-02	0.137	0.306	0.685	7.31E-02	3.27E-02	1.46E-02
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	7.85E-03	0.137	0.306	0.685	5.73E-02	2.56E-02	1.15E-02
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	6.83E-03	0.137	0.306	0.685	4.99E-02	2.23E-02	9.97E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	3.38E-03	0.137	0.306	0.685	2.47E-02	1.10E-02	4.93E-03
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	2.52E-01	0.137	0.306	0.685	**1.84E+00**	8.24E-01	3.68E-01
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	1.08E-01	0.137	0.306	0.685	7.91E-01	3.54E-01	1.58E-01
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	Measured	6.37E+00	3.11E-04	2.18E-01	0.137	0.306	0.685	**1.59E+00**	7.13E-01	3.19E-01
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	5.33E-03	0.147	0.329	0.735	3.63E-02	1.62E-02	7.26E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	8.99E-03	0.147	0.329	0.735	6.12E-02	2.74E-02	1.22E-02
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	3.13E-02	0.147	0.329	0.735	2.13E-01	9.54E-02	4.26E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	1.73E-04	0.20	0.45	1.00	8.66E-04	3.87E-04	1.73E-04
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	2.12E-03	1.60	2.26	3.20	1.32E-03	9.35E-04	6.61E-04
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	1.25E-03	4.58	6.48	9.16	2.73E-04	1.93E-04	1.37E-04
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	2.12E-03	1.60	2.26	3.20	1.32E-03	9.35E-04	6.61E-04
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	2.12E-03	1.60	2.26	3.20	1.32E-03	9.35E-04	6.61E-04
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	1.07E-02	0.015	0.021	0.030	7.14E-01	5.05E-01	3.57E-01
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	2.70E-03	0.15	0.34	0.75	1.80E-02	8.05E-03	3.60E-03
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	1.61E-02	0.15	0.34	0.75	1.07E-01	4.79E-02	2.14E-02
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	2.17E-02	0.184	0.411	0.920	1.18E-01	5.27E-02	2.36E-02
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	2.11E-03	8.00	17.9	40.0	2.64E-04	1.18E-04	5.29E-05
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	9.25E-03	4.58	6.48	9.16	2.02E-03	1.43E-03	1.01E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	2.94E-04	0.20	0.45	1.00	1.47E-03	6.57E-04	2.94E-04
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.04E-02	0.20	0.45	1.00	5.22E-02	2.34E-02	1.04E-02
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.13E-02	4.00	5.66	8.00	2.83E-03	2.00E-03	1.42E-03
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	4.49E-02	8.00	17.9	40.0	5.61E-03	2.51E-03	1.12E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	1.99E-04	76.0	170	380	2.62E-06	1.17E-06	5.23E-07
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	1.45E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	1.66E-03	53.0	75.0	106	3.14E-05	2.22E-05	1.57E-05
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	1.40E-03	85.7	192	429	1.64E-05	7.32E-06	3.27E-06
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	2.62E-04	85.7	192	429	3.06E-06	1.37E-06	6.11E-07
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	1.88E-04	30.0	52.0	90.0	6.25E-06	3.61E-06	2.08E-06
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	1.28E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	1.28E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	3.79E-04	65.6	147	328	5.77E-06	2.58E-06	1.15E-06
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	1.45E-04	65.6	147	328	2.21E-06	9.87E-07	4.41E-07
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	9.89E-05	65.6	147	328	1.51E-06	6.74E-07	3.02E-07
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	6.65E-05	0.62	1.37	3.07	1.08E-04	4.84E-05	2.17E-05

ATTACHMENT TABLE L-2-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	6.70E-05	0.62	1.37	3.07	1.09E-04	4.87E-05	2.18E-05
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	1.50E-04	0.62	1.37	3.07	2.44E-04	1.09E-04	4.89E-05
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	8.30E-05	0.62	1.37	3.07	1.35E-04	6.04E-05	2.70E-05
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	5.69E-05	0.62	1.37	3.07	9.25E-05	4.14E-05	1.85E-05
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	1.12E-04	0.62	1.37	3.07	1.82E-04	8.13E-05	3.64E-05
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	3.35E-05	0.62	1.37	3.07	5.44E-05	2.44E-05	1.09E-05
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	1.19E-04	65.6	147	328	1.81E-06	8.09E-07	3.62E-07
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	2.76E-04	65.6	147	328	4.20E-06	1.88E-06	8.41E-07
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	2.38E-03	2.00	2.83	4.00	1.19E-03	8.40E-04	5.94E-04
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	1.41E-03	2.00	6.32	20.0	7.03E-04	2.22E-04	7.03E-05
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	1.28E-02	75.0	168	375	1.71E-04	7.66E-05	3.42E-05
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	9.37E-03	100	224	500	9.37E-05	4.19E-05	1.87E-05
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	8.32E-05	0.62	1.37	3.07	1.35E-04	6.05E-05	2.71E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	4.39E-03	8.42	18.8	42.1	5.22E-04	2.33E-04	1.04E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	1.59E-04	65.6	147	328	2.42E-06	1.08E-06	4.83E-07
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	1.81E-04	0.62	1.37	3.07	2.95E-04	1.32E-04	5.91E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	8.93E-05	0.00E+00	3.06E-06	0.000001	0.000003	0.00001	**3.06E+00**	9.67E-01	3.06E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	0.126	4.72E+00	1.03E-02	2.29E-01	0.25	0.56	1.26	9.09E-01	4.07E-01	1.82E-01
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	0.164	4.07E-01	8.20E-04	5.92E-02	0.77	2.43	7.70	7.68E-02	2.43E-02	7.68E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	0.038	9.30E-01	1.53E-03	1.64E-01	2.40	5.37	12.0	6.83E-02	3.05E-02	1.37E-02
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	0.100	5.08E+00	6.66E-03	6.68E-01	5.60	7.23	9.34	1.19E-01	9.24E-02	7.16E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	0.070	4.64E+00	1.55E-03	4.47E-01	4.70	6.47	8.90	9.50E-02	6.91E-02	5.02E-02
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	3.250	4.25E-01	9.18E-05	6.28E-03	0.032	0.072	0.160	1.96E-01	8.78E-02	3.93E-02
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	1.000	1.01E+01	1.27E-03	7.68E-02	1.70	2.40	3.40	4.52E-02	3.19E-02	2.26E-02
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	1.000	1.33E+00	1.30E-03	3.86E-02	0.20	0.26	0.33	1.93E-01	1.50E-01	1.17E-01
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	1.000	1.01E+00	7.00E-05	5.48E-03	12.0	26.9	60.2	4.56E-04	2.04E-04	9.11E-05
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	0.147	3.07E+01	2.15E-02	5.33E+00	75.4	169	377	7.07E-02	3.16E-02	1.41E-02
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	7.64E-04	0.136	0.304	0.680	5.62E-03	2.51E-03	1.12E-03
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	2.26E-03	0.136	0.304	0.680	1.66E-02	7.43E-03	3.32E-03
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	1.29E-03	0.136	0.304	0.680	9.50E-03	4.25E-03	1.90E-03
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	7.90E-04	0.136	0.304	0.680	5.81E-03	2.60E-03	1.16E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	2.88E-04	0.136	0.304	0.680	2.12E-03	9.48E-04	4.24E-04
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	1.60E-02	0.136	0.304	0.680	1.18E-01	5.27E-02	2.35E-02
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	5.94E-03	0.136	0.304	0.680	4.36E-02	1.95E-02	8.73E-03
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	5.17	9.55E+00	3.11E-04	2.07E-02	0.136	0.304	0.680	1.53E-01	6.82E-02	3.05E-02
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	9.02E-04	0.147	0.329	0.735	6.14E-03	2.74E-03	1.23E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	9.20E-04	0.147	0.329	0.735	6.26E-03	2.80E-03	1.25E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	3.89E-03	0.147	0.329	0.735	2.65E-02	1.18E-02	5.30E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	1.39E-05	0.20	0.45	1.00	6.93E-05	3.10E-05	1.39E-05
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	1.04E-03	1.60	2.26	3.20	6.53E-04	4.62E-04	3.27E-04
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	1.62E-04	4.58	6.48	9.16	3.54E-05	2.50E-05	1.77E-05
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	1.04E-03	1.60	2.26	3.20	6.47E-04	4.58E-04	3.24E-04
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	8.05E-04	1.60	2.26	3.20	5.03E-04	3.56E-04	2.51E-04
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	3.46E-03	0.015	0.021	0.030	2.31E-01	1.63E-01	1.15E-01
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	1.30E-03	0.15	0.34	0.75	8.65E-03	3.87E-03	1.73E-03
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	4.26E-03	0.15	0.34	0.75	2.84E-02	1.27E-02	5.68E-03
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	3.71E-03	0.184	0.411	0.920	2.02E-02	9.02E-03	4.04E-03
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	1.11E-03	8.00	17.9	40.0	1.39E-04	6.21E-05	2.78E-05
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	1.06E-03	4.58	6.48	9.16	2.30E-04	1.63E-04	1.15E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	2.45E-05	0.20	0.45	1.00	1.22E-04	5.47E-05	2.45E-05
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	1.88E-03	0.20	0.45	1.00	9.38E-03	4.20E-03	1.88E-03
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.93E-03	4.00	5.66	8.00	4.82E-04	3.41E-04	2.41E-04
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	5.55E-03	8.00	17.9	40.0	6.94E-04	3.11E-04	1.39E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	3.48E-04	76.0	170	380	4.58E-06	2.05E-06	9.17E-07
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	1.63E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	9.24E-03	53.0	75.0	106	1.74E-04	1.23E-04	8.72E-05
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	1.53E-02	85.7	192	429	1.79E-04	8.00E-05	3.58E-05
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	1.44E-02	85.7	192	429	1.68E-04	7.52E-05	3.36E-05
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	1.55E-02	30.0	52.0	90.0	5.16E-04	2.98E-04	1.72E-04
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	1.19E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	1.24E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	1.70E-03	65.6	147	328	2.59E-05	1.16E-05	5.18E-06
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	3.05E-03	65.6	147	328	4.65E-05	2.08E-05	9.30E-06
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	3.90E-03	65.6	147	328	5.94E-05	2.66E-05	1.19E-05
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	2.81E-03	0.62	1.37	3.07	4.57E-03	2.05E-03	9.16E-04

ATTACHMENT TABLE L-2-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	3.52E-03	0.62	1.37	3.07	5.73E-03	2.56E-03	1.15E-03
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	1.17E-02	0.62	1.37	3.07	1.90E-02	8.50E-03	3.80E-03
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	3.84E-03	0.62	1.37	3.07	6.24E-03	2.79E-03	1.25E-03
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	2.67E-03	0.62	1.37	3.07	4.34E-03	1.94E-03	8.69E-04
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	3.93E-03	0.62	1.37	3.07	6.40E-03	2.86E-03	1.28E-03
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	1.63E-03	0.62	1.37	3.07	2.64E-03	1.18E-03	5.30E-04
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	1.16E-02	65.6	147	328	1.77E-04	7.91E-05	3.54E-05
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	1.67E-03	65.6	147	328	2.55E-05	1.14E-05	5.10E-06
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	4.49E-03	2.00	2.83	4.00	2.25E-03	1.59E-03	1.12E-03
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	1.38E-02	2.00	6.32	20.0	6.90E-03	2.18E-03	6.90E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	8.95E-03	75.0	168	375	1.19E-04	5.34E-05	2.39E-05
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	1.95E-02	100	224	500	1.95E-04	8.74E-05	3.91E-05
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	3.37E-03	0.62	1.37	3.07	5.47E-03	2.45E-03	1.10E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	3.09E-02	8.42	18.8	42.1	3.67E-03	1.64E-03	7.34E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	1.52E-02	65.6	147	328	2.32E-04	1.04E-04	4.64E-05
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	2.06E-02	0.62	1.37	3.07	3.35E-02	1.50E-02	6.71E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0596 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1139 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.169 = Body weight (kg)

ATTACHMENT TABLE L-2-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	3.74E+01	Regression	7.84E+00	Regresson	1.05E+00	Measured	2.83E+00	1.03E-02	1.32E-01	1.04	1.31	1.66	1.27E-01	1.00E-01	7.95E-02
Cadmium	2.48E+00	Regression	7.74E-01	Regresson	1.02E+00	Measured	5.19E-01	8.20E-04	1.77E-02	0.77	2.43	7.70	2.30E-02	7.27E-03	2.30E-03
Chromium	2.45E+01	Regression	5.20E+00	0.041	1.00E+00	Measured	1.79E+00	1.53E-03	8.85E-02	2.40	5.37	12.0	3.69E-02	1.65E-02	7.38E-03
Copper	5.08E+01	0.824	4.19E+01	Regresson	9.18E+00	Measured	1.18E+01	6.66E-03	4.78E-01	11.7	13.3	15.1	4.09E-02	3.59E-02	3.16E-02
Lead	6.63E+01	Regression	4.73E+00	Regresson	2.79E+00	Measured	1.63E+00	1.55E-03	1.65E-01	4.70	6.47	8.90	3.52E-02	2.56E-02	1.86E-02
Mercury	1.31E-01	1.186	1.55E-01	Regresson	1.22E-01	Measured	7.99E-02	9.18E-05	2.34E-03	0.150	0.192	0.247	1.56E-02	1.22E-02	9.47E-03
Nickel	1.01E+01	Regression	1.81E+00	Regresson	6.10E-01	Measured	8.21E-01	1.27E-03	3.55E-02	1.70	2.40	3.40	2.09E-02	1.48E-02	1.05E-02
Selenium	1.33E+00	1.000	1.33E+00	Regresson	6.95E-01	Measured	1.42E+00	1.30E-03	1.89E-02	0.20	0.26	0.33	9.44E-02	7.35E-02	5.72E-02
Silver	1.01E+00	0.180	1.81E-01	0.014	1.41E-02	Measured	4.77E-01	7.00E-05	3.70E-03	12.0	26.9	60.2	3.07E-04	1.37E-04	6.14E-05
Zinc	2.09E+02	Regression	1.52E+02	Regresson	9.37E+01	Measured	1.53E+02	2.15E-02	2.33E+00	75.4	169	377	3.09E-02	1.38E-02	6.18E-03
Polychlorinated Biphenyls															
Aroclor-1016	3.74E-02	Regression	1.01E-01	0.323	1.21E-02	5.17	1.94E-01	2.73E-04	1.17E-03	1.37	2.17	3.43	8.54E-04	5.40E-04	3.41E-04
Aroclor-1221	5.65E-02	Regression	1.60E-01	0.749	4.23E-02	5.17	2.92E-01	3.61E-04	1.98E-03	0.137	0.306	0.685	1.45E-02	6.47E-03	2.89E-03
Aroclor-1232	4.42E-02	Regression	1.22E-01	0.515	2.28E-02	5.17	2.29E-01	2.73E-04	1.46E-03	0.137	0.306	0.685	1.06E-02	4.75E-03	2.12E-03
Aroclor-1242	3.85E-02	Regression	1.05E-01	0.323	1.24E-02	5.17	1.99E-01	3.17E-04	1.21E-03	0.137	0.306	0.685	8.83E-03	3.95E-03	1.77E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.61E-04	5.66E-04	0.137	0.306	0.685	4.13E-03	1.85E-03	8.27E-04
Aroclor-1254	1.42E+00	Regression	5.76E+00	0.139	1.98E-01	5.17	7.37E+00	2.73E-04	5.62E-02	0.137	0.306	0.685	4.10E-01	1.84E-01	8.21E-02
Aroclor-1260	6.11E-01	Regression	2.25E+00	0.105	6.44E-02	5.17	3.16E+00	3.17E-04	2.24E-02	0.137	0.306	0.685	1.63E-01	7.30E-02	3.27E-02
PCB (total)	1.84E+00	Regression	7.68E+00	0.139	2.57E-01	Measured	4.73E+00	3.11E-04	6.86E-02	0.137	0.306	0.685	5.01E-01	2.24E-01	1.00E-01
Pesticides															
4,4'-DDD	7.54E-02	1.88	1.42E-01	Regresson	1.16E-02	2.07	1.56E-01	4.88E-05	1.47E-03	0.147	0.329	0.735	1.00E-02	4.47E-03	2.00E-03
4,4'-DDE	7.72E-02	1.88	1.45E-01	Regresson	1.18E-02	3.40	2.62E-01	4.88E-05	1.63E-03	0.147	0.329	0.735	1.11E-02	4.96E-03	2.22E-03
4,4'-DDT	4.11E-01	0.248	1.02E-01	Regresson	4.15E-02	2.23	9.15E-01	4.88E-05	2.84E-03	0.147	0.329	0.735	1.94E-02	8.65E-03	3.87E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.69E-05	1.49E-05	0.20	0.45	1.00	7.43E-05	3.32E-05	1.49E-05
alpha-BHC	1.23E-02	0.912	1.12E-02	1.735	2.13E-02	5.03	6.18E-02	2.69E-05	3.30E-04	1.60	2.26	3.20	2.06E-04	1.46E-04	1.03E-04
alpha-Chlordane	1.28E-02	1.88	2.42E-02	0.165	2.12E-03	2.84	3.65E-02	2.69E-05	2.65E-04	4.58	6.48	9.16	5.78E-05	4.09E-05	2.89E-05
beta-BHC	1.23E-02	0.912	1.12E-02	1.719	2.11E-02	5.03	6.18E-02	2.69E-05	3.28E-04	1.60	2.26	3.20	2.05E-04	1.45E-04	1.03E-04
delta-BHC	1.23E-02	0.912	1.12E-02	1.311	1.61E-02	5.03	6.18E-02	2.69E-05	2.94E-04	1.60	2.26	3.20	1.83E-04	1.30E-04	9.17E-05
Dieldrin	1.46E-01	4.920	7.17E-01	0.410	5.97E-02	2.15	3.13E-01	4.88E-05	6.46E-03	0.015	0.021	0.030	4.31E-01	3.04E-01	2.15E-01
Endosulfan I	1.56E-02	0.073	1.14E-03	1.687	2.64E-02	5.03	7.88E-02	2.69E-05	3.15E-04	0.15	0.34	0.75	2.10E-03	9.40E-04	4.20E-04
Endosulfan II	9.32E-02	0.073	6.77E-03	0.886	8.25E-02	5.03	4.69E-01	4.88E-05	1.35E-03	0.15	0.34	0.75	9.00E-03	4.02E-03	1.80E-03
Endrin	1.26E-01	0.600	7.54E-02	0.535	6.72E-02	5.03	6.33E-01	4.88E-05	2.01E-03	0.184	0.411	0.920	1.09E-02	4.90E-03	2.19E-03
gamma-BHC (Lindane)	1.23E-02	0.430	5.26E-03	1.852	2.27E-02	5.03	6.17E-02	2.69E-05	2.95E-04	8.00	17.9	40.0	3.68E-05	1.65E-05	7.36E-06
gamma-Chlordane	8.48E-02	2.65	2.25E-01	0.165	1.40E-02	3.19	2.70E-01	2.69E-05	2.27E-03	4.58	6.48	9.16	4.95E-04	3.50E-04	2.48E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.69E-05	1.82E-05	0.20	0.45	1.00	9.09E-05	4.07E-05	1.82E-05
Heptachlor epoxide	6.06E-02	0.372	2.25E-02	0.566	3.43E-02	5.03	3.05E-01	2.69E-05	8.80E-04	0.20	0.45	1.00	4.40E-03	1.97E-03	8.80E-04
Methoxychlor	6.57E-02	1.000	6.57E-02	0.525	3.45E-02	5.03	3.31E-01	2.32E-04	1.26E-03	4.00	5.66	8.00	3.16E-04	2.23E-04	1.58E-04
Toxaphene	2.60E-01	1.000	2.60E-01	0.355	9.22E-02	5.03	1.31E+00	4.99E-04	4.66E-03	8.00	17.9	40.0	5.83E-04	2.61E-04	1.17E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	1.000	5.04E-03	9.37E-04	1.65E-04	76.0	170	380	2.17E-06	9.71E-07	4.34E-07
1,2,4,5-Tetrachlorobenzene	3.84E-01	0.397	1.52E-01	0.792	3.04E-01	0.101	3.87E-02	4.46E-03	4.31E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.29E-01	0.257	3.33E-02	1.426	1.85E-01	0.369	4.78E-02	9.37E-04	1.88E-03	53.0	75.0	106	3.55E-05	2.51E-05	1.77E-05
1,2-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.452	3.17E-01	0.313	4.05E-02	5.00E-04	3.48E-03	85.7	192	429	4.07E-05	1.82E-05	8.13E-06
1,3-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.296	2.97E-01	0.056	7.24E-03	5.00E-04	3.30E-03	85.7	192	429	3.86E-05	1.72E-05	7.71E-06
1,4-Dichlorobenzene	1.29E-01	1.000	1.29E-01	2.475	3.20E-01	0.039	5.07E-03	5.00E-04	3.46E-03	30.0	52.0	90.0	1.15E-04	6.66E-05	3.85E-05
4-Bromophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.566	2.10E-01	1.000	3.71E-01	4.46E-03	5.69E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.71E-01	1.000	3.71E-01	0.593	2.20E-01	1.000	3.71E-01	4.46E-03	5.76E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	1.12E-01	0.065	7.23E-03	Regresson	2.50E-02	0.098	1.10E-02	6.90E-05	4.30E-04	65.6	147	328	6.56E-06	2.93E-06	1.31E-06
Acenaphthylene	1.08E-01	0.157	1.69E-02	Regresson	5.47E-02	0.039	4.15E-03	8.84E-05	6.96E-04	65.6	147	328	1.06E-05	4.74E-06	2.12E-06
Anthracene	1.21E-01	0.699	8.43E-02	Regresson	7.17E-02	0.023	2.82E-03	8.84E-05	1.34E-03	65.6	147	328	2.05E-05	9.15E-06	4.09E-06
Benzo(a)anthracene	2.82E-01	0.198	5.59E-02	Regresson	3.14E-02	0.007	1.87E-03	9.25E-05	1.11E-03	0.62	1.37	3.07	1.81E-03	8.08E-04	3.62E-04

ATTACHMENT TABLE L-2-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	3.24E-01	0.075	2.44E-02	Regresson	4.24E-02	0.006	1.87E-03	1.03E-04	1.02E-03	0.62	1.37	3.07	1.66E-03	7.41E-04	3.32E-04
Benzo(b)fluoranthene	6.10E-01	0.005	3.03E-03	0.310	1.89E-01	0.007	4.29E-03	1.10E-04	2.35E-03	0.62	1.37	3.07	3.82E-03	1.71E-03	7.64E-04
Benzo(g,h,i)perylene	2.07E-01	0.004	7.49E-04	Regresson	6.13E-02	0.011	2.35E-03	9.42E-05	7.80E-04	0.62	1.37	3.07	1.27E-03	5.68E-04	2.54E-04
Benzo(k)fluoranthene	2.34E-01	0.303	7.11E-02	Regresson	3.32E-02	0.007	1.59E-03	9.17E-05	1.16E-03	0.62	1.37	3.07	1.89E-03	8.44E-04	3.78E-04
Chrysene	4.30E-01	0.228	9.82E-02	Regresson	4.04E-02	0.007	3.20E-03	8.00E-05	1.74E-03	0.62	1.37	3.07	2.82E-03	1.26E-03	5.65E-04
Dibenz(a,h)anthracene	1.50E-01	0.041	6.18E-03	0.130	1.95E-02	0.006	9.05E-04	8.84E-05	4.35E-04	0.62	1.37	3.07	7.07E-04	3.16E-04	1.42E-04
Fluoranthene	4.16E-01	0.191	7.95E-02	0.500	2.08E-01	0.008	3.36E-03	1.23E-04	2.74E-03	65.6	147	328	4.17E-05	1.87E-05	8.34E-06
Fluorene	1.20E-01	0.642	7.74E-02	Regresson	2.35E-02	0.066	7.98E-03	8.58E-05	9.62E-04	65.6	147	328	1.47E-05	6.56E-06	2.93E-06
Hexachlorobenzene	2.73E-01	0.512	1.40E-01	0.246	6.72E-02	0.252	6.87E-02	8.06E-04	2.12E-03	2.00	2.83	4.00	1.06E-03	7.49E-04	5.30E-04
Hexachlorobutadiene	3.71E-01	0.385	1.43E-01	0.675	2.51E-01	0.101	3.74E-02	4.46E-03	3.84E-03	2.00	6.32	20.0	1.92E-03	6.08E-04	1.92E-04
Hexachlorocyclopentadiene	3.71E-01	1.000	3.71E-01	0.393	1.46E-01	1.000	3.71E-01	4.46E-03	5.25E-03	75.0	168	375	7.00E-05	3.13E-05	1.40E-05
Hexachloroethane	2.73E-01	1.000	2.73E-01	1.439	3.93E-01	1.000	2.73E-01	8.06E-04	5.64E-03	100	224	500	5.64E-05	2.52E-05	1.13E-05
Indeno(1,2,3-cd)pyrene	3.40E-01	0.004	1.30E-03	0.110	3.74E-02	0.007	2.34E-03	1.04E-04	8.35E-04	0.62	1.37	3.07	1.36E-03	6.08E-04	2.72E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	2.51E-03	5.90E-03	8.42	18.8	42.1	7.01E-04	3.13E-04	1.40E-04
Phenanthrene	1.96E-01	0.530	1.04E-01	Regresson	3.09E-01	0.023	4.56E-03	8.36E-05	3.26E-03	65.6	147	328	4.97E-05	2.22E-05	9.95E-06
Pyrene	5.41E-01	0.623	3.37E-01	0.720	3.89E-01	0.010	5.18E-03	1.36E-04	6.15E-03	0.62	1.37	3.07	1.00E-02	4.47E-03	2.00E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	7.38E-05	0.00E+00	8.97E-08	0.000001	0.000003	0.00001	8.97E-02	2.84E-02	8.97E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.1031	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.436	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.400	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.070	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.094	= Proportion of diet composed of sediment
WIR =	0.4921	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	5.940	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	Measured	9.20E-01	5.17E-03	2.06E-01	5.14	8.12	12.8	4.01E-02	2.54E-02	1.61E-02
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	Measured	2.60E-01	6.67E-04	3.99E-02	1.47	3.29	7.35	2.72E-02	1.21E-02	5.43E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	Measured	8.80E-01	1.30E-03	1.87E-01	2.66	5.95	13.3	7.03E-02	3.14E-02	1.41E-02
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	Measured	6.05E+00	4.34E-03	1.26E+00	4.05	7.00	12.1	3.11E-01	1.80E-01	1.04E-01
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	Measured	6.89E-01	1.02E-03	1.45E-01	3.85	8.61	19.3	3.76E-02	1.68E-02	7.52E-03
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	Measured	6.22E-02	7.93E-05	8.52E-03	0.026	0.045	0.078	3.28E-01	1.89E-01	1.09E-01
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	Measured	4.73E-01	9.56E-04	7.99E-02	6.71	15.0	33.6	1.19E-02	5.33E-03	2.38E-03
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	Measured	1.06E+00	1.30E-03	1.29E-01	1.80	4.02	9.00	7.14E-02	3.19E-02	1.43E-02
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	Measured	3.77E-01	7.00E-05	4.11E-02	4.04	9.03	20.2	1.02E-02	4.55E-03	2.04E-03
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	Measured	1.30E+02	1.58E-02	1.62E+01	66.1	148	331	2.45E-01	1.09E-01	4.90E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	1.71E-02	1.50	3.35	7.50	1.14E-02	5.11E-03	2.29E-03
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	2.50E-02	1.50	3.35	7.50	1.66E-02	7.44E-03	3.33E-03
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	2.00E-02	1.50	3.35	7.50	1.33E-02	5.97E-03	2.67E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	1.78E-02	1.50	3.35	7.50	1.19E-02	5.30E-03	2.37E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	1.10E-02	1.50	3.35	7.50	7.35E-03	3.29E-03	1.47E-03
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	3.51E-01	1.50	3.35	7.50	2.34E-01	1.05E-01	4.68E-02
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	2.64E-01	1.50	3.35	7.50	1.76E-01	7.86E-02	3.51E-02
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	Measured	4.51E+00	2.92E-04	5.37E-01	1.50	3.35	7.50	3.58E-01	1.60E-01	7.16E-02
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	1.16E-02	0.30	0.95	3.00	3.86E-02	1.22E-02	3.86E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	1.55E-02	0.30	0.95	3.00	5.17E-02	1.64E-02	5.17E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	4.48E-02	0.30	0.95	3.00	1.49E-01	4.72E-02	1.49E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	5.28E-04	0.155	0.347	0.775	3.41E-03	1.52E-03	6.81E-04
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	4.74E-03	0.56	1.12	2.25	8.46E-03	4.22E-03	2.11E-03
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	3.10E-03	0.80	1.79	4.00	3.88E-03	1.74E-03	7.76E-04
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	4.74E-03	0.56	1.12	2.25	8.46E-03	4.22E-03	2.11E-03
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	4.74E-03	0.56	1.12	2.25	8.46E-03	4.22E-03	2.11E-03
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	1.93E-02	0.071	0.518	3.780	2.72E-01	3.73E-02	5.10E-03
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	5.80E-03	10.0	22.4	50.0	5.80E-04	2.59E-04	1.16E-04
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	2.22E-02	10.0	22.4	50.0	2.22E-03	9.94E-04	4.45E-04
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	2.81E-02	0.30	0.67	1.50	9.35E-02	4.18E-02	1.87E-02
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	4.65E-03	4.00	8.9	20.0	1.16E-03	5.20E-04	2.32E-04
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	1.43E-02	0.80	1.79	4.00	1.79E-02	8.00E-03	3.58E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	8.80E-04	0.48	1.07	2.40	1.83E-03	8.20E-04	3.67E-04
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	1.47E-02	0.48	1.07	2.40	3.06E-02	1.37E-02	6.12E-03
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	1.87E-02	355	794	1,775	5.27E-05	2.36E-05	1.05E-05
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	1.04E-01	1.00	2.24	5.00	1.04E-01	4.67E-02	2.09E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	5.86E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	6.48E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	3.07E-03	80.4	180	402	3.82E-05	1.71E-05	7.64E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	3.64E-03	80.4	180	402	4.53E-05	2.03E-05	9.06E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	1.81E-03	80.4	180	402	2.25E-05	1.01E-05	4.50E-06
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	1.69E-03	80.4	180	402	2.10E-05	9.40E-06	4.20E-06
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	3.95E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	3.95E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	8.17E-04	7.10	15.9	35.5	1.15E-04	5.14E-05	2.30E-05
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	4.87E-04	7.10	15.9	35.5	6.86E-05	3.07E-05	1.37E-05
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	1.31E-03	7.10	15.9	35.5	1.84E-04	8.23E-05	3.68E-05
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	9.34E-04	7.10	15.9	35.5	1.32E-04	5.89E-05	2.63E-05

ATTACHMENT TABLE L-2-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	4.72E-04	7.10	15.9	35.5	6.65E-05	2.97E-05	1.33E-05
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	3.49E-04	7.10	15.9	35.5	4.92E-05	2.20E-05	9.83E-06
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	1.71E-04	7.10	15.9	35.5	2.41E-05	1.08E-05	4.83E-06
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	1.07E-03	7.10	15.9	35.5	1.50E-04	6.71E-05	3.00E-05
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	1.58E-03	7.10	15.9	35.5	2.22E-04	9.94E-05	4.44E-05
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	1.57E-04	7.10	15.9	35.5	2.21E-05	9.87E-06	4.42E-06
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	1.48E-03	7.10	15.9	35.5	2.09E-04	9.34E-05	4.18E-05
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	1.53E-03	7.10	15.9	35.5	2.16E-04	9.65E-05	4.32E-05
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	7.38E-03	0.113	0.253	0.565	6.53E-02	2.92E-02	1.31E-02
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	6.17E-03	3.39	7.58	17.0	1.82E-03	8.14E-04	3.64E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	3.95E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	2.50E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	1.79E-04	7.10	15.9	35.5	2.53E-05	1.13E-05	5.05E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	1.52E-02	6.73	21.3	67.3	2.27E-03	7.16E-04	2.27E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	2.00E-03	7.10	15.9	35.5	2.82E-04	1.26E-04	5.63E-05
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	5.02E-03	7.10	15.9	35.5	7.08E-04	3.17E-04	1.42E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.41E-04	0.00E+00	1.45E-05	0.000014	0.000044	0.00014	**1.03E+00**	3.27E-01	1.03E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0180	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.160	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.840	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0164	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.1480	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	Measured	1.32E+00	5.17E-03	7.47E-02	5.14	8.12	12.8	1.45E-02	9.20E-03	5.82E-03
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	Measured	3.96E-01	6.67E-04	2.23E-02	1.47	3.29	7.35	1.52E-02	6.78E-03	3.03E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	Measured	1.20E+00	1.30E-03	6.78E-02	2.66	5.95	13.3	2.55E-02	1.14E-02	5.10E-03
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	Measured	8.43E+00	4.34E-03	4.75E-01	4.05	7.00	12.1	1.17E-01	6.78E-02	3.92E-02
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	Measured	9.83E-01	1.02E-03	5.53E-02	3.85	8.61	19.3	1.44E-02	6.43E-03	2.87E-03
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	Measured	6.27E-02	7.93E-05	3.53E-03	0.026	0.045	0.078	1.36E-01	7.84E-02	4.53E-02
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	Measured	5.37E-01	9.56E-04	3.02E-02	6.71	15.0	33.6	4.51E-03	2.02E-03	9.01E-04
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	Measured	1.17E+00	1.30E-03	6.61E-02	1.80	4.02	9.00	3.67E-02	1.64E-02	7.34E-03
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	Measured	3.89E-01	7.00E-05	2.19E-02	4.04	9.03	20.2	5.41E-03	2.42E-03	1.08E-03
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	Measured	1.20E+02	1.58E-02	6.72E+00	66.1	148	331	1.02E-01	4.55E-02	2.03E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	8.59E-03	1.50	3.35	7.50	5.73E-03	2.56E-03	1.15E-03
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	1.25E-02	1.50	3.35	7.50	8.31E-03	3.72E-03	1.66E-03
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	1.00E-02	1.50	3.35	7.50	6.67E-03	2.98E-03	1.33E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	8.90E-03	1.50	3.35	7.50	5.93E-03	2.65E-03	1.19E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	5.55E-03	1.50	3.35	7.50	3.70E-03	1.65E-03	7.39E-04
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	1.70E-01	1.50	3.35	7.50	1.13E-01	5.07E-02	2.27E-02
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	1.28E-01	1.50	3.35	7.50	8.54E-02	3.82E-02	1.71E-02
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	Measured	3.29E+00	2.92E-04	1.85E-01	1.50	3.35	7.50	1.24E-01	5.52E-02	2.47E-02
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	5.43E-03	0.30	0.95	3.00	1.81E-02	5.72E-03	1.81E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	7.71E-03	0.30	0.95	3.00	2.57E-02	8.13E-03	2.57E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	2.41E-02	0.30	0.95	3.00	8.03E-02	2.54E-02	8.03E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	2.84E-04	0.155	0.347	0.775	1.83E-03	8.20E-04	3.67E-04
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	2.52E-03	0.56	1.12	2.25	4.50E-03	2.24E-03	1.12E-03
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	1.52E-03	0.80	1.79	4.00	1.89E-03	8.47E-04	3.79E-04
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	2.52E-03	0.56	1.12	2.25	4.50E-03	2.24E-03	1.12E-03
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	2.52E-03	0.56	1.12	2.25	4.50E-03	2.24E-03	1.12E-03
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	7.38E-03	0.071	0.518	3.780	1.04E-01	1.43E-02	1.95E-03
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	3.18E-03	10.0	22.4	50.0	3.18E-04	1.42E-04	6.36E-05
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	1.22E-02	10.0	22.4	50.0	1.22E-03	5.45E-04	2.44E-04
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	1.51E-02	0.30	0.67	1.50	5.03E-02	2.25E-02	1.01E-02
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	2.51E-03	4.00	8.9	20.0	6.29E-04	2.81E-04	1.26E-04
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	6.79E-03	0.80	1.79	4.00	8.49E-03	3.80E-03	1.70E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	4.83E-04	0.48	1.07	2.40	1.01E-03	4.50E-04	2.01E-04
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	7.97E-03	0.48	1.07	2.40	1.66E-02	7.42E-03	3.32E-03
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	9.92E-03	355	794	1,775	2.79E-05	1.25E-05	5.59E-06
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	5.53E-02	1.00	2.24	5.00	5.53E-02	2.47E-02	1.11E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	2.66E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	2.08E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	1.48E-03	80.4	180	402	1.84E-05	8.25E-06	3.69E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	1.25E-03	80.4	180	402	1.55E-05	6.94E-06	3.11E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	2.42E-04	80.4	180	402	3.00E-06	1.34E-06	6.01E-07
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	1.76E-04	80.4	180	402	2.19E-06	9.78E-07	4.37E-07
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	1.82E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.82E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	3.98E-04	7.10	15.9	35.5	5.61E-05	2.51E-05	1.12E-05
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	1.52E-04	7.10	15.9	35.5	2.13E-05	9.55E-06	4.27E-06
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	1.10E-04	7.10	15.9	35.5	1.55E-05	6.93E-06	3.10E-06
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	7.94E-05	7.10	15.9	35.5	1.12E-05	5.00E-06	2.24E-06

ATTACHMENT TABLE L-2-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	7.69E-05	7.10	15.9	35.5	1.08E-05	4.84E-06	2.17E-06
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	1.68E-04	7.10	15.9	35.5	2.37E-05	1.06E-05	4.74E-06
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	8.78E-05	7.10	15.9	35.5	1.24E-05	5.53E-06	2.47E-06
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	6.45E-05	7.10	15.9	35.5	9.09E-06	4.06E-06	1.82E-06
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	1.29E-04	7.10	15.9	35.5	1.82E-05	8.15E-06	3.64E-06
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	3.89E-05	7.10	15.9	35.5	5.48E-06	2.45E-06	1.10E-06
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	1.52E-04	7.10	15.9	35.5	2.13E-05	9.54E-06	4.27E-06
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	2.98E-04	7.10	15.9	35.5	4.19E-05	1.88E-05	8.39E-06
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	2.93E-03	0.113	0.253	0.565	2.59E-02	1.16E-02	5.18E-03
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	2.00E-03	3.39	7.58	17.0	5.91E-04	2.64E-04	1.18E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	1.82E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	1.15E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	8.83E-05	7.10	15.9	35.5	1.24E-05	5.56E-06	2.49E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	7.17E-03	6.73	21.3	67.3	1.07E-03	3.37E-04	1.07E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	2.08E-04	7.10	15.9	35.5	2.93E-05	1.31E-05	5.86E-06
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	2.11E-04	7.10	15.9	35.5	2.97E-05	1.33E-05	5.94E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.12E-04	0.00E+00	6.28E-06	0.000014	0.000044	0.00014	4.49E-01	1.42E-01	4.49E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.1254	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.1010	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	2.230	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	0.126	3.11E+00	5.17E-03	1.01E-01	5.14	8.12	12.8	1.97E-02	1.25E-02	7.90E-03
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	0.164	3.15E-01	6.67E-04	4.32E-02	1.47	3.29	7.35	2.94E-02	1.31E-02	5.87E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	0.038	8.17E-01	1.30E-03	9.45E-02	2.66	5.95	13.3	3.55E-02	1.59E-02	7.11E-03
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	0.100	3.98E+00	4.34E-03	5.67E-01	4.05	7.00	12.1	1.40E-01	8.10E-02	4.68E-02
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	0.070	3.33E+00	1.02E-03	1.90E-01	1.63	2.31	3.26	1.17E-01	8.24E-02	5.83E-02
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	3.250	3.03E-01	7.93E-05	4.90E-03	0.026	0.045	0.078	1.89E-01	1.09E-01	6.29E-02
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	1.000	8.53E+00	9.56E-04	4.36E-02	6.71	15.0	33.6	6.50E-03	2.91E-03	1.30E-03
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	1.000	1.02E+00	1.30E-03	2.80E-02	0.40	0.57	0.80	7.00E-02	4.95E-02	3.50E-02
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	1.000	7.34E-01	7.00E-05	2.23E-03	4.04	9.03	20.2	5.51E-04	2.46E-04	1.10E-04
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	0.147	2.51E+01	1.58E-02	4.46E+00	66.1	148	331	6.75E-02	3.02E-02	1.35E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	8.29E-04	1.50	3.35	7.50	5.53E-04	2.47E-04	1.11E-04
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	1.98E-03	1.50	3.35	7.50	1.32E-03	5.90E-04	2.64E-04
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	1.25E-03	1.50	3.35	7.50	8.31E-04	3.72E-04	1.66E-04
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	8.63E-04	1.50	3.35	7.50	5.75E-04	2.57E-04	1.15E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	4.23E-04	1.50	3.35	7.50	2.82E-04	1.26E-04	5.65E-05
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	1.46E-02	1.50	3.35	7.50	9.73E-03	4.35E-03	1.95E-03
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	1.01E-02	1.50	3.35	7.50	6.76E-03	3.02E-03	1.35E-03
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	5.17	5.17E+00	2.92E-04	2.60E-02	1.50	3.35	7.50	1.73E-02	7.75E-03	3.47E-03
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	8.34E-04	0.12	0.27	0.60	6.95E-03	3.11E-03	1.39E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	7.31E-04	0.12	0.27	0.60	6.09E-03	2.72E-03	1.22E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	1.51E-03	0.60	0.95	1.50	2.52E-03	1.59E-03	1.01E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	1.13E-05	0.155	0.347	0.775	7.28E-05	3.26E-05	1.46E-05
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	6.95E-04	0.56	1.12	2.25	1.24E-03	6.20E-04	3.09E-04
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	1.67E-04	0.80	1.79	4.00	2.08E-04	9.31E-05	4.17E-05
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	6.89E-04	0.56	1.12	2.25	1.23E-03	6.14E-04	3.06E-04
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	5.39E-04	0.56	1.12	2.25	9.62E-04	4.80E-04	2.39E-04
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	2.58E-03	0.071	0.518	3.780	3.64E-02	4.99E-03	6.83E-04
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	8.10E-04	10.0	22.4	50.0	8.10E-05	3.62E-05	1.62E-05
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	1.67E-03	10.0	22.4	50.0	1.67E-04	7.47E-05	3.34E-05
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	1.42E-03	0.30	0.67	1.50	4.75E-03	2.12E-03	9.49E-04
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	7.17E-04	4.00	8.9	20.0	1.79E-04	8.02E-05	3.58E-05
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	8.03E-04	0.80	1.79	4.00	1.00E-03	4.49E-04	2.01E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	1.69E-05	0.48	1.07	2.40	3.52E-05	1.58E-05	7.04E-06
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	7.57E-04	0.48	1.07	2.40	1.58E-03	7.06E-04	3.16E-04
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	9.97E-04	355	794	1,775	2.81E-06	1.26E-06	5.61E-07
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	4.15E-03	1.00	2.24	5.00	4.15E-03	1.85E-03	8.29E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	2.41E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	1.24E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	4.37E-03	80.4	180	402	5.43E-05	2.43E-05	1.09E-05
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	7.56E-03	80.4	180	402	9.40E-05	4.20E-05	1.88E-05
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	7.11E-03	80.4	180	402	8.84E-05	3.96E-05	1.77E-05
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	7.63E-03	80.4	180	402	9.48E-05	4.24E-05	1.90E-05
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	9.81E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.02E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	1.66E-03	7.10	15.9	35.5	2.34E-04	1.05E-04	4.69E-05
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	1.75E-03	7.10	15.9	35.5	2.46E-04	1.10E-04	4.92E-05
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	2.59E-03	7.10	15.9	35.5	3.65E-04	1.63E-04	7.30E-05
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	1.60E-03	7.10	15.9	35.5	2.25E-04	1.01E-04	4.50E-05

ATTACHMENT TABLE L-2-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	1.68E-03	7.10	15.9	35.5	2.36E-04	1.06E-04	4.72E-05
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	6.03E-03	7.10	15.9	35.5	8.49E-04	3.80E-04	1.70E-04
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	1.71E-03	7.10	15.9	35.5	2.41E-04	1.08E-04	4.83E-05
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	1.48E-03	7.10	15.9	35.5	2.09E-04	9.35E-05	4.18E-05
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	2.17E-03	7.10	15.9	35.5	3.05E-04	1.37E-04	6.11E-05
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	7.53E-04	7.10	15.9	35.5	1.06E-04	4.74E-05	2.12E-05
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	7.53E-03	7.10	15.9	35.5	1.06E-03	4.74E-04	2.12E-04
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	1.77E-03	7.10	15.9	35.5	2.50E-04	1.12E-04	4.99E-05
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	2.95E-03	0.113	0.253	0.565	2.61E-02	1.17E-02	5.23E-03
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	1.03E-02	3.39	7.58	17.0	3.05E-03	1.36E-03	6.10E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	7.51E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	1.36E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	1.35E-03	7.10	15.9	35.5	1.90E-04	8.49E-05	3.80E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	2.79E-02	6.73	21.3	67.3	4.15E-03	1.31E-03	4.15E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	1.18E-02	7.10	15.9	35.5	1.66E-03	7.43E-04	3.32E-04
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	1.32E-02	7.10	15.9	35.5	1.86E-03	8.31E-04	3.71E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0564	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.100	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.867	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.033	= Proportion of diet composed of sediment
WIR =	0.0658	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.177	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	Measured	6.46E-01	5.17E-03	3.42E-02	5.14	8.12	12.8	6.65E-03	4.20E-03	2.66E-03
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	Measured	1.84E-01	6.67E-04	9.71E-03	1.47	3.29	7.35	6.60E-03	2.95E-03	1.32E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	Measured	6.46E-01	1.30E-03	3.40E-02	2.66	5.95	13.3	1.28E-02	5.71E-03	2.55E-03
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	Measured	2.09E+00	4.34E-03	1.10E-01	4.05	7.00	12.1	2.71E-02	1.57E-02	9.08E-03
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	Measured	2.64E-01	1.02E-03	1.39E-02	3.85	8.61	19.3	3.61E-03	1.62E-03	7.23E-04
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	Measured	2.08E-01	7.93E-05	1.09E-02	0.49	0.77	1.20	2.23E-02	1.43E-02	9.12E-03
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	Measured	3.26E-01	9.56E-04	1.72E-02	6.71	15.0	33.6	2.56E-03	1.14E-03	5.12E-04
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	Measured	8.86E-01	1.30E-03	4.66E-02	1.80	4.02	9.00	2.59E-02	1.16E-02	5.17E-03
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	Measured	2.63E-01	7.00E-05	1.38E-02	4.04	9.03	20.2	3.42E-03	1.53E-03	6.84E-04
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	Measured	6.82E+01	1.58E-02	3.58E+00	66.1	148	331	5.42E-02	2.42E-02	1.08E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	Measured	5.23E-02	2.60E-04	2.76E-03	0.41	0.92	2.05	6.73E-03	3.01E-03	1.35E-03
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	Measured	5.23E-02	3.33E-04	2.76E-03	0.41	0.92	2.05	6.74E-03	3.02E-03	1.35E-03
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	Measured	6.09E-02	2.60E-04	3.21E-03	0.41	0.92	2.05	7.83E-03	3.50E-03	1.57E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	Measured	5.23E-02	2.98E-04	2.76E-03	0.41	0.92	2.05	6.74E-03	3.01E-03	1.35E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	Measured	5.23E-02	3.33E-04	2.76E-03	0.41	0.92	2.05	6.74E-03	3.02E-03	1.35E-03
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	Measured	3.23E-01	2.60E-04	1.70E-02	0.41	0.92	2.05	4.14E-02	1.85E-02	8.29E-03
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	Measured	1.94E+00	2.98E-04	1.02E-01	0.41	0.92	2.05	2.48E-01	1.11E-01	4.96E-02
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	Measured	6.21E+00	2.92E-04	3.26E-01	0.41	0.92	2.05	7.96E-01	3.56E-01	1.59E-01
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	5.07E-03	0.30	0.95	3.00	1.69E-02	5.34E-03	1.69E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	7.20E-03	0.30	0.95	3.00	2.40E-02	7.59E-03	2.40E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	2.25E-02	0.30	0.95	3.00	7.50E-02	2.37E-02	7.50E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	2.66E-04	0.155	0.347	0.775	1.71E-03	7.67E-04	3.43E-04
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	2.35E-03	0.56	1.12	2.25	4.20E-03	2.09E-03	1.04E-03
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	1.41E-03	0.80	1.79	4.00	1.77E-03	7.91E-04	3.54E-04
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	2.35E-03	0.56	1.12	2.25	4.20E-03	2.09E-03	1.04E-03
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	2.35E-03	0.56	1.12	2.25	4.20E-03	2.09E-03	1.04E-03
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	6.89E-03	0.071	0.518	3.780	9.72E-02	1.33E-02	1.82E-03
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	2.97E-03	10.0	22.4	50.0	2.97E-04	1.33E-04	5.93E-05
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	1.14E-02	10.0	22.4	50.0	1.14E-03	5.09E-04	2.28E-04
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	1.41E-02	0.021	0.047	0.104	6.77E-01	3.03E-01	1.35E-01
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	2.35E-03	4.00	8.9	20.0	5.87E-04	2.62E-04	1.17E-04
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	6.34E-03	0.80	1.79	4.00	7.92E-03	3.54E-03	1.58E-03
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	4.51E-04	0.48	1.07	2.40	9.39E-04	4.20E-04	1.88E-04
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	7.44E-03	0.48	1.07	2.40	1.55E-02	6.93E-03	3.10E-03
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	9.26E-03	355	794	1,775	2.61E-05	1.17E-05	5.22E-06
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	5.16E-02	1.00	2.24	5.00	5.16E-02	2.31E-02	1.03E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	2.56E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	1.98E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	1.39E-03	80.4	180	402	1.73E-05	7.74E-06	3.46E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	1.17E-03	80.4	180	402	1.46E-05	6.51E-06	2.91E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	2.30E-04	80.4	180	402	2.86E-06	1.28E-06	5.73E-07
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	1.69E-04	80.4	180	402	2.10E-06	9.39E-07	4.20E-07
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	1.71E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.71E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	3.73E-04	7.10	15.9	35.5	5.25E-05	2.35E-05	1.05E-05
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	1.42E-04	7.10	15.9	35.5	2.00E-05	8.96E-06	4.01E-06
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	1.03E-04	7.10	15.9	35.5	1.46E-05	6.51E-06	2.91E-06
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	7.49E-05	7.10	15.9	35.5	1.06E-05	4.72E-06	2.11E-06

ATTACHMENT TABLE L-2-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	7.26E-05	7.10	15.9	35.5	1.02E-05	4.57E-06	2.04E-06
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	1.58E-04	7.10	15.9	35.5	2.23E-05	9.95E-06	4.45E-06
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	8.28E-05	7.10	15.9	35.5	1.17E-05	5.21E-06	2.33E-06
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	6.10E-05	7.10	15.9	35.5	8.59E-06	3.84E-06	1.72E-06
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	1.21E-04	7.10	15.9	35.5	1.71E-05	7.65E-06	3.42E-06
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	3.71E-05	7.10	15.9	35.5	5.22E-06	2.33E-06	1.04E-06
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	1.42E-04	7.10	15.9	35.5	2.01E-05	8.97E-06	4.01E-06
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	2.79E-04	7.10	15.9	35.5	3.92E-05	1.76E-05	7.85E-06
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	2.74E-03	0.113	0.253	0.565	2.42E-02	1.08E-02	4.84E-03
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	1.91E-03	3.39	7.58	17.0	5.63E-04	2.52E-04	1.13E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	1.71E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	1.08E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	8.33E-05	7.10	15.9	35.5	1.17E-05	5.25E-06	2.35E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	6.71E-03	6.73	21.3	67.3	9.98E-04	3.15E-04	9.98E-05
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	1.95E-04	7.10	15.9	35.5	2.74E-05	1.23E-05	5.49E-06
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	1.98E-04	7.10	15.9	35.5	2.79E-05	1.25E-05	5.57E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.51E-04	0.00E+00	1.32E-05	0.000014	0.000044	0.00014	9.41E-01	2.98E-01	9.41E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0780 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0769 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.486 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	0.126	3.11E+00	5.17E-03	2.70E-01	2.46	4.26	7.38	1.10E-01	6.33E-02	3.66E-02
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	0.164	3.15E-01	6.67E-04	3.19E-02	1.47	3.29	7.35	2.17E-02	9.72E-03	4.34E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	0.038	8.17E-01	1.30E-03	2.33E-01	2.66	5.95	13.3	8.76E-02	3.92E-02	1.75E-02
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	0.100	3.98E+00	4.34E-03	1.54E+00	4.05	7.00	12.1	3.80E-01	2.20E-01	1.27E-01
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	0.070	3.33E+00	1.02E-03	1.79E-01	3.85	8.61	19.3	4.64E-02	2.08E-02	9.29E-03
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	3.250	3.03E-01	7.93E-05	5.20E-03	0.026	0.045	0.078	2.00E-01	1.15E-01	6.67E-02
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	1.000	8.53E+00	9.56E-04	7.58E-02	6.71	15.0	33.6	1.13E-02	5.05E-03	2.26E-03
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	1.000	1.02E+00	1.30E-03	4.79E-02	0.40	0.57	0.80	1.20E-01	8.47E-02	5.99E-02
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	1.000	7.34E-01	7.00E-05	6.21E-03	4.04	9.03	20.2	1.54E-03	6.88E-04	3.07E-04
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	0.147	2.51E+01	1.58E-02	6.96E+00	66.1	148	331	1.05E-01	4.71E-02	2.11E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	1.45E+00	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	6.83E-02	1.50	3.35	7.50	4.55E-02	2.04E-02	9.10E-03
Aroclor-1221	4.28E-02	Regression	2.06E+00	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	9.68E-02	1.50	3.35	7.50	6.46E-02	2.89E-02	1.29E-02
Aroclor-1232	3.43E-02	Regression	1.68E+00	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	7.88E-02	1.50	3.35	7.50	5.25E-02	2.35E-02	1.05E-02
Aroclor-1242	3.05E-02	Regression	1.50E+00	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	7.06E-02	1.50	3.35	7.50	4.71E-02	2.10E-02	9.41E-03
Aroclor-1248	1.90E-02	Regression	9.63E-01	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	4.52E-02	1.50	3.35	7.50	3.02E-02	1.35E-02	6.03E-03
Aroclor-1254	5.84E-01	Regression	2.40E+01	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	1.13E+00	1.50	3.35	7.50	7.52E-01	3.36E-01	1.50E-01
Aroclor-1260	4.40E-01	Regression	1.84E+01	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	8.64E-01	1.50	3.35	7.50	5.76E-01	2.58E-01	1.15E-01
PCB (total)	9.99E-01	Regression	3.98E+01	0.139	1.39E-01	5.17	5.17E+00	2.92E-04	1.87E+00	1.50	3.35	7.50	**1.24E+00**	5.56E-01	2.49E-01
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	4.13E-03	0.12	0.27	0.60	3.44E-02	1.54E-02	6.88E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	3.57E-03	0.12	0.27	0.60	2.97E-02	1.33E-02	5.94E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	2.25E-03	0.60	0.95	1.50	3.74E-03	2.37E-03	1.50E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	2.98E-05	0.155	0.347	0.775	1.92E-04	8.59E-05	3.84E-05
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	3.86E-04	0.56	1.12	2.25	6.89E-04	3.44E-04	1.71E-04
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	8.41E-04	2.14	4.79	10.7	3.93E-04	1.76E-04	7.86E-05
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	3.86E-04	0.56	1.12	2.25	6.89E-04	3.44E-04	1.71E-04
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	3.86E-04	0.56	1.12	2.25	6.89E-04	3.44E-04	1.71E-04
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	1.41E-02	0.071	0.518	3.780	1.99E-01	2.73E-02	3.73E-03
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	4.37E-05	10.0	22.4	50.0	4.37E-06	1.96E-06	8.75E-07
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	1.56E-04	10.0	22.4	50.0	1.56E-05	6.98E-06	3.12E-06
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	1.51E-03	0.30	0.67	1.50	5.03E-03	2.25E-03	1.01E-03
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	1.84E-04	4.00	8.9	20.0	4.61E-05	2.06E-05	9.21E-06
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	4.72E-03	2.14	4.79	10.7	2.21E-03	9.86E-04	4.41E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	1.00E-05	0.48	1.07	2.40	2.09E-05	9.35E-06	4.18E-06
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	4.96E-04	0.48	1.07	2.40	1.03E-03	4.62E-04	2.07E-04
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	1.68E-03	355	794	1,775	4.73E-06	2.12E-06	9.47E-07
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	9.25E-03	1.00	2.24	5.00	9.25E-03	4.14E-03	1.85E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	3.70E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	7.10E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	1.02E-03	80.4	180	402	1.27E-05	5.67E-06	2.53E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	3.37E-03	80.4	180	402	4.19E-05	1.87E-05	8.38E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	3.37E-03	80.4	180	402	4.19E-05	1.87E-05	8.38E-06
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	3.37E-03	80.4	180	402	4.19E-05	1.87E-05	8.38E-06
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	1.59E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.59E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	2.31E-04	7.10	15.9	35.5	3.26E-05	1.46E-05	6.52E-06
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	5.20E-04	7.10	15.9	35.5	7.32E-05	3.27E-05	1.46E-05
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	2.67E-03	7.10	15.9	35.5	3.77E-04	1.68E-04	7.53E-05
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	1.91E-03	7.10	15.9	35.5	2.69E-04	1.20E-04	5.39E-05

ATTACHMENT TABLE L-2-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	8.11E-04	7.10	15.9	35.5	1.14E-04	5.11E-05	2.29E-05
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	1.16E-04	7.10	15.9	35.5	1.63E-05	7.28E-06	3.26E-06
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	3.98E-05	7.10	15.9	35.5	5.61E-06	2.51E-06	1.12E-06
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	2.29E-03	7.10	15.9	35.5	3.23E-04	1.44E-04	6.46E-05
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	3.24E-03	7.10	15.9	35.5	4.57E-04	2.04E-04	9.13E-05
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	2.18E-04	7.10	15.9	35.5	3.07E-05	1.37E-05	6.15E-06
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	2.92E-03	7.10	15.9	35.5	4.11E-04	1.84E-04	8.23E-05
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	2.40E-03	7.10	15.9	35.5	3.37E-04	1.51E-04	6.75E-05
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	5.04E-03	0.113	0.253	0.565	4.46E-02	1.99E-02	8.91E-03
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	6.68E-03	3.39	7.58	17.0	1.97E-03	8.81E-04	3.94E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	1.59E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	9.72E-03	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	5.75E-05	7.10	15.9	35.5	8.09E-06	3.62E-06	1.62E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	5.53E-03	6.73	21.3	67.3	8.22E-04	2.60E-04	8.22E-05
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	3.91E-03	7.10	15.9	35.5	5.51E-04	2.46E-04	1.10E-04
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	1.12E-02	7.10	15.9	35.5	1.58E-03	7.05E-04	3.15E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

ATTACHMENT TABLE L-2-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	Measured	9.20E-01	5.17E-03	3.17E-02	1.04	1.31	1.66	3.04E-02	2.41E-02	1.91E-02
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	Measured	2.60E-01	6.67E-04	8.94E-03	0.77	2.43	7.70	1.16E-02	3.67E-03	1.16E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	Measured	8.80E-01	1.30E-03	3.02E-02	2.40	5.37	12.0	1.26E-02	5.62E-03	2.51E-03
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	Measured	6.05E+00	4.34E-03	2.07E-01	11.7	13.3	15.1	1.77E-02	1.56E-02	1.37E-02
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	Measured	6.89E-01	1.02E-03	2.36E-02	4.70	6.47	8.90	5.03E-03	3.65E-03	2.66E-03
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	Measured	6.22E-02	7.93E-05	2.13E-03	0.150	0.192	0.247	1.42E-02	1.11E-02	8.63E-03
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	Measured	4.73E-01	9.56E-04	1.62E-02	1.70	2.40	3.40	9.55E-03	6.75E-03	4.77E-03
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	Measured	1.06E+00	1.30E-03	3.64E-02	0.20	0.26	0.33	1.82E-01	1.42E-01	1.10E-01
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	Measured	3.77E-01	7.00E-05	1.29E-02	12.0	26.9	60.2	1.07E-03	4.79E-04	2.14E-04
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	Measured	1.30E+02	1.58E-02	4.45E+00	75.4	169	377	5.90E-02	2.64E-02	1.18E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	5.23E-03	1.37	2.17	3.43	3.82E-03	2.41E-03	1.52E-03
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	7.59E-03	0.137	0.306	0.685	5.54E-02	2.48E-02	1.11E-02
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	6.09E-03	0.137	0.306	0.685	4.45E-02	1.99E-02	8.90E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	5.42E-03	0.137	0.306	0.685	3.96E-02	1.77E-02	7.91E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	3.38E-03	0.137	0.306	0.685	2.46E-02	1.10E-02	4.93E-03
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	1.04E-01	0.137	0.306	0.685	7.56E-01	3.38E-01	1.51E-01
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	7.80E-02	0.137	0.306	0.685	5.69E-01	2.55E-01	1.14E-01
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	Measured	4.51E+00	2.92E-04	1.54E-01	0.137	0.306	0.685	**1.13E+00**	5.04E-01	2.25E-01
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	3.31E-03	0.147	0.329	0.735	2.25E-02	1.01E-02	4.50E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	4.70E-03	0.147	0.329	0.735	3.20E-02	1.43E-02	6.39E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	1.47E-02	0.147	0.329	0.735	9.98E-02	4.46E-02	2.00E-02
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	1.73E-04	0.20	0.45	1.00	8.66E-04	3.87E-04	1.73E-04
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	1.53E-03	1.60	2.26	3.20	9.59E-04	6.78E-04	4.79E-04
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	9.23E-04	4.58	6.48	9.16	2.02E-04	1.42E-04	1.01E-04
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	1.53E-03	1.60	2.26	3.20	9.59E-04	6.78E-04	4.79E-04
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	1.53E-03	1.60	2.26	3.20	9.59E-04	6.78E-04	4.79E-04
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	4.49E-03	0.015	0.021	0.030	3.00E-01	2.12E-01	1.50E-01
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	1.94E-03	0.15	0.34	0.75	1.29E-02	5.77E-03	2.58E-03
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	7.42E-03	0.15	0.34	0.75	4.95E-02	2.21E-02	9.90E-03
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	9.19E-03	0.184	0.411	0.920	4.99E-02	2.23E-02	9.98E-03
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	1.53E-03	8.00	17.9	40.0	1.91E-04	8.56E-05	3.83E-05
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	4.13E-03	4.58	6.48	9.16	9.03E-04	6.38E-04	4.51E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	2.94E-04	0.20	0.45	1.00	1.47E-03	6.57E-04	2.94E-04
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	4.85E-03	0.20	0.45	1.00	2.43E-02	1.08E-02	4.85E-03
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	6.04E-03	4.00	5.66	8.00	1.51E-03	1.07E-03	7.55E-04
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	3.37E-02	8.00	17.9	40.0	4.21E-03	1.88E-03	8.42E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	1.62E-04	76.0	170	380	2.13E-06	9.54E-07	4.27E-07
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	1.27E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	9.03E-04	53.0	75.0	106	1.70E-05	1.21E-05	8.52E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	7.60E-04	85.7	192	429	8.87E-06	3.97E-06	1.77E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	1.47E-04	85.7	192	429	1.72E-06	7.69E-07	3.44E-07
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	1.07E-04	30.0	52.0	90.0	3.58E-06	2.06E-06	1.19E-06
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	1.11E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.11E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	2.43E-04	65.6	147	328	3.70E-06	1.65E-06	7.40E-07
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	9.23E-05	65.6	147	328	1.41E-06	6.29E-07	2.81E-07
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	6.70E-05	65.6	147	328	1.02E-06	4.57E-07	2.04E-07
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	4.84E-05	0.62	1.37	3.07	7.87E-05	3.52E-05	1.58E-05

ATTACHMENT TABLE L-2-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	4.69E-05	0.62	1.37	3.07	7.62E-05	3.41E-05	1.53E-05
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	1.03E-04	0.62	1.37	3.07	1.67E-04	7.47E-05	3.34E-05
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	5.35E-05	0.62	1.37	3.07	8.70E-05	3.90E-05	1.74E-05
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	3.93E-05	0.62	1.37	3.07	6.39E-05	2.86E-05	1.28E-05
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	7.88E-05	0.62	1.37	3.07	1.28E-04	5.74E-05	2.57E-05
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	2.37E-05	0.62	1.37	3.07	3.86E-05	1.73E-05	7.73E-06
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	9.23E-05	65.6	147	328	1.41E-06	6.29E-07	2.81E-07
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	1.81E-04	65.6	147	328	2.76E-06	1.24E-06	5.53E-07
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	1.78E-03	2.00	2.83	4.00	8.91E-04	6.30E-04	4.45E-04
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	1.22E-03	2.00	6.32	20.0	6.11E-04	1.93E-04	6.11E-05
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	1.11E-02	75.0	168	375	1.48E-04	6.62E-05	2.96E-05
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	7.03E-03	100	224	500	7.03E-05	3.14E-05	1.41E-05
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	5.38E-05	0.62	1.37	3.07	8.75E-05	3.92E-05	1.75E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	4.37E-03	8.42	18.8	42.1	5.19E-04	2.32E-04	1.04E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	1.27E-04	65.6	147	328	1.93E-06	8.64E-07	3.86E-07
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	1.28E-04	0.62	1.37	3.07	2.09E-04	9.35E-05	4.18E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	6.59E-05	0.00E+00	2.26E-06	0.000001	0.000003	0.00001	**2.26E+00**	7.13E-01	2.26E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-2-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	0.126	3.11E+00	5.17E-03	1.57E-01	0.25	0.56	1.26	6.24E-01	2.79E-01	1.25E-01
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	0.164	3.15E-01	6.67E-04	5.02E-02	0.77	2.43	7.70	6.52E-02	2.06E-02	6.52E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	0.038	8.17E-01	1.30E-03	1.44E-01	2.40	5.37	12.0	6.00E-02	2.68E-02	1.20E-02
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	0.100	3.98E+00	4.34E-03	5.76E-01	5.60	7.23	9.34	1.03E-01	7.97E-02	6.17E-02
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	0.070	3.33E+00	1.02E-03	3.35E-01	4.70	6.47	8.90	7.14E-02	5.19E-02	3.77E-02
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	3.250	3.03E-01	7.93E-05	5.15E-03	0.032	0.072	0.160	1.61E-01	7.20E-02	3.22E-02
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	1.000	8.53E+00	9.56E-04	6.59E-02	1.70	2.40	3.40	3.87E-02	2.74E-02	1.94E-02
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	1.000	1.02E+00	1.30E-03	2.88E-02	0.20	0.26	0.33	1.44E-01	1.12E-01	8.74E-02
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	1.000	7.34E-01	7.00E-05	4.00E-03	12.0	26.9	60.2	3.32E-04	1.49E-04	6.65E-05
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	0.147	2.51E+01	1.58E-02	4.69E+00	75.4	169	377	6.22E-02	2.78E-02	1.24E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	6.06E-04	0.136	0.304	0.680	4.46E-03	1.99E-03	8.92E-04
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	1.72E-03	0.136	0.304	0.680	1.26E-02	5.64E-03	2.52E-03
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	1.01E-03	0.136	0.304	0.680	7.41E-03	3.31E-03	1.48E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	6.31E-04	0.136	0.304	0.680	4.64E-03	2.07E-03	9.28E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	2.85E-04	0.136	0.304	0.680	2.10E-03	9.38E-04	4.20E-04
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	6.59E-03	0.136	0.304	0.680	4.84E-02	2.17E-02	9.69E-03
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	4.28E-03	0.136	0.304	0.680	3.15E-02	1.41E-02	6.29E-03
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	5.17	5.17E+00	2.92E-04	1.12E-02	0.136	0.304	0.680	8.27E-02	3.70E-02	1.65E-02
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	6.02E-04	0.147	0.329	0.735	4.09E-03	1.83E-03	8.19E-04
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	5.32E-04	0.147	0.329	0.735	3.62E-03	1.62E-03	7.24E-04
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	2.01E-03	0.147	0.329	0.735	1.37E-02	6.11E-03	2.73E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	1.37E-05	0.20	0.45	1.00	6.87E-05	3.07E-05	1.37E-05
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	7.58E-04	1.60	2.26	3.20	4.74E-04	3.35E-04	2.37E-04
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	1.20E-04	4.58	6.48	9.16	2.62E-05	1.85E-05	1.31E-05
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	7.51E-04	1.60	2.26	3.20	4.69E-04	3.32E-04	2.35E-04
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	5.84E-04	1.60	2.26	3.20	3.65E-04	2.58E-04	1.82E-04
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	1.46E-03	0.015	0.021	0.030	9.70E-02	6.86E-02	4.85E-02
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	9.31E-04	0.15	0.34	0.75	6.21E-03	2.78E-03	1.24E-03
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	1.97E-03	0.15	0.34	0.75	1.31E-02	5.88E-03	2.63E-03
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	1.58E-03	0.184	0.411	0.920	8.56E-03	3.83E-03	1.71E-03
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	8.05E-04	8.00	17.9	40.0	1.01E-04	4.50E-05	2.01E-05
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	4.73E-04	4.58	6.48	9.16	1.03E-04	7.30E-05	5.16E-05
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	2.43E-05	0.20	0.45	1.00	1.22E-04	5.44E-05	2.43E-05
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	8.72E-04	0.20	0.45	1.00	4.36E-03	1.95E-03	8.72E-04
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	1.03E-03	4.00	5.66	8.00	2.59E-04	1.83E-04	1.29E-04
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	4.18E-03	8.00	17.9	40.0	5.22E-04	2.34E-04	1.04E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	2.88E-04	76.0	170	380	3.80E-06	1.70E-06	7.59E-07
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	1.42E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	5.00E-03	53.0	75.0	106	9.43E-05	6.67E-05	4.72E-05
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	8.26E-03	85.7	192	429	9.64E-05	4.31E-05	1.93E-05
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	7.76E-03	85.7	192	429	9.06E-05	4.05E-05	1.81E-05
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	8.34E-03	30.0	52.0	90.0	2.78E-04	1.60E-04	9.26E-05
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	1.03E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	1.07E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	2.04E-03	65.6	147	328	3.12E-05	1.39E-05	6.23E-06
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	2.10E-03	65.6	147	328	3.19E-05	1.43E-05	6.39E-06
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	2.83E-03	65.6	147	328	4.31E-05	1.93E-05	8.62E-06
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	2.18E-03	0.62	1.37	3.07	3.55E-03	1.59E-03	7.10E-04

ATTACHMENT TABLE L-2-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	2.46E-03	0.62	1.37	3.07	4.00E-03	1.79E-03	8.01E-04
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	7.95E-03	0.62	1.37	3.07	1.29E-02	5.79E-03	2.59E-03
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	2.31E-03	0.62	1.37	3.07	3.75E-03	1.68E-03	7.51E-04
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	1.88E-03	0.62	1.37	3.07	3.06E-03	1.37E-03	6.13E-04
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	2.96E-03	0.62	1.37	3.07	4.81E-03	2.15E-03	9.64E-04
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	1.13E-03	0.62	1.37	3.07	1.84E-03	8.24E-04	3.69E-04
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	9.03E-03	65.6	147	328	1.38E-04	6.15E-05	2.75E-05
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	1.94E-03	65.6	147	328	2.96E-05	1.32E-05	5.92E-06
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	3.37E-03	2.00	2.83	4.00	1.68E-03	1.19E-03	8.42E-04
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	1.19E-02	2.00	6.32	20.0	5.97E-03	1.89E-03	5.97E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	7.76E-03	75.0	168	375	1.03E-04	4.63E-05	2.07E-05
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	1.47E-02	100	224	500	1.47E-04	6.56E-05	2.93E-05
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	2.16E-03	0.62	1.37	3.07	3.51E-03	1.57E-03	7.03E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	3.08E-02	8.42	18.8	42.1	3.66E-03	1.64E-03	7.32E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	1.32E-02	65.6	147	328	2.01E-04	8.97E-05	4.01E-05
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	1.46E-02	0.62	1.37	3.07	2.37E-02	1.06E-02	4.74E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.165	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0596 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1139 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.169 = Body weight (kg)

ATTACHMENT TABLE L-2-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.47E+01	Regression	5.73E+00	Regresson	8.32E-01	Measured	1.32E+00	5.17E-03	9.14E-02	1.04	1.31	1.66	8.79E-02	6.96E-02	5.51E-02
Cadmium	1.92E+00	Regression	6.78E-01	Regresson	8.87E-01	Measured	3.96E-01	6.67E-04	1.49E-02	0.77	2.43	7.70	1.94E-02	6.14E-03	1.94E-03
Chromium	2.15E+01	Regression	4.96E+00	0.041	8.82E-01	Measured	1.20E+00	1.30E-03	8.03E-02	2.40	5.37	12.0	3.35E-02	1.50E-02	6.69E-03
Copper	3.98E+01	0.824	3.28E+01	Regresson	8.33E+00	Measured	8.43E+00	4.34E-03	3.82E-01	11.7	13.3	15.1	3.26E-02	2.87E-02	2.52E-02
Lead	4.76E+01	Regression	3.81E+00	Regresson	2.32E+00	Measured	9.83E-01	1.02E-03	1.24E-01	4.70	6.47	8.90	2.64E-02	1.92E-02	1.39E-02
Mercury	9.32E-02	1.186	1.11E-01	Regresson	1.02E-01	Measured	6.27E-02	7.93E-05	1.78E-03	0.150	0.192	0.247	1.18E-02	9.23E-03	7.19E-03
Nickel	8.53E+00	Regression	1.61E+00	Regresson	5.38E-01	Measured	5.37E-01	9.56E-04	3.06E-02	1.70	2.40	3.40	1.80E-02	1.27E-02	8.99E-03
Selenium	1.02E+00	1.000	1.02E+00	Regresson	5.16E-01	Measured	1.17E+00	1.30E-03	1.45E-02	0.20	0.26	0.33	7.23E-02	5.63E-02	4.38E-02
Silver	7.34E-01	0.180	1.32E-01	0.014	1.03E-02	Measured	3.89E-01	7.00E-05	2.75E-03	12.0	26.9	60.2	2.28E-04	1.02E-04	4.56E-05
Zinc	1.71E+02	Regression	1.48E+02	Regresson	8.38E+01	Measured	1.20E+02	1.58E-02	2.13E+00	75.4	169	377	2.82E-02	1.26E-02	5.65E-03
Polychlorinated Biphenyls															
Aroclor-1016	2.95E-02	Regression	7.78E-02	0.323	9.51E-03	5.17	1.52E-01	2.60E-04	9.09E-04	1.37	2.17	3.43	6.64E-04	4.20E-04	2.65E-04
Aroclor-1221	4.28E-02	Regression	1.18E-01	0.749	3.20E-02	5.17	2.21E-01	3.33E-04	1.48E-03	0.137	0.306	0.685	1.08E-02	4.83E-03	2.16E-03
Aroclor-1232	3.43E-02	Regression	9.22E-02	0.515	1.77E-02	5.17	1.78E-01	2.60E-04	1.11E-03	0.137	0.306	0.685	8.13E-03	3.64E-03	1.63E-03
Aroclor-1242	3.05E-02	Regression	8.09E-02	0.323	9.86E-03	5.17	1.58E-01	2.98E-04	9.47E-04	0.137	0.306	0.685	6.91E-03	3.09E-03	1.38E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.17	9.83E-02	3.33E-04	5.64E-04	0.137	0.306	0.685	4.12E-03	1.84E-03	8.23E-04
Aroclor-1254	5.84E-01	Regression	2.14E+00	0.139	8.14E-02	5.17	3.02E+00	2.60E-04	2.14E-02	0.137	0.306	0.685	1.56E-01	7.00E-02	3.13E-02
Aroclor-1260	4.40E-01	Regression	1.56E+00	0.105	4.63E-02	5.17	2.28E+00	2.98E-04	1.57E-02	0.137	0.306	0.685	1.14E-01	5.11E-02	2.29E-02
PCB (total)	9.99E-01	Regression	3.89E+00	0.139	1.39E-01	Measured	3.29E+00	2.92E-04	3.60E-02	0.137	0.306	0.685	2.63E-01	1.18E-01	5.26E-02
Pesticides															
4,4'-DDD	4.67E-02	1.88	8.78E-02	Regresson	8.09E-03	2.07	9.65E-02	4.33E-05	9.18E-04	0.147	0.329	0.735	6.24E-03	2.79E-03	1.25E-03
4,4'-DDE	4.03E-02	1.88	7.58E-02	Regresson	7.24E-03	3.40	1.37E-01	4.33E-05	8.60E-04	0.147	0.329	0.735	5.85E-03	2.62E-03	1.17E-03
4,4'-DDT	1.92E-01	0.248	4.77E-02	Regresson	2.35E-02	2.23	4.28E-01	4.33E-05	1.36E-03	0.147	0.329	0.735	9.26E-03	4.14E-03	1.85E-03
Aldrin	1.00E-03	0.517	5.17E-04	0.139	1.39E-04	5.03	5.03E-03	2.57E-05	1.48E-05	0.20	0.45	1.00	7.38E-05	3.30E-05	1.48E-05
alpha-BHC	8.89E-03	0.912	8.10E-03	1.735	1.54E-02	5.03	4.48E-02	2.57E-05	2.39E-04	1.60	2.26	3.20	1.50E-04	1.06E-04	7.48E-05
alpha-Chlordane	9.47E-03	1.88	1.78E-02	0.165	1.56E-03	2.84	2.69E-02	2.57E-05	1.96E-04	4.58	6.48	9.16	4.28E-05	3.02E-05	2.14E-05
beta-BHC	8.89E-03	0.912	8.10E-03	1.719	1.53E-02	5.03	4.48E-02	2.57E-05	2.38E-04	1.60	2.26	3.20	1.49E-04	1.05E-04	7.45E-05
delta-BHC	8.89E-03	0.912	8.10E-03	1.311	1.17E-02	5.03	4.48E-02	2.57E-05	2.13E-04	1.60	2.26	3.20	1.33E-04	9.42E-05	6.66E-05
Dieldrin	6.11E-02	4.920	3.01E-01	0.410	2.51E-02	2.15	1.31E-01	4.33E-05	2.71E-03	0.015	0.021	0.030	1.81E-01	1.28E-01	9.04E-02
Endosulfan I	1.12E-02	0.073	8.15E-04	1.687	1.89E-02	5.03	5.65E-02	2.57E-05	2.27E-04	0.15	0.34	0.75	1.51E-03	6.76E-04	3.02E-04
Endosulfan II	4.30E-02	0.073	3.13E-03	0.886	3.81E-02	5.03	2.17E-01	4.33E-05	6.25E-04	0.15	0.34	0.75	4.17E-03	1.86E-03	8.34E-04
Endrin	5.33E-02	0.600	3.20E-02	0.535	2.85E-02	5.03	2.68E-01	4.33E-05	8.56E-04	0.184	0.411	0.920	4.65E-03	2.08E-03	9.30E-04
gamma-BHC (Lindane)	8.87E-03	0.430	3.81E-03	1.852	1.64E-02	5.03	4.47E-02	2.57E-05	2.14E-04	8.00	17.9	40.0	2.67E-05	1.20E-05	5.35E-06
gamma-Chlordane	3.79E-02	2.65	1.01E-01	0.165	6.25E-03	3.19	1.21E-01	2.57E-05	1.01E-03	4.58	6.48	9.16	2.21E-04	1.57E-04	1.11E-04
Heptachlor	1.70E-03	0.057	9.68E-05	0.174	2.96E-04	5.03	8.56E-03	2.57E-05	1.81E-05	0.20	0.45	1.00	9.04E-05	4.04E-05	1.81E-05
Heptachlor epoxide	2.81E-02	0.372	1.05E-02	0.566	1.59E-02	5.03	1.42E-01	2.57E-05	4.10E-04	0.20	0.45	1.00	2.05E-03	9.16E-04	4.10E-04
Methoxychlor	3.50E-02	1.000	3.50E-02	0.525	1.84E-02	5.03	1.76E-01	1.86E-04	6.79E-04	4.00	5.66	8.00	1.70E-04	1.20E-04	8.48E-05
Toxaphene	1.95E-01	1.000	1.95E-01	0.355	6.92E-02	5.03	9.83E-01	4.55E-04	3.51E-03	8.00	17.9	40.0	4.38E-04	1.96E-04	8.77E-05
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	1.000	4.05E-03	8.42E-04	1.40E-04	76.0	170	380	1.84E-06	8.24E-07	3.68E-07
1,2,4,5-Tetrachlorobenzene	3.34E-01	0.397	1.32E-01	0.792	2.64E-01	0.101	3.36E-02	4.13E-03	3.76E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	6.96E-02	0.257	1.79E-02	1.426	9.92E-02	0.369	2.57E-02	8.42E-04	1.04E-03	53.0	75.0	106	1.96E-05	1.39E-05	9.80E-06
1,2-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.452	1.71E-01	0.313	2.18E-02	5.00E-04	1.89E-03	85.7	192	429	2.21E-05	9.87E-06	4.41E-06
1,3-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.296	1.60E-01	0.056	3.89E-03	5.00E-04	1.79E-03	85.7	192	429	2.09E-05	9.37E-06	4.19E-06
1,4-Dichlorobenzene	6.96E-02	1.000	6.96E-02	2.475	1.72E-01	0.039	2.72E-03	5.00E-04	1.88E-03	30.0	52.0	90.0	6.26E-05	3.62E-05	2.09E-05
4-Bromophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.566	1.81E-01	1.000	3.21E-01	4.13E-03	4.94E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.21E-01	1.000	3.21E-01	0.593	1.90E-01	1.000	3.21E-01	4.13E-03	5.00E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	7.16E-02	0.065	4.62E-03	Regresson	3.67E-02	0.098	7.03E-03	6.90E-05	4.21E-04	65.6	147	328	6.41E-06	2.87E-06	1.28E-06
Acenaphthylene	6.83E-02	0.157	1.07E-02	Regresson	3.81E-02	0.039	2.63E-03	7.79E-05	4.67E-04	65.6	147	328	7.11E-06	3.18E-06	1.42E-06
Anthracene	8.10E-02	0.699	5.67E-02	Regresson	5.26E-02	0.023	1.89E-03	7.79E-05	9.35E-04	65.6	147	328	1.43E-05	6.37E-06	2.85E-06
Benzo(a)anthracene	2.04E-01	0.198	4.04E-02	Regresson	2.59E-02	0.007	1.35E-03	7.92E-05	8.26E-04	0.62	1.37	3.07	1.34E-03	6.01E-04	2.69E-04

ATTACHMENT TABLE L-2-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - All Site Waterbodies

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.25E-01	0.075	1.69E-02	Regresson	2.97E-02	0.006	1.30E-03	8.44E-05	7.10E-04	0.62	1.37	3.07	1.15E-03	5.17E-04	2.31E-04
Benzo(b)fluoranthene	4.15E-01	0.005	2.06E-03	0.310	1.29E-01	0.007	2.92E-03	8.84E-05	1.60E-03	0.62	1.37	3.07	2.60E-03	1.16E-03	5.21E-04
Benzo(g,h,i)perylene	1.32E-01	0.004	4.78E-04	Regresson	3.60E-02	0.011	1.50E-03	8.13E-05	4.78E-04	0.62	1.37	3.07	7.77E-04	3.48E-04	1.56E-04
Benzo(k)fluoranthene	1.60E-01	0.303	4.85E-02	Regresson	2.39E-02	0.007	1.08E-03	7.94E-05	8.02E-04	0.62	1.37	3.07	1.30E-03	5.84E-04	2.61E-04
Chrysene	3.01E-01	0.228	6.88E-02	Regresson	3.27E-02	0.007	2.24E-03	7.71E-05	1.25E-03	0.62	1.37	3.07	2.03E-03	9.08E-04	4.06E-04
Dibenz(a,h)anthracene	1.04E-01	0.041	4.30E-03	0.130	1.35E-02	0.006	6.29E-04	7.79E-05	3.04E-04	0.62	1.37	3.07	4.94E-04	2.21E-04	9.89E-05
Fluoranthene	3.23E-01	0.191	6.18E-02	0.500	1.62E-01	0.008	2.62E-03	9.68E-05	2.13E-03	65.6	147	328	3.24E-05	1.45E-05	6.49E-06
Fluorene	7.90E-02	0.642	5.07E-02	Regresson	3.37E-02	0.066	5.23E-03	7.46E-05	7.59E-04	65.6	147	328	1.16E-05	5.18E-06	2.31E-06
Hexachlorobenzene	2.05E-01	0.512	1.05E-01	0.246	5.05E-02	0.252	5.16E-02	5.39E-04	1.59E-03	2.00	2.83	4.00	7.93E-04	5.61E-04	3.96E-04
Hexachlorobutadiene	3.21E-01	0.385	1.23E-01	0.675	2.17E-01	0.101	3.23E-02	4.13E-03	3.34E-03	2.00	6.32	20.0	1.67E-03	5.28E-04	1.67E-04
Hexachlorocyclopentadiene	3.21E-01	1.000	3.21E-01	0.393	1.26E-01	1.000	3.21E-01	4.13E-03	4.56E-03	75.0	168	375	6.07E-05	2.72E-05	1.21E-05
Hexachloroethane	2.05E-01	1.000	2.05E-01	1.439	2.95E-01	1.000	2.05E-01	5.39E-04	4.23E-03	100	224	500	4.23E-05	1.89E-05	8.45E-06
Indeno(1,2,3-cd)pyrene	2.18E-01	0.004	8.34E-04	0.110	2.39E-02	0.007	1.50E-03	8.55E-05	5.36E-04	0.62	1.37	3.07	8.72E-04	3.90E-04	1.75E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.147	1.26E-01	1.75E-03	5.84E-03	8.42	18.8	42.1	6.93E-04	3.10E-04	1.39E-04
Phenanthrene	1.57E-01	0.530	8.31E-02	Regresson	2.68E-01	0.023	3.64E-03	7.36E-05	2.76E-03	65.6	147	328	4.20E-05	1.88E-05	8.41E-06
Pyrene	3.82E-01	0.623	2.38E-01	0.720	2.75E-01	0.010	3.67E-03	1.04E-04	4.35E-03	0.62	1.37	3.07	7.07E-03	3.16E-03	1.42E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	5.46E-05	0.00E+00	6.63E-08	0.000001	0.000003	0.00001	6.63E-02	2.10E-02	6.63E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.72	5.72	5.72
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.4921 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 5.940 = Body weight (kg)

ATTACHMENT TABLE L-3-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	Measured	3.90E+00	5.80E-02	1.29E+00	5.14	8.12	12.8	2.51E-01	1.59E-01	1.01E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	3.12E-01	8.20E-04	1.07E-01	1.47	3.29	7.35	7.27E-02	3.25E-02	1.45E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	2.51E+00	6.30E-03	6.80E-01	2.66	5.95	13.3	2.56E-01	1.14E-01	5.12E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.22E+01	2.59E-02	5.47E+01	4.05	7.00	12.1	**1.35E+01**	**7.81E+00**	**4.52E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	1.95E+00	5.90E-03	8.71E-01	3.85	8.61	19.3	2.26E-01	1.01E-01	4.53E-02
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	Measured	1.19E-01	2.00E-04	8.05E-02	0.026	0.045	0.078	**3.10E+00**	**1.79E+00**	**1.03E+00**
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.59E+00	3.50E-03	4.00E-01	6.71	15.0	33.6	5.97E-02	2.67E-02	1.19E-02
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	Measured	2.59E+00	1.30E-03	5.02E-01	1.80	4.02	9.00	2.79E-01	1.25E-01	5.58E-02
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	1.17E+00	7.00E-05	2.43E-01	4.04	9.03	20.2	6.03E-02	2.70E-02	1.21E-02
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.31E+02	6.54E-02	4.66E+01	66.1	148	331	7.04E-01	3.15E-01	1.41E-01
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	3.24E-01	1.50	3.35	7.50	2.16E-01	9.65E-02	4.31E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	7.70E-01	1.50	3.35	7.50	5.13E-01	2.30E-01	1.03E-01
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	5.11E-01	1.50	3.35	7.50	3.41E-01	1.52E-01	6.81E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	5.92E-02	1.50	3.35	7.50	3.95E-02	1.77E-02	7.89E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	2.16E-02	1.50	3.35	7.50	1.44E-02	6.43E-03	2.87E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	2.57E+01	1.50	3.35	7.50	**1.71E+01**	**7.66E+00**	**3.43E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	2.85E+00	1.50	3.35	7.50	**1.90E+00**	8.48E-01	3.79E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	8.43E+00	7.81E-04	5.31E+00	1.50	3.35	7.50	**3.54E+00**	**1.58E+00**	7.08E-01
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	3.56E-01	0.30	0.95	3.00	**1.19E+00**	3.76E-01	1.19E-01
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	5.88E+00	0.30	0.95	3.00	**1.96E+01**	**6.20E+00**	**1.96E+00**
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	1.60E+00	0.30	0.95	3.00	**5.32E+00**	**1.68E+00**	5.32E-01
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	1.04E-03	0.155	0.347	0.775	6.74E-03	3.01E-03	1.35E-03
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	7.46E-03	0.56	1.12	2.25	1.33E-02	6.64E-03	3.31E-03
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	2.62E-02	0.80	1.79	4.00	3.28E-02	1.47E-02	6.56E-03
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	7.46E-03	0.56	1.12	2.25	1.33E-02	6.64E-03	3.31E-03
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	7.46E-03	0.56	1.12	2.25	1.33E-02	6.64E-03	3.31E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	4.49E+00	0.071	0.518	3.780	**6.33E+01**	**8.67E+00**	**1.19E+00**
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	5.90E-02	10.0	22.4	50.0	5.90E-03	2.64E-03	1.18E-03
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	8.44E-01	10.0	22.4	50.0	8.44E-02	3.77E-02	1.69E-02
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	1.24E+00	0.30	0.67	1.50	**4.15E+00**	**1.85E+00**	8.29E-01
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	8.60E-04	4.00	8.9	20.0	2.15E-04	9.62E-05	4.30E-05
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	9.59E-01	0.80	1.79	4.00	**1.20E+00**	5.36E-01	2.40E-01
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	1.74E-03	0.48	1.07	2.40	3.62E-03	1.62E-03	7.25E-04
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	5.55E-01	0.48	1.07	2.40	**1.16E+00**	5.17E-01	2.31E-01
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	5.45E-01	355	794	1,775	1.53E-03	6.86E-04	3.07E-04
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	4.19E-01	1.00	2.24	5.00	4.19E-01	1.87E-01	8.38E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	5.87E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	7.58E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	1.84E-01	80.4	180	402	2.29E-03	1.02E-03	4.57E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	1.55E-01	80.4	180	402	1.92E-03	8.61E-04	3.85E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	7.18E-02	80.4	180	402	8.93E-04	3.99E-04	1.79E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	6.64E-02	80.4	180	402	8.26E-04	3.69E-04	1.65E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	1.80E-02	7.10	15.9	35.5	2.54E-03	1.14E-03	5.08E-04
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	7.76E-03	7.10	15.9	35.5	1.09E-03	4.89E-04	2.19E-04
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	1.51E-02	7.10	15.9	35.5	2.13E-03	9.52E-04	4.26E-04
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	5.21E-02	7.10	15.9	35.5	7.33E-03	3.28E-03	1.47E-03

ATTACHMENT TABLE L-3-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	1.26E-01	7.10	15.9	35.5	1.78E-02	7.94E-03	3.55E-03
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	8.90E-02	7.10	15.9	35.5	1.25E-02	5.61E-03	2.51E-03
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	8.43E-02	7.10	15.9	35.5	1.19E-02	5.31E-03	2.38E-03
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	3.15E-02	7.10	15.9	35.5	4.43E-03	1.98E-03	8.87E-04
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	8.93E-02	7.10	15.9	35.5	1.26E-02	5.63E-03	2.52E-03
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	7.24E-03	7.10	15.9	35.5	1.02E-03	4.56E-04	2.04E-04
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	3.53E-02	7.10	15.9	35.5	4.98E-03	2.23E-03	9.95E-04
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	6.01E-02	7.10	15.9	35.5	8.46E-03	3.78E-03	1.69E-03
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	1.27E-01	0.113	0.253	0.565	**1.12E+00**	5.03E-01	2.25E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	6.69E-02	3.39	7.58	17.0	1.97E-02	8.83E-03	3.95E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	3.37E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	3.35E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	9.11E-02	7.10	15.9	35.5	1.28E-02	5.74E-03	2.57E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	2.92E-02	6.73	21.3	67.3	4.35E-03	1.37E-03	4.35E-04
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	3.46E-02	7.10	15.9	35.5	4.87E-03	2.18E-03	9.74E-04
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	5.76E-01	7.10	15.9	35.5	8.11E-02	3.63E-02	1.62E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.18E-04	0.00E+00	7.35E-05	0.000014	0.000044	0.00014	**5.25E+00**	**1.66E+00**	5.25E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0262 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.160 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.840 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0211 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.125 = Body weight (kg)

ATTACHMENT TABLE L-3-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	Measured	6.88E+00	5.80E-02	4.48E-01	5.14	8.12	12.8	8.71E-02	5.51E-02	3.49E-02
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	5.57E-01	8.20E-04	3.60E-02	1.47	3.29	7.35	2.45E-02	1.10E-02	4.90E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	3.34E+00	6.30E-03	2.16E-01	2.66	5.95	13.3	8.13E-02	3.63E-02	1.63E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.89E+01	2.59E-02	1.22E+00	4.05	7.00	12.1	3.01E-01	1.74E-01	1.01E-01
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	3.14E+00	5.90E-03	2.03E-01	3.85	8.61	19.3	5.27E-02	2.36E-02	1.05E-02
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	Measured	1.13E-01	2.00E-04	7.28E-03	0.026	0.045	0.078	2.80E-01	1.62E-01	9.33E-02
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.75E+00	3.50E-03	1.13E-01	6.71	15.0	33.6	1.68E-02	7.53E-03	3.37E-03
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	Measured	2.58E+00	1.30E-03	1.67E-01	1.80	4.02	9.00	9.27E-02	4.14E-02	1.85E-02
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.26E-01	7.00E-05	5.98E-02	4.04	9.03	20.2	1.48E-02	6.62E-03	2.96E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.12E+02	6.54E-02	1.37E+01	66.1	148	331	2.07E-01	9.27E-02	4.14E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	1.07E-01	1.50	3.35	7.50	7.14E-02	3.19E-02	1.43E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	2.52E-01	1.50	3.35	7.50	1.68E-01	7.53E-02	3.37E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	1.68E-01	1.50	3.35	7.50	1.12E-01	5.02E-02	2.24E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	1.99E-02	1.50	3.35	7.50	1.33E-02	5.94E-03	2.66E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	7.31E-03	1.50	3.35	7.50	4.88E-03	2.18E-03	9.75E-04
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	8.03E+00	1.50	3.35	7.50	**5.35E+00**	**2.39E+00**	**1.07E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	9.18E-01	1.50	3.35	7.50	6.12E-01	2.74E-01	1.22E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	6.56E+00	7.81E-04	4.24E-01	1.50	3.35	7.50	2.83E-01	1.26E-01	5.65E-02
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	1.21E-01	0.30	0.95	3.00	4.02E-01	1.27E-01	4.02E-02
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	2.14E+00	0.30	0.95	3.00	**7.14E+00**	**2.26E+00**	7.14E-01
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	5.78E-01	0.30	0.95	3.00	**1.93E+00**	6.09E-01	1.93E-01
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	3.76E-04	0.155	0.347	0.775	2.42E-03	1.08E-03	4.85E-04
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	2.65E-03	0.56	1.12	2.25	4.72E-03	2.36E-03	1.18E-03
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	9.18E-03	0.80	1.79	4.00	1.15E-02	5.13E-03	2.29E-03
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	2.65E-03	0.56	1.12	2.25	4.72E-03	2.36E-03	1.18E-03
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	2.65E-03	0.56	1.12	2.25	4.72E-03	2.36E-03	1.18E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	1.56E+00	0.071	0.518	3.780	**2.20E+01**	**3.02E+00**	4.13E-01
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	2.16E-02	10.0	22.4	50.0	2.16E-03	9.65E-04	4.32E-04
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	3.09E-01	10.0	22.4	50.0	3.09E-02	1.38E-02	6.18E-03
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	4.46E-01	0.30	0.67	1.50	**1.49E+00**	6.66E-01	2.98E-01
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	2.94E-04	4.00	8.9	20.0	7.34E-05	3.28E-05	1.47E-05
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	3.23E-01	0.80	1.79	4.00	4.04E-01	1.80E-01	8.07E-02
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	6.36E-04	0.48	1.07	2.40	1.32E-03	5.93E-04	2.65E-04
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	2.01E-01	0.48	1.07	2.40	4.19E-01	1.87E-01	8.37E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	1.94E-01	355	794	1,775	5.45E-04	2.44E-04	1.09E-04
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	1.49E-01	1.00	2.24	5.00	1.49E-01	6.66E-02	2.98E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.81E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	1.39E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	5.80E-02	80.4	180	402	7.21E-04	3.23E-04	1.44E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	3.71E-02	80.4	180	402	4.61E-04	2.06E-04	9.23E-05
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	6.67E-03	80.4	180	402	8.29E-05	3.71E-05	1.66E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	4.68E-03	80.4	180	402	5.82E-05	2.60E-05	1.16E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	2.66E-03	7.10	15.9	35.5	3.75E-04	1.68E-04	7.49E-05
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	6.69E-04	7.10	15.9	35.5	9.43E-05	4.22E-05	1.89E-05
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	7.15E-04	7.10	15.9	35.5	1.01E-04	4.51E-05	2.02E-05
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	9.64E-03	7.10	15.9	35.5	1.36E-03	6.07E-04	2.72E-04

ATTACHMENT TABLE L-3-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	1.55E-03	7.10	15.9	35.5	2.18E-04	9.74E-05	4.36E-05
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	3.21E-03	7.10	15.9	35.5	4.52E-04	2.02E-04	9.05E-05
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	2.23E-02	7.10	15.9	35.5	3.14E-03	1.40E-03	6.28E-04
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	1.21E-03	7.10	15.9	35.5	1.71E-04	7.63E-05	3.41E-05
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	1.25E-02	7.10	15.9	35.5	1.76E-03	7.85E-04	3.51E-04
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	5.06E-04	7.10	15.9	35.5	7.13E-05	3.19E-05	1.43E-05
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	3.60E-03	7.10	15.9	35.5	5.06E-04	2.26E-04	1.01E-04
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	1.08E-02	7.10	15.9	35.5	1.52E-03	6.81E-04	3.05E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	2.98E-02	0.113	0.253	0.565	2.63E-01	1.18E-01	5.27E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	1.24E-02	3.39	7.58	17.0	3.67E-03	1.64E-03	7.33E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.04E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	1.03E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	2.31E-02	7.10	15.9	35.5	3.26E-03	1.46E-03	6.52E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	9.37E-03	6.73	21.3	67.3	1.39E-03	4.40E-04	1.39E-04
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	7.62E-03	7.10	15.9	35.5	1.07E-03	4.80E-04	2.15E-04
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	3.63E-02	7.10	15.9	35.5	5.11E-03	2.29E-03	1.02E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	3.33E-04	0.00E+00	2.15E-05	0.000014	0.000044	0.00014	**1.54E+00**	4.86E-01	1.54E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1356 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1090 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.10 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	0.126	1.40E+01	5.80E-02	8.43E-01	5.14	8.12	12.8	1.64E-01	1.04E-01	6.56E-02
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	2.72E-01	1.47	3.29	7.35	1.85E-01	8.28E-02	3.70E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	7.90E-01	2.66	5.95	13.3	2.97E-01	1.33E-01	5.94E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	2.07E+01	4.05	7.00	12.1	**5.11E+00**	**2.96E+00**	**1.71E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	2.59E+00	1.63	2.31	3.26	**1.59E+00**	**1.12E+00**	7.95E-01
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	4.580	2.84E+00	2.00E-04	5.22E-02	0.026	0.045	0.078	**2.01E+00**	**1.16E+00**	6.69E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	2.78E-01	6.71	15.0	33.6	4.14E-02	1.85E-02	8.28E-03
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	1.000	1.40E+00	1.30E-03	9.67E-02	0.40	0.57	0.80	2.42E-01	1.71E-01	1.21E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	5.92E-02	4.04	9.03	20.2	1.46E-02	6.55E-03	2.93E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	2.20E+01	66.1	148	331	3.32E-01	1.49E-01	6.65E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	2.14E-02	1.50	3.35	7.50	1.43E-02	6.39E-03	2.86E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	8.16E-02	1.50	3.35	7.50	5.44E-02	2.43E-02	1.09E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	4.31E-02	1.50	3.35	7.50	2.88E-02	1.29E-02	5.75E-03
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	3.73E-03	1.50	3.35	7.50	2.49E-03	1.11E-03	4.97E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	1.12E-03	1.50	3.35	7.50	7.45E-04	3.33E-04	1.49E-04
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	1.72E+00	1.50	3.35	7.50	**1.14E+00**	5.12E-01	2.29E-01
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	1.55E-01	1.50	3.35	7.50	1.04E-01	4.63E-02	2.07E-02
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	7.81E-04	1.72E+00	1.50	3.35	7.50	**1.14E+00**	5.12E-01	2.29E-01
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	1.50E-02	0.12	0.27	0.60	1.25E-01	5.61E-02	2.51E-02
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	2.31E-02	0.12	0.27	0.60	1.92E-01	8.60E-02	3.84E-02
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	2.53E-02	0.60	0.95	1.50	4.21E-02	2.66E-02	1.69E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	3.42E-05	0.155	0.347	0.775	2.21E-04	9.88E-05	4.42E-05
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	1.37E-03	0.56	1.12	2.25	2.45E-03	1.22E-03	6.11E-04
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	7.88E-04	0.80	1.79	4.00	9.85E-04	4.40E-04	1.97E-04
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	1.36E-03	0.56	1.12	2.25	2.43E-03	1.21E-03	6.06E-04
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	1.07E-03	0.56	1.12	2.25	1.91E-03	9.52E-04	4.75E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	2.99E-01	0.071	0.518	3.780	**4.22E+00**	5.78E-01	7.92E-02
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	1.02E-02	10.0	22.4	50.0	1.02E-03	4.57E-04	2.05E-04
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	7.87E-02	10.0	22.4	50.0	7.87E-03	3.52E-03	1.57E-03
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	7.95E-02	0.30	0.67	1.50	2.65E-01	1.18E-01	5.30E-02
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	1.79E-04	4.00	8.9	20.0	4.49E-05	2.01E-05	8.97E-06
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	4.38E-02	0.80	1.79	4.00	5.47E-02	2.45E-02	1.09E-02
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	4.77E-05	0.48	1.07	2.40	9.93E-05	4.44E-05	1.99E-05
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	3.58E-02	0.48	1.07	2.40	7.46E-02	3.34E-02	1.49E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	3.59E-02	355	794	1,775	1.01E-04	4.52E-05	2.02E-05
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	2.08E-02	1.00	2.24	5.00	2.08E-02	9.31E-03	4.16E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	3.37E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	1.66E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	2.47E-01	80.4	180	402	3.07E-03	1.37E-03	6.15E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	4.23E-01	80.4	180	402	5.27E-03	2.35E-03	1.05E-03
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	3.98E-01	80.4	180	402	4.95E-03	2.21E-03	9.90E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	4.27E-01	80.4	180	402	5.31E-03	2.38E-03	1.06E-03
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.18E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.23E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	6.03E-03	7.10	15.9	35.5	8.50E-04	3.80E-04	1.70E-04
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	8.61E-03	7.10	15.9	35.5	1.21E-03	5.42E-04	2.43E-04
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	1.89E-02	7.10	15.9	35.5	2.66E-03	1.19E-03	5.32E-04
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	2.35E-02	7.10	15.9	35.5	3.31E-03	1.48E-03	6.61E-04

ATTACHMENT TABLE L-3-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	7.73E-02	7.10	15.9	35.5	1.09E-02	4.87E-03	2.18E-03
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	2.33E-01	7.10	15.9	35.5	3.29E-02	1.47E-02	6.57E-03
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	1.01E-01	7.10	15.9	35.5	1.42E-02	6.37E-03	2.85E-03
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	3.36E-02	7.10	15.9	35.5	4.74E-03	2.12E-03	9.47E-04
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	4.20E-02	7.10	15.9	35.5	5.92E-03	2.65E-03	1.18E-03
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	2.00E-02	7.10	15.9	35.5	2.82E-03	1.26E-03	5.64E-04
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	8.75E-01	7.10	15.9	35.5	1.23E-01	5.51E-02	2.46E-02
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	1.32E-02	7.10	15.9	35.5	1.85E-03	8.29E-04	3.71E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	6.23E-02	0.113	0.253	0.565	5.51E-01	2.46E-01	1.10E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	1.29E-01	3.39	7.58	17.0	3.80E-02	1.70E-02	7.60E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	9.01E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	2.59E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	6.33E-02	7.10	15.9	35.5	8.92E-03	3.99E-03	1.78E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	3.38E-01	6.73	21.3	67.3	5.02E-02	1.59E-02	5.02E-03
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	6.91E-02	7.10	15.9	35.5	9.73E-03	4.35E-03	1.95E-03
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	1.11E+00	7.10	15.9	35.5	1.56E-01	6.98E-02	3.12E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0717 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.100 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.867 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.033 = Proportion of diet composed of sediment
WIR = 0.0850 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.612 = Body weight (kg)

ATTACHMENT TABLE L-3-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	Measured	1.14E+00	5.80E-02	8.88E-02	5.14	8.12	12.8	1.73E-02	1.09E-02	6.92E-03
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	6.65E-01	8.20E-04	4.95E-02	1.47	3.29	7.35	3.37E-02	1.51E-02	6.74E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	1.03E+00	6.30E-03	7.71E-02	2.66	5.95	13.3	2.90E-02	1.30E-02	5.80E-03
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	2.89E+00	2.59E-02	2.17E-01	4.05	7.00	12.1	5.36E-02	3.10E-02	1.79E-02
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	9.09E-01	5.90E-03	6.80E-02	3.85	8.61	19.3	1.77E-02	7.90E-03	3.53E-03
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	Measured	1.22E-01	2.00E-04	9.08E-03	0.49	0.77	1.20	1.85E-02	1.18E-02	7.56E-03
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	9.09E-01	3.50E-03	6.78E-02	6.71	15.0	33.6	1.01E-02	4.52E-03	2.02E-03
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	Measured	1.85E+00	1.30E-03	1.37E-01	1.80	4.02	9.00	7.63E-02	3.41E-02	1.53E-02
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.09E-01	7.00E-05	6.76E-02	4.04	9.03	20.2	1.67E-02	7.48E-03	3.35E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	5.39E+01	6.54E-02	4.01E+00	66.1	148	331	6.07E-02	2.71E-02	1.21E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	Measured	1.04E-01	6.70E-04	7.80E-03	0.41	0.92	2.05	1.90E-02	8.50E-03	3.80E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	Measured	1.04E-01	9.30E-04	7.82E-03	0.41	0.92	2.05	1.91E-02	8.52E-03	3.81E-03
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	Measured	1.20E-01	6.70E-04	9.01E-03	0.41	0.92	2.05	2.20E-02	9.82E-03	4.39E-03
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	Measured	1.04E-01	8.00E-04	7.81E-03	0.41	0.92	2.05	1.90E-02	8.51E-03	3.81E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	Measured	1.04E-01	9.30E-04	7.82E-03	0.41	0.92	2.05	1.91E-02	8.52E-03	3.81E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	5.94E-01	6.70E-04	4.43E-02	0.41	0.92	2.05	1.08E-01	4.83E-02	2.16E-02
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	Measured	3.20E+00	8.00E-04	2.38E-01	0.41	0.92	2.05	5.80E-01	2.60E-01	1.16E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	1.07E+01	7.81E-04	7.93E-01	0.41	0.92	2.05	**1.93E+00**	8.65E-01	3.87E-01
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	1.39E-01	0.30	0.95	3.00	4.64E-01	1.47E-01	4.64E-02
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	2.47E+00	0.30	0.95	3.00	**8.22E+00**	**2.60E+00**	8.22E-01
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	6.66E-01	0.30	0.95	3.00	**2.22E+00**	7.02E-01	2.22E-01
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	4.33E-04	0.155	0.347	0.775	2.79E-03	1.25E-03	5.59E-04
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	3.05E-03	0.56	1.12	2.25	5.44E-03	2.71E-03	1.35E-03
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	1.06E-02	0.80	1.79	4.00	1.32E-02	5.91E-03	2.64E-03
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	3.05E-03	0.56	1.12	2.25	5.44E-03	2.71E-03	1.35E-03
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	3.05E-03	0.56	1.12	2.25	5.44E-03	2.71E-03	1.35E-03
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	1.80E+00	0.071	0.518	3.780	**2.54E+01**	**3.48E+00**	4.76E-01
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	2.49E-02	10.0	22.4	50.0	2.49E-03	1.11E-03	4.97E-04
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	3.56E-01	10.0	22.4	50.0	3.56E-02	1.59E-02	7.11E-03
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	5.14E-01	0.021	0.047	0.104	**2.47E+01**	**1.11E+01**	**4.94E+00**
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	3.39E-04	4.00	8.9	20.0	8.47E-05	3.79E-05	1.69E-05
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	3.72E-01	0.80	1.79	4.00	4.65E-01	2.08E-01	9.30E-02
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	7.33E-04	0.48	1.07	2.40	1.53E-03	6.83E-04	3.05E-04
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	2.31E-01	0.48	1.07	2.40	4.82E-01	2.16E-01	9.64E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	2.23E-01	355	794	1,775	6.28E-04	2.81E-04	1.26E-04
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	1.71E-01	1.00	2.24	5.00	1.71E-01	7.67E-02	3.43E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	2.10E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	1.61E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	6.68E-02	80.4	180	402	8.31E-04	3.72E-04	1.66E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	4.27E-02	80.4	180	402	5.31E-04	2.38E-04	1.06E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	7.69E-03	80.4	180	402	9.56E-05	4.28E-05	1.91E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	5.40E-03	80.4	180	402	6.72E-05	3.00E-05	1.34E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	3.06E-03	7.10	15.9	35.5	4.32E-04	1.93E-04	8.63E-05
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	7.73E-04	7.10	15.9	35.5	1.09E-04	4.87E-05	2.18E-05
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	8.26E-04	7.10	15.9	35.5	1.16E-04	5.20E-05	2.33E-05
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	1.11E-02	7.10	15.9	35.5	1.56E-03	6.99E-04	3.13E-04

ATTACHMENT TABLE L-3-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	1.78E-03	7.10	15.9	35.5	2.51E-04	1.12E-04	5.02E-05
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	3.70E-03	7.10	15.9	35.5	5.22E-04	2.33E-04	1.04E-04
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	2.57E-02	7.10	15.9	35.5	3.61E-03	1.62E-03	7.23E-04
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	1.40E-03	7.10	15.9	35.5	1.97E-04	8.80E-05	3.93E-05
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	1.44E-02	7.10	15.9	35.5	2.02E-03	9.05E-04	4.05E-04
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	5.85E-04	7.10	15.9	35.5	8.23E-05	3.68E-05	1.65E-05
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	4.14E-03	7.10	15.9	35.5	5.84E-04	2.61E-04	1.17E-04
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	1.25E-02	7.10	15.9	35.5	1.75E-03	7.84E-04	3.51E-04
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	3.43E-02	0.113	0.253	0.565	3.03E-01	1.36E-01	6.07E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	1.44E-02	3.39	7.58	17.0	4.25E-03	1.90E-03	8.50E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.20E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	1.19E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	2.67E-02	7.10	15.9	35.5	3.75E-03	1.68E-03	7.51E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	1.08E-02	6.73	21.3	67.3	1.61E-03	5.08E-04	1.61E-04
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	8.78E-03	7.10	15.9	35.5	1.24E-03	5.53E-04	2.47E-04
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	4.18E-02	7.10	15.9	35.5	5.89E-03	2.63E-03	1.18E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.42E-04	0.00E+00	3.29E-05	0.000014	0.000044	0.00014	**2.35E+00**	7.42E-01	2.35E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0919	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0858	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.235	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	0.126	1.40E+01	5.80E-02	1.38E+00	2.46	4.26	7.38	5.60E-01	3.23E-01	1.87E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	1.19E-01	1.47	3.29	7.35	8.06E-02	3.61E-02	1.61E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	5.43E-01	2.66	5.95	13.3	2.04E-01	9.13E-02	4.08E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	1.20E+02	4.05	7.00	12.1	**2.96E+01**	**1.71E+01**	**9.89E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	1.20E+00	3.85	8.61	19.3	3.12E-01	1.40E-01	6.24E-02
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	4.580	2.84E+00	2.00E-04	1.36E-01	0.026	0.045	0.078	**5.22E+00**	**3.02E+00**	**1.74E+00**
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	2.76E-01	6.71	15.0	33.6	4.12E-02	1.84E-02	8.24E-03
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	1.000	1.40E+00	1.30E-03	1.07E-01	0.40	0.57	0.80	2.68E-01	1.90E-01	1.34E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	8.39E-02	4.04	9.03	20.2	2.08E-02	9.28E-03	4.15E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	1.34E+01	66.1	148	331	2.02E-01	9.04E-02	4.04E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	1.20E+01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	9.20E-01	1.50	3.35	7.50	6.13E-01	2.74E-01	1.23E-01
Aroclor-1221	6.60E-01	Regression	2.69E+01	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	2.06E+00	1.50	3.35	7.50	**1.37E+00**	6.14E-01	2.74E-01
Aroclor-1232	4.40E-01	Regression	1.84E+01	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	1.41E+00	1.50	3.35	7.50	9.38E-01	4.19E-01	1.88E-01
Aroclor-1242	5.20E-02	Regression	2.48E+00	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	1.90E-01	1.50	3.35	7.50	1.26E-01	5.65E-02	2.53E-02
Aroclor-1248	1.90E-02	Regression	9.63E-01	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	7.39E-02	1.50	3.35	7.50	4.92E-02	2.20E-02	9.85E-03
Aroclor-1254	2.10E+01	Regression	6.94E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	5.30E+01	1.50	3.35	7.50	**3.53E+01**	**1.58E+01**	**7.07E+00**
Aroclor-1260	2.40E+00	Regression	9.06E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	6.92E+00	1.50	3.35	7.50	**4.61E+00**	**2.06E+00**	9.22E-01
PCB (total)	2.10E+01	Regression	6.94E+02	0.139	2.93E+00	5.92	1.24E+02	7.81E-04	5.30E+01	1.50	3.35	7.50	**3.53E+01**	**1.58E+01**	**7.07E+00**
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	6.25E-02	0.12	0.27	0.60	5.21E-01	2.33E-01	1.04E-01
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	9.86E-02	0.12	0.27	0.60	8.22E-01	3.68E-01	1.64E-01
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	4.80E-02	0.60	0.95	1.50	7.99E-02	5.06E-02	3.20E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	6.68E-05	0.155	0.347	0.775	4.31E-04	1.93E-04	8.62E-05
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	5.87E-04	0.56	1.12	2.25	1.05E-03	5.23E-04	2.61E-04
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	2.81E-03	2.14	4.79	10.7	1.32E-03	5.88E-04	2.63E-04
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	5.87E-04	0.56	1.12	2.25	1.05E-03	5.23E-04	2.61E-04
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	5.87E-04	0.56	1.12	2.25	1.05E-03	5.23E-04	2.61E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	5.26E-01	0.071	0.518	3.780	**7.42E+00**	**1.02E+00**	1.39E-01
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	3.90E-04	10.0	22.4	50.0	3.90E-05	1.74E-05	7.80E-06
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	5.31E-03	10.0	22.4	50.0	5.31E-04	2.38E-04	1.06E-04
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	6.29E-02	0.30	0.67	1.50	2.10E-01	9.38E-02	4.20E-02
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	1.55E-04	4.00	8.9	20.0	3.87E-05	1.73E-05	7.74E-06
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	1.81E-01	2.14	4.79	10.7	8.45E-02	3.78E-02	1.69E-02
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	3.28E-05	0.48	1.07	2.40	6.83E-05	3.05E-05	1.37E-05
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	1.76E-02	0.48	1.07	2.40	3.66E-02	1.64E-02	7.32E-03
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	3.99E-02	355	794	1,775	1.12E-04	5.03E-05	2.25E-05
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	3.10E-02	1.00	2.24	5.00	3.10E-02	1.38E-02	6.19E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	2.66E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	8.90E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	5.95E-02	80.4	180	402	7.41E-04	3.31E-04	1.48E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	1.23E-01	80.4	180	402	1.52E-03	6.81E-04	3.05E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	2.46E-02	7.10	15.9	35.5	3.47E-03	1.55E-03	6.94E-04
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	1.36E-02	7.10	15.9	35.5	1.91E-03	8.56E-04	3.83E-04
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	3.00E-02	7.10	15.9	35.5	4.23E-03	1.89E-03	8.46E-04
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	5.89E-02	7.10	15.9	35.5	8.29E-03	3.71E-03	1.66E-03

ATTACHMENT TABLE L-3-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	2.78E-01	7.10	15.9	35.5	3.91E-02	1.75E-02	7.82E-03
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	1.83E-01	7.10	15.9	35.5	2.58E-02	1.15E-02	5.16E-03
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	5.39E-02	7.10	15.9	35.5	7.59E-03	3.40E-03	1.52E-03
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	6.42E-02	7.10	15.9	35.5	9.05E-03	4.05E-03	1.81E-03
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	1.26E-01	7.10	15.9	35.5	1.78E-02	7.95E-03	3.55E-03
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	1.34E-02	7.10	15.9	35.5	1.89E-03	8.44E-04	3.77E-04
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	5.83E-02	7.10	15.9	35.5	8.21E-03	3.67E-03	1.64E-03
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	6.98E-02	7.10	15.9	35.5	9.83E-03	4.40E-03	1.97E-03
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	1.05E-01	0.113	0.253	0.565	9.27E-01	4.15E-01	1.85E-01
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	7.80E-02	3.39	7.58	17.0	2.30E-02	1.03E-02	4.60E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	1.25E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	1.22E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	6.40E-02	7.10	15.9	35.5	9.02E-03	4.03E-03	1.80E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	8.72E-03	6.73	21.3	67.3	1.30E-03	4.10E-04	1.30E-04
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	3.15E-02	7.10	15.9	35.5	4.44E-03	1.99E-03	8.88E-04
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	1.09E+00	7.10	15.9	35.5	1.53E-01	6.85E-02	3.06E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0012	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0050	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0156	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	Measured	3.90E+00	5.80E-02	1.90E-01	1.04	1.31	1.66	1.82E-01	1.44E-01	1.14E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	3.12E-01	8.20E-04	1.50E-02	0.77	2.43	7.70	1.95E-02	6.18E-03	1.95E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	2.51E+00	6.30E-03	1.21E-01	2.40	5.37	12.0	5.05E-02	2.26E-02	1.01E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.22E+01	2.59E-02	5.90E-01	11.7	13.3	15.1	5.04E-02	4.43E-02	3.90E-02
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	1.95E+00	5.90E-03	9.43E-02	4.70	6.47	8.90	2.01E-02	1.46E-02	1.06E-02
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	Measured	1.19E-01	2.00E-04	5.72E-03	0.150	0.192	0.247	3.81E-02	2.97E-02	2.32E-02
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.59E+00	3.50E-03	7.64E-02	1.70	2.40	3.40	4.50E-02	3.18E-02	2.25E-02
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	Measured	2.59E+00	1.30E-03	1.24E-01	0.20	0.26	0.33	6.22E-01	4.85E-01	3.77E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	1.17E+00	7.00E-05	5.65E-02	12.0	26.9	60.2	4.69E-03	2.10E-03	9.39E-04
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.31E+02	6.54E-02	1.11E+01	75.4	169	377	1.48E-01	6.60E-02	2.95E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	7.98E-02	1.37	2.17	3.43	5.82E-02	3.68E-02	2.33E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	1.88E-01	0.137	0.306	0.685	**1.37E+00**	6.14E-01	2.75E-01
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	1.25E-01	0.137	0.306	0.685	9.15E-01	4.09E-01	1.83E-01
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	1.48E-02	0.137	0.306	0.685	1.08E-01	4.85E-02	2.17E-02
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	5.45E-03	0.137	0.306	0.685	3.98E-02	1.78E-02	7.95E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	5.98E+00	0.137	0.306	0.685	**4.37E+01**	**1.95E+01**	**8.73E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	6.84E-01	0.137	0.306	0.685	**4.99E+00**	**2.23E+00**	9.98E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	8.43E+00	7.81E-04	4.06E-01	0.137	0.306	0.685	**2.96E+00**	**1.32E+00**	5.92E-01
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	8.99E-02	0.147	0.329	0.735	6.12E-01	2.74E-01	1.22E-01
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	1.60E+00	0.147	0.329	0.735	**1.09E+01**	**4.85E+00**	**2.17E+00**
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	4.31E-01	0.147	0.329	0.735	**2.93E+00**	**1.31E+00**	5.86E-01
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	2.80E-04	0.20	0.45	1.00	1.40E-03	6.26E-04	2.80E-04
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	1.97E-03	1.60	2.26	3.20	1.23E-03	8.71E-04	6.16E-04
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	6.84E-03	4.58	6.48	9.16	1.49E-03	1.06E-03	7.47E-04
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	1.97E-03	1.60	2.26	3.20	1.23E-03	8.71E-04	6.16E-04
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	1.97E-03	1.60	2.26	3.20	1.23E-03	8.71E-04	6.16E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	1.16E+00	0.015	0.021	0.030	**7.76E+01**	**5.49E+01**	**3.88E+01**
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	1.61E-02	0.15	0.34	0.75	1.07E-01	4.79E-02	2.14E-02
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	2.30E-01	0.15	0.34	0.75	**1.53E+00**	6.86E-01	3.07E-01
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	3.33E-01	0.184	0.411	0.920	**1.81E+00**	8.08E-01	3.62E-01
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	2.19E-04	8.00	17.9	40.0	2.74E-05	1.22E-05	5.47E-06
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	2.41E-01	4.58	6.48	9.16	5.25E-02	3.71E-02	2.63E-02
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	4.74E-04	0.20	0.45	1.00	2.37E-03	1.06E-03	4.74E-04
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	1.50E-01	0.20	0.45	1.00	7.48E-01	3.35E-01	1.50E-01
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	1.44E-01	4.00	5.66	8.00	3.60E-02	2.55E-02	1.80E-02
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	1.11E-01	8.00	17.9	40.0	1.39E-02	6.20E-03	2.77E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.35E-03	76.0	170	380	1.78E-05	7.94E-06	3.55E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	1.04E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	4.32E-02	53.0	75.0	106	8.15E-04	5.76E-04	4.07E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	2.76E-02	85.7	192	429	3.22E-04	1.44E-04	6.45E-05
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	4.97E-03	85.7	192	429	5.80E-05	2.59E-05	1.16E-05
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	3.49E-03	30.0	52.0	90.0	1.16E-04	6.71E-05	3.88E-05
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	7.74E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	7.74E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	1.98E-03	65.6	147	328	3.02E-05	1.35E-05	6.04E-06
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	4.99E-04	65.6	147	328	7.60E-06	3.40E-06	1.52E-06
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	5.33E-04	65.6	147	328	8.13E-06	3.63E-06	1.63E-06
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	7.18E-03	0.62	1.37	3.07	1.17E-02	5.23E-03	2.34E-03

ATTACHMENT TABLE L-3-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	1.15E-03	0.62	1.37	3.07	1.87E-03	8.39E-04	3.75E-04
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	2.39E-03	0.62	1.37	3.07	3.89E-03	1.74E-03	7.79E-04
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	1.66E-02	0.62	1.37	3.07	2.70E-02	1.21E-02	5.41E-03
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	9.03E-04	0.62	1.37	3.07	1.47E-03	6.57E-04	2.94E-04
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	9.29E-03	0.62	1.37	3.07	1.51E-02	6.76E-03	3.03E-03
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	3.77E-04	0.62	1.37	3.07	6.13E-04	2.74E-04	1.23E-04
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	2.68E-03	65.6	147	328	4.08E-05	1.83E-05	8.17E-06
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	8.05E-03	65.6	147	328	1.23E-04	5.49E-05	2.46E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	2.22E-02	2.00	2.83	4.00	1.11E-02	7.84E-03	5.55E-03
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	9.26E-03	2.00	6.32	20.0	4.63E-03	1.46E-03	4.63E-04
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	7.74E-02	75.0	168	375	1.03E-03	4.61E-04	2.06E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	7.70E-02	100	224	500	7.70E-04	3.44E-04	1.54E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	1.72E-02	0.62	1.37	3.07	2.80E-02	1.25E-02	5.62E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	6.98E-03	8.42	18.8	42.1	8.29E-04	3.71E-04	1.66E-04
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	5.68E-03	65.6	147	328	8.66E-05	3.87E-05	1.73E-05
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	2.71E-02	0.62	1.37	3.07	4.40E-02	1.97E-02	8.81E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.49E-04	0.00E+00	7.17E-06	0.000001	0.000003	0.00001	**7.17E+00**	**2.27E+00**	7.17E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0349 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0286 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.726 = Body weight (kg)

ATTACHMENT TABLE L-3-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	0.126	1.40E+01	5.80E-02	1.25E+00	0.25	0.56	1.26	**4.98E+00**	**2.23E+00**	9.96E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	0.164	1.57E+00	8.20E-04	2.90E-01	0.77	2.43	7.70	3.76E-01	1.19E-01	3.76E-02
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	0.038	2.17E+00	6.30E-03	9.90E-01	2.40	5.37	12.0	4.12E-01	1.84E-01	8.25E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	0.100	1.97E+01	2.59E-02	3.34E+00	5.60	7.23	9.34	5.96E-01	4.62E-01	3.58E-01
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	0.070	2.92E+01	5.90E-03	4.72E+00	4.70	6.47	8.90	**1.00E+00**	7.30E-01	5.31E-01
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	4.580	2.84E+00	2.00E-04	3.23E-02	0.032	0.072	0.160	**1.01E+00**	4.51E-01	2.02E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	1.000	2.72E+01	3.50E-03	3.80E-01	1.70	2.40	3.40	2.23E-01	1.58E-01	1.12E-01
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	1.000	1.40E+00	1.30E-03	8.17E-02	0.20	0.26	0.33	4.08E-01	3.18E-01	2.48E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	1.000	6.10E+00	7.00E-05	7.92E-02	12.0	26.9	60.2	6.58E-03	2.94E-03	1.32E-03
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	0.147	9.20E+01	6.54E-02	2.19E+01	75.4	169	377	2.91E-01	1.30E-01	5.82E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	1.12E-02	0.136	0.304	0.680	8.21E-02	3.67E-02	1.64E-02
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	5.22E-02	0.136	0.304	0.680	3.84E-01	1.72E-01	7.67E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	2.53E-02	0.136	0.304	0.680	1.86E-01	8.32E-02	3.72E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	2.20E-03	0.136	0.304	0.680	1.62E-02	7.24E-03	3.24E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	6.83E-04	0.136	0.304	0.680	5.02E-03	2.24E-03	1.00E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	4.72E-01	0.136	0.304	0.680	**3.47E+00**	**1.55E+00**	6.94E-01
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	4.65E-02	0.136	0.304	0.680	3.42E-01	1.53E-01	6.84E-02
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	7.81E-04	4.72E-01	0.136	0.304	0.680	**3.47E+00**	**1.55E+00**	6.94E-01
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	7.29E-03	0.147	0.329	0.735	4.96E-02	2.22E-02	9.92E-03
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	1.09E-02	0.147	0.329	0.735	7.40E-02	3.31E-02	1.48E-02
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	2.60E-02	0.147	0.329	0.735	1.77E-01	7.92E-02	3.54E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	3.52E-05	0.20	0.45	1.00	1.76E-04	7.87E-05	3.52E-05
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	1.22E-03	1.60	2.26	3.20	7.62E-04	5.39E-04	3.81E-04
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	4.35E-04	4.58	6.48	9.16	9.49E-05	6.71E-05	4.75E-05
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	1.21E-03	1.60	2.26	3.20	7.55E-04	5.34E-04	3.78E-04
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	9.41E-04	1.60	2.26	3.20	5.88E-04	4.16E-04	2.94E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	2.08E-01	0.015	0.021	0.030	**1.38E+01**	**9.78E+00**	**6.92E+00**
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	9.61E-03	0.15	0.34	0.75	6.41E-02	2.87E-02	1.28E-02
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	7.59E-02	0.15	0.34	0.75	5.06E-01	2.26E-01	1.01E-01
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	7.08E-02	0.184	0.411	0.920	3.85E-01	1.72E-01	7.70E-02
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	1.54E-04	8.00	17.9	40.0	1.92E-05	8.59E-06	3.84E-06
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	1.94E-02	4.58	6.48	9.16	4.23E-03	2.99E-03	2.11E-03
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	5.64E-05	0.20	0.45	1.00	2.82E-04	1.26E-04	5.64E-05
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	3.34E-02	0.20	0.45	1.00	1.67E-01	7.47E-02	3.34E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	3.03E-02	4.00	5.66	8.00	7.58E-03	5.36E-03	3.79E-03
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	1.72E-02	8.00	17.9	40.0	2.15E-03	9.61E-04	4.30E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	3.07E-03	76.0	170	380	4.04E-05	1.81E-05	8.09E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	1.51E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	2.27E-01	53.0	75.0	106	4.28E-03	3.02E-03	2.14E-03
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	3.78E-01	85.7	192	429	4.41E-03	1.97E-03	8.82E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	3.55E-01	85.7	192	429	4.14E-03	1.85E-03	8.29E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	3.81E-01	30.0	52.0	90.0	1.27E-02	7.34E-03	4.24E-03
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	1.01E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	1.05E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	3.88E-03	65.6	147	328	5.92E-05	2.65E-05	1.18E-05
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	6.69E-03	65.6	147	328	1.02E-04	4.56E-05	2.04E-05
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	1.46E-02	65.6	147	328	2.22E-04	9.94E-05	4.45E-05
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	2.23E-02	0.62	1.37	3.07	3.62E-02	1.62E-02	7.26E-03

ATTACHMENT TABLE L-3-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	4.44E-02	0.62	1.37	3.07	7.22E-02	3.23E-02	1.45E-02
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	2.10E-01	0.62	1.37	3.07	3.42E-01	1.53E-01	6.86E-02
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	9.61E-02	0.62	1.37	3.07	1.56E-01	6.99E-02	3.13E-02
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	3.14E-02	0.62	1.37	3.07	5.10E-02	2.28E-02	1.02E-02
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	3.70E-02	0.62	1.37	3.07	6.02E-02	2.69E-02	1.21E-02
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	2.04E-02	0.62	1.37	3.07	3.32E-02	1.48E-02	6.64E-03
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	7.99E-01	65.6	147	328	1.22E-02	5.45E-03	2.44E-03
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	4.81E-03	65.6	147	328	7.33E-05	3.28E-05	1.47E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	5.18E-02	2.00	2.83	4.00	2.59E-02	1.83E-02	1.29E-02
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	1.17E-01	2.00	6.32	20.0	5.86E-02	1.85E-02	5.86E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	7.53E-02	75.0	168	375	1.00E-03	4.49E-04	2.01E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	2.28E-01	100	224	500	2.28E-03	1.02E-03	4.56E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	6.57E-02	0.62	1.37	3.07	1.07E-01	4.78E-02	2.14E-02
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	3.07E-01	8.42	18.8	42.1	3.65E-02	1.63E-02	7.30E-03
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	6.21E-02	65.6	147	328	9.46E-04	4.23E-04	1.89E-04
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	8.79E-01	0.62	1.37	3.07	**1.43E+00**	6.40E-01	2.86E-01
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0765	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.906	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.094	= Proportion of diet composed of sediment
WIR =	0.1426	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.750	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.11E+02	Regression	1.78E+01	Regresson	1.94E+00	Measured	6.88E+00	5.80E-02	6.09E-01	1.04	1.31	1.66	5.86E-01	4.64E-01	3.67E-01
Cadmium	9.60E+00	Regression	1.55E+00	Regresson	2.14E+00	Measured	5.57E-01	8.20E-04	7.65E-02	0.77	2.43	7.70	9.93E-02	3.14E-02	9.93E-03
Chromium	5.70E+01	Regression	7.08E+00	0.084	4.78E+00	Measured	3.34E+00	6.30E-03	3.28E-01	2.40	5.37	12.0	1.37E-01	6.11E-02	2.73E-02
Copper	1.97E+02	7.957	1.57E+03	Regresson	1.57E+01	Measured	1.89E+01	2.59E-02	2.19E+01	11.7	13.3	15.1	**1.87E+00**	**1.65E+00**	**1.45E+00**
Lead	4.17E+02	Regression	1.57E+01	Regresson	7.82E+00	Measured	3.14E+00	5.90E-03	1.53E+00	4.70	6.47	8.90	3.25E-01	2.36E-01	1.72E-01
Mercury	6.20E-01	2.868	1.78E+00	Regresson	2.85E-01	Measured	1.13E-01	2.00E-04	2.95E-02	0.150	0.192	0.247	1.97E-01	1.53E-01	1.20E-01
Nickel	2.72E+01	Regression	3.61E+00	Regresson	1.28E+00	Measured	1.75E+00	3.50E-03	1.48E-01	1.70	2.40	3.40	8.69E-02	6.14E-02	4.34E-02
Selenium	1.40E+00	1.000	1.40E+00	Regresson	7.36E-01	Measured	2.58E+00	1.30E-03	3.78E-02	0.20	0.26	0.33	1.89E-01	1.47E-01	1.15E-01
Silver	6.10E+00	0.180	1.10E+00	0.037	2.24E-01	Measured	9.26E-01	7.00E-05	3.73E-02	12.0	26.9	60.2	3.10E-03	1.38E-03	6.19E-04
Zinc	6.26E+02	Regression	1.75E+02	Regresson	1.72E+02	Measured	2.12E+02	6.54E-02	6.77E+00	75.4	169	377	8.98E-02	4.01E-02	1.80E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.80E-01	Regression	9.47E-01	0.323	9.04E-02	5.92	1.66E+00	6.70E-04	1.84E-02	1.37	2.17	3.43	1.34E-02	8.47E-03	5.35E-03
Aroclor-1221	6.60E-01	Regression	2.45E+00	0.749	4.94E-01	5.92	3.91E+00	9.30E-04	4.96E-02	0.137	0.306	0.685	3.62E-01	1.62E-01	7.25E-02
Aroclor-1232	4.40E-01	Regression	1.56E+00	0.515	2.27E-01	5.92	2.60E+00	6.70E-04	3.09E-02	0.137	0.306	0.685	2.25E-01	1.01E-01	4.51E-02
Aroclor-1242	5.20E-02	Regression	1.46E-01	0.323	1.68E-02	5.92	3.08E-01	8.00E-04	3.11E-03	0.137	0.306	0.685	2.27E-02	1.01E-02	4.54E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	9.30E-04	1.12E-03	0.137	0.306	0.685	8.17E-03	3.65E-03	1.63E-03
Aroclor-1254	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	5.92	1.24E+02	6.70E-04	1.90E+00	0.137	0.306	0.685	**1.39E+01**	**6.22E+00**	**2.78E+00**
Aroclor-1260	2.40E+00	Regression	1.03E+01	0.105	2.53E-01	5.92	1.42E+01	8.00E-04	1.79E-01	0.137	0.306	0.685	**1.31E+00**	5.86E-01	2.62E-01
PCB (total)	2.10E+01	Regression	1.14E+02	0.139	2.93E+00	Measured	6.56E+00	7.81E-04	1.65E+00	0.137	0.306	0.685	**1.20E+01**	**5.38E+00**	**2.41E+00**
Pesticides															
4,4'-DDD	3.80E-01	2.15	8.18E-01	Regresson	3.92E-02	4.92	1.87E+00	1.30E-04	1.67E-02	0.147	0.329	0.735	1.13E-01	5.07E-02	2.27E-02
4,4'-DDE	6.00E-01	2.15	1.29E+00	Regresson	5.52E-02	55.3	3.32E+01	1.30E-04	9.15E-02	0.147	0.329	0.735	6.23E-01	2.78E-01	1.25E-01
4,4'-DDT	1.60E+00	0.392	6.27E-01	Regresson	1.16E-01	5.59	8.95E+00	1.30E-04	3.39E-02	0.147	0.329	0.735	2.31E-01	1.03E-01	4.61E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	6.70E-05	3.47E-05	0.20	0.45	1.00	1.74E-04	7.76E-05	3.47E-05
alpha-BHC	7.10E-03	1.043	7.41E-03	1.735	1.23E-02	5.76	4.09E-02	6.70E-05	3.71E-04	1.60	2.26	3.20	2.32E-04	1.64E-04	1.16E-04
alpha-Chlordane	1.70E-02	2.15	3.66E-02	0.165	2.80E-03	8.36	1.42E-01	6.70E-05	8.94E-04	4.58	6.48	9.16	1.95E-04	1.38E-04	9.75E-05
beta-BHC	7.10E-03	1.043	7.41E-03	1.719	1.22E-02	5.76	4.09E-02	6.70E-05	3.69E-04	1.60	2.26	3.20	2.31E-04	1.63E-04	1.15E-04
delta-BHC	7.10E-03	1.043	7.41E-03	1.311	9.31E-03	5.76	4.09E-02	6.70E-05	3.33E-04	1.60	2.26	3.20	2.08E-04	1.47E-04	1.04E-04
Dieldrin	1.40E+00	4.920	6.89E+00	1.500	2.10E+00	17.3	2.42E+01	1.30E-04	1.75E-01	0.015	0.021	0.030	**1.17E+01**	**8.26E+00**	**5.84E+00**
Endosulfan I	5.80E-02	0.083	4.82E-03	1.687	9.79E-02	5.76	3.34E-01	6.70E-05	2.17E-03	0.15	0.34	0.75	1.45E-02	6.48E-03	2.90E-03
Endosulfan II	8.30E-01	0.083	6.90E-02	0.886	7.35E-01	5.76	4.78E+00	1.30E-04	2.28E-02	0.15	0.34	0.75	1.52E-01	6.79E-02	3.04E-02
Endrin	1.20E+00	0.686	8.24E-01	0.535	6.42E-01	5.76	6.91E+00	1.30E-04	3.75E-02	0.184	0.411	0.920	2.04E-01	9.11E-02	4.07E-02
gamma-BHC (Lindane)	7.80E-04	2.24	1.74E-03	1.852	1.44E-03	5.76	4.49E-03	6.70E-05	6.30E-05	8.00	17.9	40.0	7.87E-06	3.52E-06	1.57E-06
gamma-Chlordane	7.80E-01	3.03	2.37E+00	0.165	1.29E-01	6.41	5.00E+00	6.70E-05	4.65E-02	4.58	6.48	9.16	1.02E-02	7.19E-03	5.08E-03
Heptachlor	1.70E-03	0.086	1.46E-04	0.174	2.96E-04	5.76	9.79E-03	6.70E-05	4.14E-05	0.20	0.45	1.00	2.07E-04	9.25E-05	4.14E-05
Heptachlor epoxide	5.40E-01	0.426	2.30E-01	0.566	3.05E-01	5.76	3.11E+00	6.70E-05	1.52E-02	0.20	0.45	1.00	7.59E-02	3.39E-02	1.52E-02
Methoxychlor	5.20E-01	1.000	5.20E-01	0.525	2.73E-01	5.76	3.00E+00	6.70E-04	1.85E-02	4.00	5.66	8.00	4.61E-03	3.26E-03	2.31E-03
Toxaphene	4.00E-01	1.000	4.00E-01	0.355	1.42E-01	5.76	2.30E+00	1.30E-03	1.35E-02	8.00	17.9	40.0	1.68E-03	7.53E-04	3.37E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	1.000	2.64E-02	2.00E-03	1.10E-03	76.0	170	380	1.45E-05	6.49E-06	2.90E-06
1,2,4,5-Tetrachlorobenzene	1.80E+00	0.624	1.12E+00	0.792	1.43E+00	0.115	2.07E-01	1.00E-02	3.99E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.60E+00	0.482	7.71E-01	1.426	2.28E+00	0.560	8.96E-01	2.00E-03	4.55E-02	53.0	75.0	106	8.58E-04	6.06E-04	4.29E-04
1,2-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.452	3.92E+00	0.358	5.73E-01	1.00E-03	7.61E-02	85.7	192	429	8.87E-04	3.97E-04	1.77E-04
1,3-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.296	3.67E+00	0.064	1.02E-01	1.00E-03	7.20E-02	85.7	192	429	8.40E-04	3.76E-04	1.68E-04
1,4-Dichlorobenzene	1.60E+00	1.000	1.60E+00	2.475	3.96E+00	0.045	7.17E-02	1.00E-03	7.54E-02	30.0	52.0	90.0	2.51E-03	1.45E-03	8.38E-04
4-Bromophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.566	9.05E-01	1.000	1.60E+00	1.00E-02	4.23E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.60E+00	1.000	1.60E+00	0.593	9.48E-01	1.000	1.60E+00	1.00E-02	4.28E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	3.00E-01	1.074	3.22E-01	Regresson	1.08E-02	0.137	4.11E-02	6.90E-05	5.44E-03	65.6	147	328	8.30E-05	3.71E-05	1.66E-05
Acenaphthylene	1.20E-01	1.476	1.77E-01	Regresson	5.95E-02	0.085	1.02E-02	2.00E-04	3.52E-03	65.6	147	328	5.37E-05	2.40E-05	1.07E-05
Anthracene	2.60E-01	1.510	3.93E-01	Regresson	1.30E-01	0.042	1.09E-02	2.00E-04	7.71E-03	65.6	147	328	1.17E-04	5.25E-05	2.35E-05
Benzo(a)anthracene	1.50E+00	0.513	7.69E-01	Regresson	8.49E-02	0.099	1.49E-01	3.40E-04	1.61E-02	0.62	1.37	3.07	2.62E-02	1.17E-02	5.26E-03

ATTACHMENT TABLE L-3-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.10E+00	1.730	3.63E+00	Regresson	2.62E-01	0.011	2.37E-02	2.40E-04	5.84E-02	0.62	1.37	3.07	9.49E-02	4.25E-02	1.90E-02
Benzo(b)fluoranthene	3.90E+00	0.614	2.39E+00	0.480	1.87E+00	0.013	4.93E-02	5.80E-04	6.69E-02	0.62	1.37	3.07	1.09E-01	4.87E-02	2.18E-02
Benzo(g,h,i)perylene	1.90E+00	0.371	7.05E-01	Regresson	8.42E-01	0.181	3.45E-01	1.60E-04	2.62E-02	0.62	1.37	3.07	4.26E-02	1.91E-02	8.53E-03
Benzo(k)fluoranthene	1.60E+00	0.525	8.41E-01	Regresson	1.73E-01	0.012	1.86E-02	1.50E-04	1.82E-02	0.62	1.37	3.07	2.95E-02	1.32E-02	5.92E-03
Chrysene	2.70E+00	0.612	1.65E+00	Regresson	1.20E-01	0.071	1.93E-01	8.00E-05	3.20E-02	0.62	1.37	3.07	5.20E-02	2.33E-02	1.04E-02
Dibenz(a,h)anthracene	6.60E-01	0.265	1.75E-01	0.230	1.52E-01	0.012	7.67E-03	2.00E-04	6.19E-03	0.62	1.37	3.07	1.01E-02	4.50E-03	2.02E-03
Fluoranthene	1.80E+00	0.423	7.62E-01	4.700	8.46E+00	0.031	5.54E-02	3.20E-04	1.20E-01	65.6	147	328	1.83E-03	8.19E-04	3.66E-04
Fluorene	4.20E-01	2.17	9.13E-01	Regresson	8.07E-03	0.398	1.67E-01	2.00E-04	1.40E-02	65.6	147	328	2.14E-04	9.55E-05	4.27E-05
Hexachlorobenzene	1.60E+00	0.857	1.37E+00	0.246	3.94E-01	0.288	4.61E-01	2.00E-04	2.90E-02	2.00	2.83	4.00	1.45E-02	1.03E-02	7.25E-03
Hexachlorobutadiene	1.60E+00	0.612	9.79E-01	0.675	1.08E+00	0.115	1.84E-01	1.00E-02	3.30E-02	2.00	6.32	20.0	1.65E-02	5.22E-03	1.65E-03
Hexachlorocyclopentadiene	1.60E+00	1.000	1.60E+00	0.393	6.29E-01	1.000	1.60E+00	1.00E-02	3.89E-02	75.0	168	375	5.18E-04	2.32E-04	1.04E-04
Hexachloroethane	1.60E+00	1.000	1.60E+00	1.439	2.30E+00	1.000	1.60E+00	2.00E-04	5.81E-02	100	224	500	5.81E-04	2.60E-04	1.16E-04
Indeno(1,2,3-cd)pyrene	2.80E+00	0.299	8.38E-01	0.150	4.20E-01	0.128	3.58E-01	2.40E-04	2.54E-02	0.62	1.37	3.07	4.13E-02	1.85E-02	8.28E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	30.10	3.31E+00	1.312	1.44E-01	9.80E-04	4.32E-02	8.42	18.8	42.1	5.13E-03	2.29E-03	1.03E-03
Phenanthrene	5.90E-01	0.699	4.13E-01	Regresson	6.10E-01	0.200	1.18E-01	8.80E-05	1.51E-02	65.6	147	328	2.30E-04	1.03E-04	4.60E-05
Pyrene	3.80E+00	3.74	1.42E+01	2.400	9.12E+00	0.148	5.62E-01	2.90E-04	3.17E-01	0.62	1.37	3.07	5.15E-01	2.30E-01	1.03E-01
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.19E-04	0.00E+00	2.56E-07	0.000001	0.000003	0.00001	2.56E-01	8.10E-02	2.56E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1307 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.6092 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 4.23 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	Measured	2.56E+00	1.46E-02	3.63E-01	5.14	8.12	12.8	7.07E-02	4.47E-02	2.83E-02
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	Measured	3.12E-01	4.29E-04	4.87E-02	1.47	3.29	7.35	3.32E-02	1.48E-02	6.63E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	Measured	1.59E+00	1.55E-03	2.67E-01	2.66	5.95	13.3	1.00E-01	4.48E-02	2.00E-02
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	Measured	1.04E+01	9.20E-03	2.05E+00	4.05	7.00	12.1	5.06E-01	2.93E-01	1.69E-01
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	Measured	1.51E+00	2.07E-03	2.58E-01	3.85	8.61	19.3	6.70E-02	3.00E-02	1.34E-02
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	Measured	9.66E-02	1.00E-04	1.26E-02	0.026	0.045	0.078	4.86E-01	2.81E-01	1.62E-01
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	Measured	8.91E-01	1.34E-03	1.30E-01	6.71	15.0	33.6	1.94E-02	8.69E-03	3.89E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	Measured	1.43E+00	1.30E-03	1.57E-01	1.80	4.02	9.00	8.74E-02	3.91E-02	1.75E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	Measured	6.06E-01	7.00E-05	6.62E-02	4.04	9.03	20.2	1.64E-02	7.32E-03	3.28E-03
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	Measured	1.91E+02	2.76E-02	2.26E+01	66.1	148	331	3.42E-01	1.53E-01	6.83E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	1.70E-02	1.50	3.35	7.50	1.13E-02	5.05E-03	2.26E-03
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	3.59E-02	1.50	3.35	7.50	2.39E-02	1.07E-02	4.79E-03
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	2.41E-02	1.50	3.35	7.50	1.61E-02	7.18E-03	3.21E-03
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	1.81E-02	1.50	3.35	7.50	1.20E-02	5.38E-03	2.41E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	1.25E-02	1.50	3.35	7.50	8.32E-03	3.72E-03	1.66E-03
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	1.32E+00	1.50	3.35	7.50	8.78E-01	3.93E-01	1.76E-01
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	5.37E-01	1.50	3.35	7.50	3.58E-01	1.60E-01	7.16E-02
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	Measured	8.25E+00	3.33E-04	1.05E+00	1.50	3.35	7.50	7.00E-01	3.13E-01	1.40E-01
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	2.91E-02	0.30	0.95	3.00	9.71E-02	3.07E-02	9.71E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	4.90E-02	0.30	0.95	3.00	1.63E-01	5.17E-02	1.63E-02
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	7.28E-02	0.30	0.95	3.00	2.43E-01	7.67E-02	2.43E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	6.04E-04	0.155	0.347	0.775	3.90E-03	1.74E-03	7.79E-04
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	1.05E-03	0.56	1.12	2.25	1.87E-03	9.32E-04	4.65E-04
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	1.51E-03	0.80	1.79	4.00	1.89E-03	8.46E-04	3.78E-04
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	1.05E-03	0.56	1.12	2.25	1.87E-03	9.32E-04	4.65E-04
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	1.05E-03	0.56	1.12	2.25	1.87E-03	9.32E-04	4.65E-04
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	8.01E-02	0.071	0.518	3.780	**1.13E+00**	1.55E-01	2.12E-02
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	6.57E-03	10.0	22.4	50.0	6.57E-04	2.94E-04	1.31E-04
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	8.43E-02	10.0	22.4	50.0	8.43E-03	3.77E-03	1.69E-03
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	1.19E-01	0.30	0.67	1.50	3.97E-01	1.77E-01	7.93E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	4.70E-04	4.00	8.9	20.0	1.18E-04	5.26E-05	2.35E-05
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	5.57E-02	0.80	1.79	4.00	6.97E-02	3.12E-02	1.39E-02
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	1.01E-03	0.48	1.07	2.40	2.10E-03	9.38E-04	4.20E-04
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	5.29E-02	0.48	1.07	2.40	1.10E-01	4.93E-02	2.20E-02
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	5.87E-02	355	794	1,775	1.65E-04	7.40E-05	3.31E-05
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	5.08E-02	1.00	2.24	5.00	5.08E-02	2.27E-02	1.02E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	9.50E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	9.00E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	1.06E-02	80.4	180	402	1.32E-04	5.92E-05	2.65E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	1.23E-02	80.4	180	402	1.53E-04	6.85E-05	3.06E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	5.74E-03	80.4	180	402	7.14E-05	3.19E-05	1.43E-05
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	5.31E-03	80.4	180	402	6.61E-05	2.95E-05	1.32E-05
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	4.95E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	4.95E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	1.81E-03	7.10	15.9	35.5	2.55E-04	1.14E-04	5.10E-05
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	9.73E-04	7.10	15.9	35.5	1.37E-04	6.13E-05	2.74E-05
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	2.77E-03	7.10	15.9	35.5	3.90E-04	1.74E-04	7.80E-05
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	1.86E-03	7.10	15.9	35.5	2.62E-04	1.17E-04	5.24E-05

ATTACHMENT TABLE L-3-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	9.96E-04	7.10	15.9	35.5	1.40E-04	6.28E-05	2.81E-05
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	7.52E-04	7.10	15.9	35.5	1.06E-04	4.74E-05	2.12E-05
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	3.86E-04	7.10	15.9	35.5	5.43E-05	2.43E-05	1.09E-05
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	2.29E-03	7.10	15.9	35.5	3.22E-04	1.44E-04	6.45E-05
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	3.31E-03	7.10	15.9	35.5	4.67E-04	2.09E-04	9.34E-05
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	3.21E-04	7.10	15.9	35.5	4.52E-05	2.02E-05	9.04E-06
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	2.65E-03	7.10	15.9	35.5	3.73E-04	1.67E-04	7.45E-05
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	3.34E-03	7.10	15.9	35.5	4.71E-04	2.11E-04	9.42E-05
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	8.92E-03	0.113	0.253	0.565	7.90E-02	3.53E-02	1.58E-02
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	8.29E-03	3.39	7.58	17.0	2.45E-03	1.09E-03	4.89E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	4.95E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	2.75E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	4.16E-04	7.10	15.9	35.5	5.85E-05	2.62E-05	1.17E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	1.70E-02	6.73	21.3	67.3	2.52E-03	7.97E-04	2.52E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	3.39E-03	7.10	15.9	35.5	4.78E-04	2.14E-04	9.56E-05
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	1.03E-02	7.10	15.9	35.5	1.46E-03	6.51E-04	2.91E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	3.11E-04	0.00E+00	3.19E-05	0.000014	0.000044	0.00014	**2.28E+00**	7.20E-01	2.28E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0180 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.160 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.840 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0164 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1480 = Body weight (kg)

ATTACHMENT TABLE L-3-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	Measured	4.46E+00	1.46E-02	2.51E-01	5.14	8.12	12.8	4.89E-02	3.09E-02	1.96E-02
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	Measured	5.57E-01	4.29E-04	3.14E-02	1.47	3.29	7.35	2.13E-02	9.54E-03	4.27E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	Measured	2.45E+00	1.55E-03	1.38E-01	2.66	5.95	13.3	5.18E-02	2.32E-02	1.04E-02
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	Measured	1.54E+01	9.20E-03	8.69E-01	4.05	7.00	12.1	2.15E-01	1.24E-01	7.18E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	Measured	2.30E+00	2.07E-03	1.29E-01	3.85	8.61	19.3	3.36E-02	1.50E-02	6.73E-03
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	Measured	9.21E-02	1.00E-04	5.18E-03	0.026	0.045	0.078	1.99E-01	1.15E-01	6.64E-02
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	Measured	1.12E+00	1.34E-03	6.29E-02	6.71	15.0	33.6	9.37E-03	4.19E-03	1.87E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	Measured	1.65E+00	1.30E-03	9.29E-02	1.80	4.02	9.00	5.16E-02	2.31E-02	1.03E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	Measured	5.47E-01	7.00E-05	3.08E-02	4.04	9.03	20.2	7.61E-03	3.40E-03	1.52E-03
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	Measured	1.74E+02	2.76E-02	9.80E+00	66.1	148	331	1.48E-01	6.63E-02	2.97E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	8.60E-03	1.50	3.35	7.50	5.73E-03	2.56E-03	1.15E-03
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	1.81E-02	1.50	3.35	7.50	1.21E-02	5.39E-03	2.41E-03
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	1.22E-02	1.50	3.35	7.50	8.12E-03	3.63E-03	1.62E-03
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	9.15E-03	1.50	3.35	7.50	6.10E-03	2.73E-03	1.22E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	6.34E-03	1.50	3.35	7.50	4.23E-03	1.89E-03	8.46E-04
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	6.38E-01	1.50	3.35	7.50	4.25E-01	1.90E-01	8.51E-02
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	2.63E-01	1.50	3.35	7.50	1.76E-01	7.85E-02	3.51E-02
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	Measured	6.20E+00	3.33E-04	3.49E-01	1.50	3.35	7.50	2.33E-01	1.04E-01	4.65E-02
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	1.36E-02	0.30	0.95	3.00	4.55E-02	1.44E-02	4.55E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	2.44E-02	0.30	0.95	3.00	8.13E-02	2.57E-02	8.13E-03
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	3.92E-02	0.30	0.95	3.00	1.31E-01	4.13E-02	1.31E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	3.25E-04	0.155	0.347	0.775	2.10E-03	9.38E-04	4.20E-04
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	5.55E-04	0.56	1.12	2.25	9.92E-04	4.95E-04	2.47E-04
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	7.38E-04	0.80	1.79	4.00	9.23E-04	4.13E-04	1.85E-04
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	5.55E-04	0.56	1.12	2.25	9.92E-04	4.95E-04	2.47E-04
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	5.55E-04	0.56	1.12	2.25	9.92E-04	4.95E-04	2.47E-04
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	3.19E-02	0.071	0.518	3.780	4.50E-01	6.16E-02	8.43E-03
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	3.60E-03	10.0	22.4	50.0	3.60E-04	1.61E-04	7.20E-05
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	4.62E-02	10.0	22.4	50.0	4.62E-03	2.07E-03	9.25E-04
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	6.39E-02	0.30	0.67	1.50	2.13E-01	9.53E-02	4.26E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	2.54E-04	4.00	8.9	20.0	6.35E-05	2.84E-05	1.27E-05
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	2.64E-02	0.80	1.79	4.00	3.31E-02	1.48E-02	6.61E-03
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	5.52E-04	0.48	1.07	2.40	1.15E-03	5.14E-04	2.30E-04
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	2.87E-02	0.48	1.07	2.40	5.97E-02	2.67E-02	1.19E-02
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	3.12E-02	355	794	1,775	8.80E-05	3.94E-05	1.76E-05
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	2.70E-02	1.00	2.24	5.00	2.70E-02	1.21E-02	5.41E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	4.33E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	3.03E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	5.23E-03	80.4	180	402	6.51E-05	2.91E-05	1.30E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	4.42E-03	80.4	180	402	5.50E-05	2.46E-05	1.10E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	8.09E-04	80.4	180	402	1.01E-05	4.50E-06	2.01E-06
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	5.73E-04	80.4	180	402	7.13E-06	3.19E-06	1.43E-06
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	2.29E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	2.29E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	8.85E-04	7.10	15.9	35.5	1.25E-04	5.57E-05	2.49E-05
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	3.02E-04	7.10	15.9	35.5	4.25E-05	1.90E-05	8.51E-06
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	2.31E-04	7.10	15.9	35.5	3.25E-05	1.45E-05	6.50E-06
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	1.56E-04	7.10	15.9	35.5	2.20E-05	9.85E-06	4.40E-06

ATTACHMENT TABLE L-3-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	1.61E-04	7.10	15.9	35.5	2.27E-05	1.01E-05	4.53E-06
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	3.63E-04	7.10	15.9	35.5	5.12E-05	2.29E-05	1.02E-05
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	1.99E-04	7.10	15.9	35.5	2.80E-05	1.25E-05	5.59E-06
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	1.36E-04	7.10	15.9	35.5	1.92E-05	8.57E-06	3.83E-06
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	2.69E-04	7.10	15.9	35.5	3.79E-05	1.69E-05	7.57E-06
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	7.85E-05	7.10	15.9	35.5	1.11E-05	4.95E-06	2.21E-06
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	2.70E-04	7.10	15.9	35.5	3.80E-05	1.70E-05	7.60E-06
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	6.48E-04	7.10	15.9	35.5	9.13E-05	4.08E-05	1.83E-05
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	3.66E-03	0.113	0.253	0.565	3.24E-02	1.45E-02	6.49E-03
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	2.82E-03	3.39	7.58	17.0	8.33E-04	3.73E-04	1.67E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	2.29E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	1.27E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	2.05E-04	7.10	15.9	35.5	2.89E-05	1.29E-05	5.78E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	8.14E-03	6.73	21.3	67.3	1.21E-03	3.82E-04	1.21E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	3.52E-04	7.10	15.9	35.5	4.95E-05	2.22E-05	9.91E-06
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	4.32E-04	7.10	15.9	35.5	6.08E-05	2.72E-05	1.22E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.50E-04	0.00E+00	1.41E-05	0.000014	0.000044	0.00014	**1.01E+00**	3.18E-01	1.01E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1254 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1010 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.230 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	0.126	2.67E+00	1.46E-02	9.06E-02	5.14	8.12	12.8	1.76E-02	1.11E-02	7.05E-03
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	0.164	5.02E-01	4.29E-04	5.65E-02	1.47	3.29	7.35	3.85E-02	1.72E-02	7.69E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	0.038	9.98E-01	1.55E-03	1.12E-01	2.66	5.95	13.3	4.21E-02	1.88E-02	8.42E-03
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	0.100	6.10E+00	9.20E-03	7.48E-01	4.05	7.00	12.1	1.85E-01	1.07E-01	6.18E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	0.070	5.55E+00	2.07E-03	2.79E-01	1.63	2.31	3.26	1.71E-01	1.21E-01	8.56E-02
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	3.250	3.86E-01	1.00E-04	5.69E-03	0.026	0.045	0.078	2.19E-01	1.26E-01	7.29E-02
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	1.000	1.17E+01	1.34E-03	5.65E-02	6.71	15.0	33.6	8.43E-03	3.77E-03	1.69E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	1.000	5.43E-01	1.30E-03	1.43E-02	0.40	0.57	0.80	3.57E-02	2.53E-02	1.79E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	1.000	1.19E+00	7.00E-05	3.60E-03	4.04	9.03	20.2	8.91E-04	3.98E-04	1.78E-04
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	0.147	3.27E+01	2.76E-02	5.12E+00	66.1	148	331	7.75E-02	3.46E-02	1.55E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	7.24E-04	1.50	3.35	7.50	4.83E-04	2.16E-04	9.65E-05
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	2.53E-03	1.50	3.35	7.50	1.69E-03	7.55E-04	3.37E-04
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	1.33E-03	1.50	3.35	7.50	8.86E-04	3.96E-04	1.77E-04
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	7.75E-04	1.50	3.35	7.50	5.17E-04	2.31E-04	1.03E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	4.27E-04	1.50	3.35	7.50	2.85E-04	1.27E-04	5.69E-05
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	5.25E-02	1.50	3.35	7.50	3.50E-02	1.57E-02	7.00E-03
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	1.91E-02	1.50	3.35	7.50	1.27E-02	5.69E-03	2.55E-03
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	5.92	1.46E+01	3.33E-04	6.91E-02	1.50	3.35	7.50	4.61E-02	2.06E-02	9.21E-03
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	1.83E-03	0.12	0.27	0.60	1.53E-02	6.83E-03	3.05E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	1.98E-03	0.12	0.27	0.60	1.65E-02	7.36E-03	3.29E-03
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	2.08E-03	0.60	0.95	1.50	3.46E-03	2.19E-03	1.39E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	1.18E-05	0.155	0.347	0.775	7.59E-05	3.39E-05	1.52E-05
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	1.36E-04	0.56	1.12	2.25	2.43E-04	1.21E-04	6.05E-05
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	7.71E-05	0.80	1.79	4.00	9.63E-05	4.31E-05	1.93E-05
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	1.35E-04	0.56	1.12	2.25	2.41E-04	1.20E-04	6.00E-05
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	1.06E-04	0.56	1.12	2.25	1.89E-04	9.44E-05	4.71E-05
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	9.74E-03	0.071	0.518	3.780	1.37E-01	1.88E-02	2.58E-03
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	8.03E-04	10.0	22.4	50.0	8.03E-05	3.59E-05	1.61E-05
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	5.54E-03	10.0	22.4	50.0	5.54E-04	2.48E-04	1.11E-04
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	5.35E-03	0.30	0.67	1.50	1.78E-02	7.98E-03	3.57E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	6.47E-05	4.00	8.9	20.0	1.62E-05	7.23E-06	3.23E-06
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	2.97E-03	0.80	1.79	4.00	3.71E-03	1.66E-03	7.41E-04
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	1.71E-05	0.48	1.07	2.40	3.56E-05	1.59E-05	7.12E-06
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	2.40E-03	0.48	1.07	2.40	5.00E-03	2.24E-03	1.00E-03
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	2.73E-03	355	794	1,775	7.70E-06	3.44E-06	1.54E-06
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	1.79E-03	1.00	2.24	5.00	1.79E-03	8.01E-04	3.58E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	3.86E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	1.60E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	1.36E-02	80.4	180	402	1.69E-04	7.57E-05	3.39E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	2.37E-02	80.4	180	402	2.94E-04	1.32E-04	5.89E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	2.23E-02	80.4	180	402	2.77E-04	1.24E-04	5.54E-05
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	2.39E-02	80.4	180	402	2.97E-04	1.33E-04	5.94E-05
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	1.23E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	1.27E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	1.13E-03	7.10	15.9	35.5	1.60E-04	7.15E-05	3.20E-05
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	2.77E-03	7.10	15.9	35.5	3.91E-04	1.75E-04	7.81E-05
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	4.36E-03	7.10	15.9	35.5	6.15E-04	2.75E-04	1.23E-04
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	2.45E-03	7.10	15.9	35.5	3.46E-04	1.55E-04	6.91E-05

ATTACHMENT TABLE L-3-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	3.10E-03	7.10	15.9	35.5	4.36E-04	1.95E-04	8.73E-05
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	1.14E-02	7.10	15.9	35.5	1.61E-03	7.21E-04	3.22E-04
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	3.85E-03	7.10	15.9	35.5	5.43E-04	2.43E-04	1.09E-04
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	2.70E-03	7.10	15.9	35.5	3.80E-04	1.70E-04	7.60E-05
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	3.53E-03	7.10	15.9	35.5	4.97E-04	2.22E-04	9.94E-05
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	1.38E-03	7.10	15.9	35.5	1.95E-04	8.70E-05	3.89E-05
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	1.18E-02	7.10	15.9	35.5	1.66E-03	7.45E-04	3.33E-04
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	1.58E-03	7.10	15.9	35.5	2.23E-04	9.96E-05	4.45E-05
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	3.23E-03	0.113	0.253	0.565	2.86E-02	1.28E-02	5.72E-03
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	1.29E-02	3.39	7.58	17.0	3.82E-03	1.71E-03	7.64E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	9.40E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	1.50E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	2.78E-03	7.10	15.9	35.5	3.92E-04	1.75E-04	7.84E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	2.78E-02	6.73	21.3	67.3	4.14E-03	1.31E-03	4.14E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	1.53E-02	7.10	15.9	35.5	2.15E-03	9.64E-04	4.31E-04
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	2.40E-02	7.10	15.9	35.5	3.38E-03	1.51E-03	6.76E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0564 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.100 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.867 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.033 = Proportion of diet composed of sediment
WIR = 0.0658 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.177 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	Measured	1.14E+00	1.46E-02	6.06E-02	5.14	8.12	12.8	1.18E-02	7.46E-03	4.72E-03
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	Measured	6.65E-01	4.29E-04	3.49E-02	1.47	3.29	7.35	2.38E-02	1.06E-02	4.75E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	Measured	1.03E+00	1.55E-03	5.42E-02	2.66	5.95	13.3	2.04E-02	9.11E-03	4.07E-03
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	Measured	2.89E+00	9.20E-03	1.52E-01	4.05	7.00	12.1	3.76E-02	2.18E-02	1.26E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	Measured	9.09E-01	2.07E-03	4.78E-02	3.85	8.61	19.3	1.24E-02	5.55E-03	2.48E-03
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	Measured	1.22E-01	1.00E-04	6.40E-03	0.49	0.77	1.20	1.31E-02	8.35E-03	5.33E-03
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	Measured	9.09E-01	1.34E-03	4.78E-02	6.71	15.0	33.6	7.12E-03	3.18E-03	1.42E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	Measured	1.85E+00	1.30E-03	9.69E-02	1.80	4.02	9.00	5.39E-02	2.41E-02	1.08E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	Measured	9.09E-01	7.00E-05	4.77E-02	4.04	9.03	20.2	1.18E-02	5.28E-03	2.36E-03
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	Measured	5.39E+01	2.76E-02	2.83E+00	66.1	148	331	4.28E-02	1.91E-02	8.56E-03
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	Measured	1.04E-01	2.84E-04	5.48E-03	0.41	0.92	2.05	1.34E-02	5.98E-03	2.68E-03
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	Measured	1.04E-01	3.97E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.99E-03	2.68E-03
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	Measured	1.20E-01	2.84E-04	6.34E-03	0.41	0.92	2.05	1.55E-02	6.91E-03	3.09E-03
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	Measured	1.04E-01	3.41E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.99E-03	2.68E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	Measured	1.04E-01	3.97E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.99E-03	2.68E-03
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	Measured	5.94E-01	2.84E-04	3.12E-02	0.41	0.92	2.05	7.61E-02	3.40E-02	1.52E-02
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	Measured	3.20E+00	3.41E-04	1.68E-01	0.41	0.92	2.05	4.10E-01	1.83E-01	8.19E-02
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	Measured	1.07E+01	3.33E-04	5.59E-01	0.41	0.92	2.05	**1.36E+00**	6.10E-01	2.73E-01
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	1.27E-02	0.30	0.95	3.00	4.24E-02	1.34E-02	4.24E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	2.28E-02	0.30	0.95	3.00	7.59E-02	2.40E-02	7.59E-03
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	3.66E-02	0.30	0.95	3.00	1.22E-01	3.86E-02	1.22E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	3.04E-04	0.155	0.347	0.775	1.96E-03	8.77E-04	3.92E-04
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	5.19E-04	0.56	1.12	2.25	9.26E-04	4.62E-04	2.30E-04
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	6.89E-04	0.80	1.79	4.00	8.62E-04	3.85E-04	1.72E-04
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	5.19E-04	0.56	1.12	2.25	9.26E-04	4.62E-04	2.30E-04
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	5.19E-04	0.56	1.12	2.25	9.26E-04	4.62E-04	2.30E-04
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	2.97E-02	0.071	0.518	3.780	4.20E-01	5.75E-02	7.87E-03
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	3.36E-03	10.0	22.4	50.0	3.36E-04	1.50E-04	6.72E-05
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	4.32E-02	10.0	22.4	50.0	4.32E-03	1.93E-03	8.63E-04
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	5.97E-02	0.021	0.047	0.104	**2.87E+00**	**1.28E+00**	5.74E-01
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	2.37E-04	4.00	8.9	20.0	5.93E-05	2.65E-05	1.19E-05
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	2.47E-02	0.80	1.79	4.00	3.08E-02	1.38E-02	6.17E-03
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	5.16E-04	0.48	1.07	2.40	1.07E-03	4.80E-04	2.15E-04
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	2.68E-02	0.48	1.07	2.40	5.57E-02	2.49E-02	1.11E-02
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	2.92E-02	355	794	1,775	8.21E-05	3.67E-05	1.64E-05
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	2.52E-02	1.00	2.24	5.00	2.52E-02	1.13E-02	5.05E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	4.13E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	2.87E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	4.89E-03	80.4	180	402	6.09E-05	2.72E-05	1.22E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	4.13E-03	80.4	180	402	5.14E-05	2.30E-05	1.03E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	7.60E-04	80.4	180	402	9.45E-06	4.23E-06	1.89E-06
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	5.40E-04	80.4	180	402	6.71E-06	3.00E-06	1.34E-06
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	2.14E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	2.14E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	8.26E-04	7.10	15.9	35.5	1.16E-04	5.21E-05	2.33E-05
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	2.83E-04	7.10	15.9	35.5	3.98E-05	1.78E-05	7.97E-06
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	2.16E-04	7.10	15.9	35.5	3.05E-05	1.36E-05	6.09E-06
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	1.47E-04	7.10	15.9	35.5	2.07E-05	9.26E-06	4.14E-06

ATTACHMENT TABLE L-3-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	1.51E-04	7.10	15.9	35.5	2.13E-05	9.53E-06	4.26E-06
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	3.40E-04	7.10	15.9	35.5	4.80E-05	2.14E-05	9.59E-06
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	1.86E-04	7.10	15.9	35.5	2.62E-05	1.17E-05	5.25E-06
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	1.28E-04	7.10	15.9	35.5	1.80E-05	8.07E-06	3.61E-06
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	2.52E-04	7.10	15.9	35.5	3.55E-05	1.59E-05	7.09E-06
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	7.42E-05	7.10	15.9	35.5	1.05E-05	4.67E-06	2.09E-06
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	2.53E-04	7.10	15.9	35.5	3.57E-05	1.60E-05	7.13E-06
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	6.06E-04	7.10	15.9	35.5	8.53E-05	3.82E-05	1.71E-05
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	3.42E-03	0.113	0.253	0.565	3.03E-02	1.35E-02	6.06E-03
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	2.68E-03	3.39	7.58	17.0	7.91E-04	3.54E-04	1.58E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	2.14E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	1.19E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	1.93E-04	7.10	15.9	35.5	2.72E-05	1.21E-05	5.43E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	7.60E-03	6.73	21.3	67.3	1.13E-03	3.57E-04	1.13E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	3.29E-04	7.10	15.9	35.5	4.63E-05	2.07E-05	9.27E-06
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	4.05E-04	7.10	15.9	35.5	5.70E-05	2.55E-05	1.14E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.42E-04	0.00E+00	2.32E-05	0.000014	0.000044	0.00014	**1.66E+00**	5.24E-01	1.66E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0780	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0769	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.486	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	0.126	2.67E+00	1.46E-02	2.43E-01	2.46	4.26	7.38	9.86E-02	5.69E-02	3.29E-02
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	0.164	5.02E-01	4.29E-04	4.05E-02	1.47	3.29	7.35	2.75E-02	1.23E-02	5.51E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	0.038	9.98E-01	1.55E-03	2.51E-01	2.66	5.95	13.3	9.42E-02	4.21E-02	1.88E-02
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	0.100	6.10E+00	9.20E-03	2.36E+00	4.05	7.00	12.1	5.83E-01	3.37E-01	1.95E-01
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	0.070	5.55E+00	2.07E-03	2.49E-01	3.85	8.61	19.3	6.48E-02	2.90E-02	1.30E-02
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	3.250	3.86E-01	1.00E-04	6.63E-03	0.026	0.045	0.078	2.55E-01	1.47E-01	8.50E-02
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	1.000	1.17E+01	1.34E-03	9.44E-02	6.71	15.0	33.6	1.41E-02	6.29E-03	2.82E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	1.000	5.43E-01	1.30E-03	2.58E-02	0.40	0.57	0.80	6.44E-02	4.55E-02	3.22E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	1.000	1.19E+00	7.00E-05	1.00E-02	4.04	9.03	20.2	2.49E-03	1.11E-03	4.97E-04
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	0.147	3.27E+01	2.76E-02	7.20E+00	66.1	148	331	1.09E-01	4.87E-02	2.18E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	1.28E+00	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	6.02E-02	1.50	3.35	7.50	4.01E-02	1.80E-02	8.03E-03
Aroclor-1221	5.43E-02	Regression	2.58E+00	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	1.21E-01	1.50	3.35	7.50	8.08E-02	3.61E-02	1.62E-02
Aroclor-1232	3.65E-02	Regression	1.78E+00	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	8.35E-02	1.50	3.35	7.50	5.57E-02	2.49E-02	1.11E-02
Aroclor-1242	2.74E-02	Regression	1.36E+00	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	6.39E-02	1.50	3.35	7.50	4.26E-02	1.90E-02	8.52E-03
Aroclor-1248	1.90E-02	Regression	9.63E-01	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	4.53E-02	1.50	3.35	7.50	3.02E-02	1.35E-02	6.04E-03
Aroclor-1254	1.92E+00	Regression	7.33E+01	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	3.44E+00	1.50	3.35	7.50	**2.29E+00**	**1.03E+00**	4.58E-01
Aroclor-1260	7.91E-01	Regression	3.19E+01	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	1.50E+00	1.50	3.35	7.50	9.98E-01	4.46E-01	2.00E-01
PCB (total)	2.47E+00	Regression	9.30E+01	0.139	3.44E-01	5.92	1.46E+01	3.33E-04	4.36E+00	1.50	3.35	7.50	**2.91E+00**	**1.30E+00**	5.82E-01
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	1.04E-02	0.12	0.27	0.60	8.64E-02	3.86E-02	1.73E-02
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	1.13E-02	0.12	0.27	0.60	9.38E-02	4.19E-02	1.88E-02
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	3.65E-03	0.60	0.95	1.50	6.08E-03	3.85E-03	2.43E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	3.37E-05	0.155	0.347	0.775	2.18E-04	9.73E-05	4.35E-05
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	8.96E-05	0.56	1.12	2.25	1.60E-04	7.98E-05	3.98E-05
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	4.12E-04	2.14	4.79	10.7	1.93E-04	8.62E-05	3.85E-05
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	8.96E-05	0.56	1.12	2.25	1.60E-04	7.98E-05	3.98E-05
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	8.96E-05	0.56	1.12	2.25	1.60E-04	7.98E-05	3.98E-05
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	5.33E-02	0.071	0.518	3.780	7.51E-01	1.03E-01	1.41E-02
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	4.93E-05	10.0	22.4	50.0	4.93E-06	2.20E-06	9.86E-07
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	5.68E-04	10.0	22.4	50.0	5.68E-05	2.54E-05	1.14E-05
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	6.37E-03	0.30	0.67	1.50	2.12E-02	9.49E-03	4.24E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	2.39E-05	4.00	8.9	20.0	5.98E-06	2.68E-06	1.20E-06
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	1.84E-02	2.14	4.79	10.7	8.58E-03	3.84E-03	1.72E-03
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	1.12E-05	0.48	1.07	2.40	2.32E-05	1.04E-05	4.65E-06
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	1.77E-03	0.48	1.07	2.40	3.69E-03	1.65E-03	7.38E-04
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	4.58E-03	355	794	1,775	1.29E-05	5.77E-06	2.58E-06
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	4.03E-03	1.00	2.24	5.00	4.03E-03	1.80E-03	8.06E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	5.37E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	9.10E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	2.85E-03	80.4	180	402	3.54E-05	1.58E-05	7.08E-06
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	1.03E-02	80.4	180	402	1.29E-04	5.76E-05	2.57E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	1.03E-02	80.4	180	402	1.29E-04	5.76E-05	2.57E-05
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	1.03E-02	80.4	180	402	1.29E-04	5.76E-05	2.57E-05
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	1.99E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	1.99E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	4.98E-04	7.10	15.9	35.5	7.01E-05	3.14E-05	1.40E-05
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	1.03E-03	7.10	15.9	35.5	1.45E-04	6.50E-05	2.91E-05
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	5.67E-03	7.10	15.9	35.5	7.99E-04	3.57E-04	1.60E-04
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	3.81E-03	7.10	15.9	35.5	5.36E-04	2.40E-04	1.07E-04

ATTACHMENT TABLE L-3-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	1.71E-03	7.10	15.9	35.5	2.41E-04	1.08E-04	4.82E-05
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	2.39E-04	7.10	15.9	35.5	3.37E-05	1.51E-05	6.75E-06
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	7.49E-05	7.10	15.9	35.5	1.06E-05	4.72E-06	2.11E-06
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	4.93E-03	7.10	15.9	35.5	6.94E-04	3.10E-04	1.39E-04
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	6.81E-03	7.10	15.9	35.5	9.59E-04	4.29E-04	1.92E-04
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	4.43E-04	7.10	15.9	35.5	6.24E-05	2.79E-05	1.25E-05
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	5.21E-03	7.10	15.9	35.5	7.34E-04	3.28E-04	1.47E-04
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	5.22E-03	7.10	15.9	35.5	7.36E-04	3.29E-04	1.47E-04
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	5.45E-03	0.113	0.253	0.565	4.82E-02	2.16E-02	9.64E-03
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	8.29E-03	3.39	7.58	17.0	2.45E-03	1.09E-03	4.89E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	1.99E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	1.06E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	1.20E-04	7.10	15.9	35.5	1.68E-05	7.53E-06	3.37E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	5.26E-03	6.73	21.3	67.3	7.82E-04	2.47E-04	7.82E-05
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	6.64E-03	7.10	15.9	35.5	9.35E-04	4.18E-04	1.87E-04
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	2.30E-02	7.10	15.9	35.5	3.24E-03	1.45E-03	6.48E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

ATTACHMENT TABLE L-3-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	Measured	2.56E+00	1.46E-02	8.82E-02	1.04	1.31	1.66	8.48E-02	6.71E-02	5.31E-02
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	Measured	3.12E-01	4.29E-04	1.07E-02	0.77	2.43	7.70	1.39E-02	4.39E-03	1.39E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	Measured	1.59E+00	1.55E-03	5.44E-02	2.40	5.37	12.0	2.27E-02	1.01E-02	4.54E-03
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	Measured	1.04E+01	9.20E-03	3.58E-01	11.7	13.3	15.1	3.06E-02	2.69E-02	2.37E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	Measured	1.51E+00	2.07E-03	5.17E-02	4.70	6.47	8.90	1.10E-02	7.99E-03	5.81E-03
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	Measured	9.66E-02	1.00E-04	3.31E-03	0.150	0.192	0.247	2.21E-02	1.72E-02	1.34E-02
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	Measured	8.91E-01	1.34E-03	3.06E-02	1.70	2.40	3.40	1.80E-02	1.27E-02	8.99E-03
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	Measured	1.43E+00	1.30E-03	4.91E-02	0.20	0.26	0.33	2.46E-01	1.91E-01	1.49E-01
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	Measured	6.06E-01	7.00E-05	2.08E-02	12.0	26.9	60.2	1.72E-03	7.71E-04	3.45E-04
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	Measured	1.91E+02	2.76E-02	6.56E+00	75.4	169	377	8.70E-02	3.89E-02	1.74E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	5.23E-03	1.37	2.17	3.43	3.82E-03	2.41E-03	1.53E-03
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	1.10E-02	0.137	0.306	0.685	8.04E-02	3.60E-02	1.61E-02
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	7.42E-03	0.137	0.306	0.685	5.41E-02	2.42E-02	1.08E-02
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	5.57E-03	0.137	0.306	0.685	4.07E-02	1.82E-02	8.14E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	3.86E-03	0.137	0.306	0.685	2.82E-02	1.26E-02	5.64E-03
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	3.89E-01	0.137	0.306	0.685	**2.84E+00**	**1.27E+00**	5.67E-01
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	1.60E-01	0.137	0.306	0.685	**1.17E+00**	5.23E-01	2.34E-01
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	Measured	8.25E+00	3.33E-04	2.82E-01	0.137	0.306	0.685	**2.06E+00**	9.22E-01	4.12E-01
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	8.31E-03	0.147	0.329	0.735	5.65E-02	2.53E-02	1.13E-02
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	1.48E-02	0.147	0.329	0.735	1.01E-01	4.52E-02	2.02E-02
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	2.39E-02	0.147	0.329	0.735	1.62E-01	7.26E-02	3.25E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	1.98E-04	0.20	0.45	1.00	9.90E-04	4.43E-04	1.98E-04
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	3.38E-04	1.60	2.26	3.20	2.11E-04	1.49E-04	1.06E-04
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	4.50E-04	4.58	6.48	9.16	9.82E-05	6.94E-05	4.91E-05
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	3.38E-04	1.60	2.26	3.20	2.11E-04	1.49E-04	1.06E-04
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	3.38E-04	1.60	2.26	3.20	2.11E-04	1.49E-04	1.06E-04
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	1.94E-02	0.015	0.021	0.030	**1.29E+00**	9.15E-01	6.47E-01
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	2.19E-03	0.15	0.34	0.75	1.46E-02	6.54E-03	2.92E-03
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	2.82E-02	0.15	0.34	0.75	1.88E-01	8.39E-02	3.75E-02
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	3.89E-02	0.184	0.411	0.920	2.12E-01	9.46E-02	4.23E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	1.55E-04	8.00	17.9	40.0	1.93E-05	8.65E-06	3.87E-06
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	1.61E-02	4.58	6.48	9.16	3.52E-03	2.49E-03	1.76E-03
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	3.36E-04	0.20	0.45	1.00	1.68E-03	7.52E-04	3.36E-04
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	1.75E-02	0.20	0.45	1.00	8.73E-02	3.90E-02	1.75E-02
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	1.90E-02	4.00	5.66	8.00	4.76E-03	3.36E-03	2.38E-03
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	1.65E-02	8.00	17.9	40.0	2.06E-03	9.21E-04	4.12E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	2.64E-04	76.0	170	380	3.47E-06	1.55E-06	6.94E-07
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	1.84E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	3.19E-03	53.0	75.0	106	6.01E-05	4.25E-05	3.01E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	2.69E-03	85.7	192	429	3.14E-05	1.41E-05	6.29E-06
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	4.93E-04	85.7	192	429	5.75E-06	2.57E-06	1.15E-06
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	3.49E-04	30.0	52.0	90.0	1.16E-05	6.72E-06	3.88E-06
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	1.39E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	1.39E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	5.39E-04	65.6	147	328	8.21E-06	3.67E-06	1.64E-06
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	1.84E-04	65.6	147	328	2.80E-06	1.25E-06	5.61E-07
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	1.41E-04	65.6	147	328	2.14E-06	9.58E-07	4.28E-07
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	9.53E-05	0.62	1.37	3.07	1.55E-04	6.93E-05	3.10E-05

ATTACHMENT TABLE L-3-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	9.80E-05	0.62	1.37	3.07	1.59E-04	7.13E-05	3.19E-05
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	2.21E-04	0.62	1.37	3.07	3.60E-04	1.61E-04	7.21E-05
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	1.21E-04	0.62	1.37	3.07	1.97E-04	8.80E-05	3.94E-05
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	8.29E-05	0.62	1.37	3.07	1.35E-04	6.04E-05	2.70E-05
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	1.64E-04	0.62	1.37	3.07	2.66E-04	1.19E-04	5.33E-05
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	4.78E-05	0.62	1.37	3.07	7.78E-05	3.48E-05	1.56E-05
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	1.64E-04	65.6	147	328	2.51E-06	1.12E-06	5.01E-07
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	3.95E-04	65.6	147	328	6.02E-06	2.69E-06	1.20E-06
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	2.23E-03	2.00	2.83	4.00	1.12E-03	7.89E-04	5.58E-04
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	1.72E-03	2.00	6.32	20.0	8.61E-04	2.72E-04	8.61E-05
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	1.39E-02	75.0	168	375	1.86E-04	8.30E-05	3.71E-05
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	7.74E-03	100	224	500	7.74E-05	3.46E-05	1.55E-05
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	1.25E-04	0.62	1.37	3.07	2.03E-04	9.10E-05	4.07E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	4.96E-03	8.42	18.8	42.1	5.89E-04	2.63E-04	1.18E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	2.14E-04	65.6	147	328	3.26E-06	1.46E-06	6.53E-07
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	2.63E-04	0.62	1.37	3.07	4.28E-04	1.91E-04	8.57E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.15E-04	0.00E+00	3.95E-06	0.000001	0.000003	0.00001	**3.95E+00**	**1.25E+00**	3.95E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

ATTACHMENT TABLE L-3-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	0.126	2.67E+00	1.46E-02	1.38E-01	0.25	0.56	1.26	5.49E-01	2.45E-01	1.10E-01
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	0.164	5.02E-01	4.29E-04	6.76E-02	0.77	2.43	7.70	8.77E-02	2.77E-02	8.77E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	0.038	9.98E-01	1.55E-03	1.76E-01	2.40	5.37	12.0	7.33E-02	3.28E-02	1.47E-02
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	0.100	6.10E+00	9.20E-03	7.49E-01	5.60	7.23	9.34	1.34E-01	1.04E-01	8.02E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	0.070	5.55E+00	2.07E-03	5.22E-01	4.70	6.47	8.90	1.11E-01	8.08E-02	5.87E-02
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	3.250	3.86E-01	1.00E-04	5.94E-03	0.032	0.072	0.160	1.85E-01	8.29E-02	3.71E-02
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	1.000	1.17E+01	1.34E-03	8.78E-02	1.70	2.40	3.40	5.16E-02	3.65E-02	2.58E-02
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	1.000	5.43E-01	1.30E-03	1.47E-02	0.20	0.26	0.33	7.34E-02	5.72E-02	4.45E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	1.000	1.19E+00	7.00E-05	6.47E-03	12.0	26.9	60.2	5.37E-04	2.40E-04	1.07E-04
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	0.147	3.27E+01	2.76E-02	5.55E+00	75.4	169	377	7.36E-02	3.29E-02	1.47E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	5.36E-04	0.136	0.304	0.680	3.94E-03	1.76E-03	7.88E-04
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	2.18E-03	0.136	0.304	0.680	1.60E-02	7.16E-03	3.20E-03
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	1.07E-03	0.136	0.304	0.680	7.89E-03	3.53E-03	1.58E-03
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	5.74E-04	0.136	0.304	0.680	4.22E-03	1.89E-03	8.44E-04
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	2.92E-04	0.136	0.304	0.680	2.14E-03	9.59E-04	4.29E-04
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	2.15E-02	0.136	0.304	0.680	1.58E-01	7.09E-02	3.17E-02
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	7.67E-03	0.136	0.304	0.680	5.64E-02	2.52E-02	1.13E-02
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	5.92	1.46E+01	3.33E-04	2.78E-02	0.136	0.304	0.680	2.04E-01	9.13E-02	4.08E-02
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	1.17E-03	0.147	0.329	0.735	7.98E-03	3.57E-03	1.60E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	1.26E-03	0.147	0.329	0.735	8.56E-03	3.83E-03	1.71E-03
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	2.73E-03	0.147	0.329	0.735	1.86E-02	8.30E-03	3.71E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	1.39E-05	0.20	0.45	1.00	6.97E-05	3.12E-05	1.39E-05
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	1.48E-04	1.60	2.26	3.20	9.25E-05	6.54E-05	4.63E-05
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	5.27E-05	4.58	6.48	9.16	1.15E-05	8.13E-06	5.75E-06
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	1.47E-04	1.60	2.26	3.20	9.17E-05	6.49E-05	4.59E-05
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	1.15E-04	1.60	2.26	3.20	7.16E-05	5.06E-05	3.58E-05
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	5.48E-03	0.015	0.021	0.030	3.66E-01	2.59E-01	1.83E-01
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	9.22E-04	0.15	0.34	0.75	6.15E-03	2.75E-03	1.23E-03
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	6.53E-03	0.15	0.34	0.75	4.35E-02	1.95E-02	8.70E-03
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	5.83E-03	0.184	0.411	0.920	3.17E-02	1.42E-02	6.33E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	7.32E-05	8.00	17.9	40.0	9.15E-06	4.09E-06	1.83E-06
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	1.60E-03	4.58	6.48	9.16	3.50E-04	2.48E-04	1.75E-04
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	2.46E-05	0.20	0.45	1.00	1.23E-04	5.49E-05	2.46E-05
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	2.74E-03	0.20	0.45	1.00	1.37E-02	6.12E-03	2.74E-03
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	2.83E-03	4.00	5.66	8.00	7.07E-04	5.00E-04	3.53E-04
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	1.82E-03	8.00	17.9	40.0	2.27E-04	1.02E-04	4.55E-05
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	4.49E-04	76.0	170	380	5.90E-06	2.64E-06	1.18E-06
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	1.84E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	1.55E-02	53.0	75.0	106	2.93E-04	2.07E-04	1.47E-04
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	2.58E-02	85.7	192	429	3.01E-04	1.35E-04	6.03E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	2.43E-02	85.7	192	429	2.83E-04	1.27E-04	5.66E-05
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	2.61E-02	30.0	52.0	90.0	8.69E-04	5.02E-04	2.90E-04
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	1.29E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	1.34E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	1.63E-03	65.6	147	328	2.49E-05	1.11E-05	4.98E-06
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	3.34E-03	65.6	147	328	5.08E-05	2.27E-05	1.02E-05
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	4.67E-03	65.6	147	328	7.12E-05	3.18E-05	1.42E-05
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	3.38E-03	0.62	1.37	3.07	5.50E-03	2.46E-03	1.10E-03

ATTACHMENT TABLE L-3-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	4.53E-03	0.62	1.37	3.07	7.36E-03	3.29E-03	1.47E-03
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	1.51E-02	0.62	1.37	3.07	2.45E-02	1.10E-02	4.92E-03
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	5.09E-03	0.62	1.37	3.07	8.28E-03	3.70E-03	1.66E-03
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	3.36E-03	0.62	1.37	3.07	5.47E-03	2.45E-03	1.09E-03
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	4.84E-03	0.62	1.37	3.07	7.86E-03	3.52E-03	1.58E-03
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	2.07E-03	0.62	1.37	3.07	3.37E-03	1.51E-03	6.74E-04
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	1.41E-02	65.6	147	328	2.15E-04	9.61E-05	4.30E-05
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	1.63E-03	65.6	147	328	2.48E-05	1.11E-05	4.96E-06
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	3.66E-03	2.00	2.83	4.00	1.83E-03	1.30E-03	9.16E-04
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	1.50E-02	2.00	6.32	20.0	7.48E-03	2.36E-03	7.48E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	9.70E-03	75.0	168	375	1.29E-04	5.78E-05	2.59E-05
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	1.61E-02	100	224	500	1.61E-04	7.21E-05	3.22E-05
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	4.45E-03	0.62	1.37	3.07	7.24E-03	3.24E-03	1.45E-03
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	3.07E-02	8.42	18.8	42.1	3.65E-03	1.63E-03	7.30E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	1.70E-02	65.6	147	328	2.59E-04	1.16E-04	5.17E-05
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	2.62E-02	0.62	1.37	3.07	4.26E-02	1.90E-02	8.53E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0596 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1139 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.169 = Body weight (kg)

ATTACHMENT TABLE L-3-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.12E+01	Regression	5.11E+00	Regresson	7.64E-01	Measured	4.46E+00	1.46E-02	8.51E-02	1.04	1.31	1.66	8.19E-02	6.48E-02	5.13E-02
Cadmium	3.06E+00	Regression	8.61E-01	Regresson	1.14E+00	Measured	5.57E-01	4.29E-04	2.02E-02	0.77	2.43	7.70	2.62E-02	8.28E-03	2.62E-03
Chromium	2.63E+01	Regression	5.34E+00	0.041	1.08E+00	Measured	2.45E+00	1.55E-03	9.38E-02	2.40	5.37	12.0	3.91E-02	1.75E-02	7.82E-03
Copper	6.10E+01	0.824	5.03E+01	Regresson	9.87E+00	Measured	1.54E+01	9.20E-03	5.68E-01	11.7	13.3	15.1	4.85E-02	4.27E-02	3.75E-02
Lead	7.93E+01	Regression	5.31E+00	Regresson	3.08E+00	Measured	2.30E+00	2.07E-03	1.94E-01	4.70	6.47	8.90	4.12E-02	3.00E-02	2.18E-02
Mercury	1.19E-01	1.186	1.41E-01	Regresson	1.16E-01	Measured	9.21E-02	1.00E-04	2.18E-03	0.150	0.192	0.247	1.46E-02	1.13E-02	8.84E-03
Nickel	1.17E+01	Regression	2.01E+00	Regresson	6.81E-01	Measured	1.12E+00	1.34E-03	4.05E-02	1.70	2.40	3.40	2.38E-02	1.68E-02	1.19E-02
Selenium	5.43E-01	1.000	5.43E-01	Regresson	2.59E-01	Measured	1.65E+00	1.30E-03	8.90E-03	0.20	0.26	0.33	4.45E-02	3.47E-02	2.70E-02
Silver	1.19E+00	0.180	2.14E-01	0.014	1.66E-02	Measured	5.47E-01	7.00E-05	4.34E-03	12.0	26.9	60.2	3.60E-04	1.61E-04	7.21E-05
Zinc	2.23E+02	Regression	1.53E+02	Regresson	9.70E+01	Measured	1.74E+02	2.76E-02	2.41E+00	75.4	169	377	3.20E-02	1.43E-02	6.39E-03
Polychlorinated Biphenyls															
Aroclor-1016	2.58E-02	Regression	6.71E-02	0.323	8.32E-03	5.92	1.53E-01	2.84E-04	8.16E-04	1.37	2.17	3.43	5.96E-04	3.76E-04	2.38E-04
Aroclor-1221	5.43E-02	Regression	1.53E-01	0.749	4.06E-02	5.92	3.21E-01	3.97E-04	1.95E-03	0.137	0.306	0.685	1.43E-02	6.38E-03	2.85E-03
Aroclor-1232	3.65E-02	Regression	9.88E-02	0.515	1.88E-02	5.92	2.16E-01	2.84E-04	1.22E-03	0.137	0.306	0.685	8.93E-03	4.00E-03	1.79E-03
Aroclor-1242	2.74E-02	Regression	7.19E-02	0.323	8.86E-03	5.92	1.62E-01	3.41E-04	8.76E-04	0.137	0.306	0.685	6.39E-03	2.86E-03	1.28E-03
Aroclor-1248	1.90E-02	Regression	4.78E-02	0.184	3.50E-03	5.92	1.12E-01	3.97E-04	5.86E-04	0.137	0.306	0.685	4.28E-03	1.91E-03	8.56E-04
Aroclor-1254	1.92E+00	Regression	8.01E+00	0.139	2.67E-01	5.92	1.13E+01	2.84E-04	7.94E-02	0.137	0.306	0.685	5.79E-01	2.59E-01	1.16E-01
Aroclor-1260	7.91E-01	Regression	3.00E+00	0.105	8.32E-02	5.92	4.68E+00	3.41E-04	3.03E-02	0.137	0.306	0.685	2.21E-01	9.88E-02	4.42E-02
PCB (total)	2.47E+00	Regression	1.06E+01	0.139	3.44E-01	Measured	6.20E+00	3.33E-04	9.43E-02	0.137	0.306	0.685	6.88E-01	3.08E-01	1.38E-01
Pesticides															
4,4'-DDD	1.03E-01	2.15	2.21E-01	Regresson	1.46E-02	2.36	2.42E-01	5.52E-05	2.24E-03	0.147	0.329	0.735	1.52E-02	6.81E-03	3.05E-03
4,4'-DDE	1.11E-01	2.15	2.40E-01	Regresson	1.56E-02	3.89	4.33E-01	5.52E-05	2.63E-03	0.147	0.329	0.735	1.79E-02	8.02E-03	3.58E-03
4,4'-DDT	2.73E-01	0.284	7.76E-02	Regresson	3.06E-02	2.55	6.97E-01	5.52E-05	2.10E-03	0.147	0.329	0.735	1.43E-02	6.38E-03	2.85E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.78E-05	1.64E-05	0.20	0.45	1.00	8.19E-05	3.66E-05	1.64E-05
alpha-BHC	1.71E-03	1.043	1.78E-03	1.735	2.97E-03	5.76	9.85E-03	2.78E-05	5.12E-05	1.60	2.26	3.20	3.20E-05	2.26E-05	1.60E-05
alpha-Chlordane	4.03E-03	2.15	8.67E-03	0.165	6.64E-04	3.25	1.31E-02	2.78E-05	9.50E-05	4.58	6.48	9.16	2.07E-05	1.47E-05	1.04E-05
beta-BHC	1.71E-03	1.043	1.78E-03	1.719	2.94E-03	5.76	9.85E-03	2.78E-05	5.10E-05	1.60	2.26	3.20	3.19E-05	2.25E-05	1.59E-05
delta-BHC	1.71E-03	1.043	1.78E-03	1.311	2.24E-03	5.76	9.85E-03	2.78E-05	4.61E-05	1.60	2.26	3.20	2.88E-05	2.04E-05	1.44E-05
Dieldrin	2.31E-01	4.920	1.14E+00	0.410	9.46E-02	2.45	5.67E-01	5.52E-05	1.03E-02	0.015	0.021	0.030	6.88E-01	4.86E-01	3.44E-01
Endosulfan I	1.11E-02	0.083	9.24E-04	1.687	1.87E-02	5.76	6.40E-02	2.78E-05	2.35E-04	0.15	0.34	0.75	1.57E-03	7.02E-04	3.14E-04
Endosulfan II	1.43E-01	0.083	1.19E-02	0.886	1.26E-01	5.76	8.22E-01	5.52E-05	2.20E-03	0.15	0.34	0.75	1.47E-02	6.57E-03	2.94E-03
Endrin	1.97E-01	0.686	1.35E-01	0.535	1.06E-01	5.76	1.14E+00	5.52E-05	3.47E-03	0.184	0.411	0.920	1.88E-02	8.42E-03	3.77E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.78E-05	2.20E-05	8.00	17.9	40.0	2.75E-06	1.23E-06	5.49E-07
gamma-Chlordane	1.29E-01	3.03	3.91E-01	0.165	2.13E-02	3.64	4.70E-01	2.78E-05	3.89E-03	4.58	6.48	9.16	8.50E-04	6.01E-04	4.25E-04
Heptachlor	1.70E-03	0.065	1.11E-04	0.174	2.96E-04	5.76	9.79E-03	2.78E-05	1.99E-05	0.20	0.45	1.00	9.93E-05	4.44E-05	1.99E-05
Heptachlor epoxide	8.85E-02	0.426	3.77E-02	0.566	5.00E-02	5.76	5.10E-01	2.78E-05	1.40E-03	0.20	0.45	1.00	6.99E-03	3.13E-03	1.40E-03
Methoxychlor	9.64E-02	1.000	9.64E-02	0.525	5.06E-02	5.76	5.55E-01	2.78E-04	1.94E-03	4.00	5.66	8.00	4.84E-04	3.42E-04	2.42E-04
Toxaphene	8.34E-02	1.000	8.34E-02	0.355	2.96E-02	5.76	4.80E-01	5.52E-04	1.60E-03	8.00	17.9	40.0	2.00E-04	8.95E-05	4.00E-05
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.000	6.89E-03	1.00E-03	2.02E-04	76.0	170	380	2.66E-06	1.19E-06	5.32E-07
1,2,4,5-Tetrachlorobenzene	4.34E-01	0.397	1.72E-01	0.792	3.43E-01	0.115	5.00E-02	4.77E-03	4.85E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.18E-01	0.257	5.61E-02	1.426	3.11E-01	0.422	9.22E-02	1.00E-03	3.14E-03	53.0	75.0	106	5.92E-05	4.19E-05	2.96E-05
1,2-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.452	5.35E-01	0.358	7.83E-02	5.00E-04	5.86E-03	85.7	192	429	6.84E-05	3.06E-05	1.37E-05
1,3-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.296	5.01E-01	0.064	1.40E-02	5.00E-04	5.55E-03	85.7	192	429	6.47E-05	2.90E-05	1.29E-05
1,4-Dichlorobenzene	2.18E-01	1.000	2.18E-01	2.475	5.40E-01	0.045	9.78E-03	5.00E-04	5.81E-03	30.0	52.0	90.0	1.94E-04	1.12E-04	6.46E-05
4-Bromophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.566	2.28E-01	1.000	4.02E-01	4.77E-03	6.17E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	4.02E-01	1.000	4.02E-01	0.593	2.39E-01	1.000	4.02E-01	4.77E-03	6.24E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	1.40E-01	0.074	1.03E-02	Regresson	2.07E-02	0.112	1.57E-02	6.90E-05	4.74E-04	65.6	147	328	7.23E-06	3.23E-06	1.45E-06
Acenaphthylene	1.20E-01	0.180	2.16E-02	Regresson	5.95E-02	0.044	5.29E-03	9.61E-05	7.87E-04	65.6	147	328	1.20E-05	5.36E-06	2.40E-06
Anthracene	1.51E-01	0.800	1.20E-01	Regresson	8.52E-02	0.027	4.02E-03	9.61E-05	1.76E-03	65.6	147	328	2.69E-05	1.20E-05	5.37E-06
Benzo(a)anthracene	3.55E-01	0.227	8.07E-02	Regresson	3.61E-02	0.008	2.69E-03	1.09E-04	1.45E-03	0.62	1.37	3.07	2.36E-03	1.06E-03	4.73E-04

ATTACHMENT TABLE L-3-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	4.18E-01	0.086	3.59E-02	Regresson	5.43E-02	0.007	2.76E-03	1.25E-04	1.34E-03	0.62	1.37	3.07	2.19E-03	9.78E-04	4.38E-04
Benzo(b)fluoranthene	7.89E-01	0.006	4.48E-03	0.310	2.45E-01	0.008	6.35E-03	1.37E-04	3.04E-03	0.62	1.37	3.07	4.94E-03	2.21E-03	9.90E-04
Benzo(g,h,i)perylene	2.66E-01	0.004	1.10E-03	Regresson	8.23E-02	0.013	3.44E-03	1.09E-04	1.03E-03	0.62	1.37	3.07	1.67E-03	7.47E-04	3.35E-04
Benzo(k)fluoranthene	3.02E-01	0.347	1.05E-01	Regresson	4.12E-02	0.008	2.33E-03	1.06E-04	1.58E-03	0.62	1.37	3.07	2.57E-03	1.15E-03	5.15E-04
Chrysene	5.54E-01	0.261	1.45E-01	Regresson	4.70E-02	0.009	4.72E-03	8.00E-05	2.34E-03	0.62	1.37	3.07	3.80E-03	1.70E-03	7.62E-04
Dibenz(a,h)anthracene	1.91E-01	0.047	9.00E-03	0.130	2.48E-02	0.007	1.32E-03	9.61E-05	5.61E-04	0.62	1.37	3.07	9.12E-04	4.08E-04	1.83E-04
Fluoranthene	5.05E-01	0.219	1.10E-01	0.500	2.52E-01	0.009	4.67E-03	1.55E-04	3.43E-03	65.6	147	328	5.23E-05	2.34E-05	1.05E-05
Fluorene	1.51E-01	0.735	1.11E-01	Regresson	1.94E-02	0.076	1.14E-02	9.93E-05	1.24E-03	65.6	147	328	1.89E-05	8.47E-06	3.79E-06
Hexachlorobenzene	2.26E-01	0.512	1.16E-01	0.246	5.57E-02	0.288	6.51E-02	9.61E-05	1.72E-03	2.00	2.83	4.00	8.59E-04	6.07E-04	4.29E-04
Hexachlorobutadiene	4.02E-01	0.385	1.55E-01	0.675	2.72E-01	0.115	4.64E-02	4.77E-03	4.17E-03	2.00	6.32	20.0	2.08E-03	6.59E-04	2.08E-04
Hexachlorocyclopentadiene	4.02E-01	1.000	4.02E-01	0.393	1.58E-01	1.000	4.02E-01	4.77E-03	5.68E-03	75.0	168	375	7.58E-05	3.39E-05	1.52E-05
Hexachloroethane	2.26E-01	1.000	2.26E-01	1.439	3.25E-01	1.000	2.26E-01	9.61E-05	4.62E-03	100	224	500	4.62E-05	2.07E-05	9.24E-06
Indeno(1,2,3-cd)pyrene	4.50E-01	0.004	1.97E-03	0.110	4.95E-02	0.008	3.55E-03	1.26E-04	1.11E-03	0.62	1.37	3.07	1.80E-03	8.05E-04	3.60E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.77E-04	5.75E-03	8.42	18.8	42.1	6.83E-04	3.06E-04	1.37E-04
Phenanthrene	2.33E-01	0.606	1.41E-01	Regresson	3.43E-01	0.027	6.18E-03	8.80E-05	3.84E-03	65.6	147	328	5.86E-05	2.62E-05	1.17E-05
Pyrene	6.87E-01	0.713	4.90E-01	0.720	4.95E-01	0.011	7.54E-03	1.73E-04	8.28E-03	0.62	1.37	3.07	1.35E-02	6.03E-03	2.70E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	9.50E-05	0.00E+00	1.15E-07	0.000001	0.000003	0.00001	1.15E-01	3.65E-02	1.15E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.4921 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 5.940 = Body weight (kg)

ATTACHMENT TABLE L-3-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	Measured	1.10E+00	6.88E-03	1.90E-01	5.14	8.12	12.8	3.69E-02	2.34E-02	1.48E-02
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	Measured	2.22E-01	3.24E-04	3.72E-02	1.47	3.29	7.35	2.53E-02	1.13E-02	5.07E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	Measured	9.84E-01	1.20E-03	1.99E-01	2.66	5.95	13.3	7.48E-02	3.35E-02	1.50E-02
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	Measured	7.01E+00	6.03E-03	1.47E+00	4.05	7.00	12.1	3.62E-01	2.10E-01	1.21E-01
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	Measured	9.27E-01	1.30E-03	1.75E-01	3.85	8.61	19.3	4.55E-02	2.03E-02	9.10E-03
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	Measured	6.88E-02	1.00E-04	9.00E-03	0.026	0.045	0.078	3.46E-01	2.00E-01	1.15E-01
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	Measured	6.42E-01	8.95E-04	1.00E-01	6.71	15.0	33.6	1.49E-02	6.66E-03	2.98E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	Measured	1.15E+00	1.30E-03	1.27E-01	1.80	4.02	9.00	7.06E-02	3.16E-02	1.41E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	Measured	5.34E-01	7.00E-05	5.75E-02	4.04	9.03	20.2	1.42E-02	6.36E-03	2.84E-03
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	Measured	1.36E+02	2.00E-02	1.68E+01	66.1	148	331	2.54E-01	1.14E-01	5.08E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	1.21E-02	1.50	3.35	7.50	8.05E-03	3.60E-03	1.61E-03
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	2.40E-02	1.50	3.35	7.50	1.60E-02	7.16E-03	3.20E-03
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	1.64E-02	1.50	3.35	7.50	1.10E-02	4.90E-03	2.19E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	1.30E-02	1.50	3.35	7.50	8.69E-03	3.89E-03	1.74E-03
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	1.21E-02	1.50	3.35	7.50	8.04E-03	3.59E-03	1.61E-03
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	5.23E-01	1.50	3.35	7.50	3.49E-01	1.56E-01	6.98E-02
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	3.85E-01	1.50	3.35	7.50	2.57E-01	1.15E-01	5.13E-02
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	Measured	6.68E+00	3.11E-04	7.87E-01	1.50	3.35	7.50	5.25E-01	2.35E-01	1.05E-01
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	1.56E-02	0.30	0.95	3.00	5.20E-02	1.64E-02	5.20E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	2.17E-02	0.30	0.95	3.00	7.22E-02	2.28E-02	7.22E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	2.94E-02	0.30	0.95	3.00	9.80E-02	3.10E-02	9.80E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	6.04E-04	0.155	0.347	0.775	3.90E-03	1.74E-03	7.79E-04
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	8.96E-04	0.56	1.12	2.25	1.60E-03	7.98E-04	3.98E-04
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	9.09E-04	0.80	1.79	4.00	1.14E-03	5.08E-04	2.27E-04
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	8.96E-04	0.56	1.12	2.25	1.60E-03	7.98E-04	3.98E-04
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	8.96E-04	0.56	1.12	2.25	1.60E-03	7.98E-04	3.98E-04
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	3.04E-02	0.071	0.518	3.780	4.28E-01	5.87E-02	8.04E-03
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	3.13E-03	10.0	22.4	50.0	3.13E-04	1.40E-04	6.27E-05
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	3.41E-02	10.0	22.4	50.0	3.41E-03	1.53E-03	6.82E-04
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	4.49E-02	0.30	0.67	1.50	1.50E-01	6.70E-02	3.00E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	4.70E-04	4.00	8.9	20.0	1.18E-04	5.25E-05	2.35E-05
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	2.13E-02	0.80	1.79	4.00	2.66E-02	1.19E-02	5.32E-03
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	8.59E-04	0.48	1.07	2.40	1.79E-03	8.00E-04	3.58E-04
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	1.98E-02	0.48	1.07	2.40	4.13E-02	1.85E-02	8.26E-03
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	2.71E-02	355	794	1,775	7.63E-05	3.41E-05	1.53E-05
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	3.56E-02	1.00	2.24	5.00	3.56E-02	1.59E-02	7.11E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	7.82E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	7.36E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	5.77E-03	80.4	180	402	7.17E-05	3.21E-05	1.43E-05
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	6.64E-03	80.4	180	402	8.26E-05	3.69E-05	1.65E-05
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	3.11E-03	80.4	180	402	3.87E-05	1.73E-05	7.73E-06
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	2.88E-03	80.4	180	402	3.58E-05	1.60E-05	7.16E-06
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	4.00E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	4.00E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	1.08E-03	7.10	15.9	35.5	1.52E-04	6.81E-05	3.05E-05
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	6.40E-04	7.10	15.9	35.5	9.01E-05	4.03E-05	1.80E-05
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	1.76E-03	7.10	15.9	35.5	2.49E-04	1.11E-04	4.97E-05
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	1.31E-03	7.10	15.9	35.5	1.84E-04	8.23E-05	3.68E-05

ATTACHMENT TABLE L-3-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	6.77E-04	7.10	15.9	35.5	9.53E-05	4.26E-05	1.91E-05
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	5.01E-04	7.10	15.9	35.5	7.05E-05	3.15E-05	1.41E-05
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	2.39E-04	7.10	15.9	35.5	3.36E-05	1.50E-05	6.72E-06
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	1.52E-03	7.10	15.9	35.5	2.14E-04	9.57E-05	4.28E-05
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	2.27E-03	7.10	15.9	35.5	3.20E-04	1.43E-04	6.40E-05
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	2.19E-04	7.10	15.9	35.5	3.09E-05	1.38E-05	6.18E-06
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	2.00E-03	7.10	15.9	35.5	2.82E-04	1.26E-04	5.65E-05
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	2.07E-03	7.10	15.9	35.5	2.92E-04	1.30E-04	5.83E-05
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	5.01E-03	0.113	0.253	0.565	4.44E-02	1.98E-02	8.87E-03
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	6.77E-03	3.39	7.58	17.0	2.00E-03	8.94E-04	4.00E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	4.00E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	1.55E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	2.64E-04	7.10	15.9	35.5	3.72E-05	1.66E-05	7.43E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	1.70E-02	6.73	21.3	67.3	2.52E-03	7.97E-04	2.52E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	2.65E-03	7.10	15.9	35.5	3.73E-04	1.67E-04	7.46E-05
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	7.10E-03	7.10	15.9	35.5	1.00E-03	4.47E-04	2.00E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.12E-04	0.00E+00	2.17E-05	0.000014	0.000044	0.00014	**1.55E+00**	4.89E-01	1.55E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0180 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.160 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.840 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0164 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1480 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	Measured	1.73E+00	6.88E-03	9.75E-02	5.14	8.12	12.8	1.90E-02	1.20E-02	7.59E-03
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	Measured	3.77E-01	3.24E-04	2.12E-02	1.47	3.29	7.35	1.44E-02	6.45E-03	2.88E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	Measured	1.40E+00	1.20E-03	7.89E-02	2.66	5.95	13.3	2.96E-02	1.33E-02	5.93E-03
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	Measured	9.83E+00	6.03E-03	5.53E-01	4.05	7.00	12.1	1.37E-01	7.90E-02	4.57E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	Measured	1.26E+00	1.30E-03	7.09E-02	3.85	8.61	19.3	1.84E-02	8.24E-03	3.68E-03
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	Measured	6.62E-02	1.00E-04	3.73E-03	0.026	0.045	0.078	1.43E-01	8.27E-02	4.78E-02
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	Measured	7.15E-01	8.95E-04	4.03E-02	6.71	15.0	33.6	6.00E-03	2.68E-03	1.20E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	Measured	1.26E+00	1.30E-03	7.08E-02	1.80	4.02	9.00	3.93E-02	1.76E-02	7.86E-03
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	Measured	4.99E-01	7.00E-05	2.81E-02	4.04	9.03	20.2	6.94E-03	3.11E-03	1.39E-03
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	Measured	1.24E+02	2.00E-02	6.99E+00	66.1	148	331	1.06E-01	4.73E-02	2.12E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	6.14E-03	1.50	3.35	7.50	4.09E-03	1.83E-03	8.19E-04
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	1.21E-02	1.50	3.35	7.50	8.10E-03	3.62E-03	1.62E-03
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	8.34E-03	1.50	3.35	7.50	5.56E-03	2.49E-03	1.11E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	6.63E-03	1.50	3.35	7.50	4.42E-03	1.98E-03	8.83E-04
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	6.13E-03	1.50	3.35	7.50	4.09E-03	1.83E-03	8.17E-04
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	2.57E-01	1.50	3.35	7.50	1.71E-01	7.65E-02	3.42E-02
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	1.89E-01	1.50	3.35	7.50	1.26E-01	5.65E-02	2.52E-02
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	Measured	4.84E+00	3.11E-04	2.72E-01	1.50	3.35	7.50	1.82E-01	8.12E-02	3.63E-02
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	7.30E-03	0.30	0.95	3.00	2.43E-02	7.70E-03	2.43E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	1.08E-02	0.30	0.95	3.00	3.59E-02	1.14E-02	3.59E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	1.58E-02	0.30	0.95	3.00	5.28E-02	1.67E-02	5.28E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	3.25E-04	0.155	0.347	0.775	2.10E-03	9.38E-04	4.20E-04
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	4.76E-04	0.56	1.12	2.25	8.50E-04	4.24E-04	2.11E-04
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	4.44E-04	0.80	1.79	4.00	5.55E-04	2.48E-04	1.11E-04
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	4.76E-04	0.56	1.12	2.25	8.50E-04	4.24E-04	2.11E-04
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	4.76E-04	0.56	1.12	2.25	8.50E-04	4.24E-04	2.11E-04
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	1.21E-02	0.071	0.518	3.780	1.70E-01	2.33E-02	3.20E-03
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	1.72E-03	10.0	22.4	50.0	1.72E-04	7.68E-05	3.44E-05
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	1.87E-02	10.0	22.4	50.0	1.87E-03	8.36E-04	3.74E-04
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	2.42E-02	0.30	0.67	1.50	8.05E-02	3.60E-02	1.61E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	2.54E-04	4.00	8.9	20.0	6.35E-05	2.84E-05	1.27E-05
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	1.01E-02	0.80	1.79	4.00	1.26E-02	5.64E-03	2.52E-03
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	4.71E-04	0.48	1.07	2.40	9.81E-04	4.39E-04	1.96E-04
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	1.07E-02	0.48	1.07	2.40	2.24E-02	1.00E-02	4.48E-03
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	1.44E-02	355	794	1,775	4.06E-05	1.82E-05	8.12E-06
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.89E-02	1.00	2.24	5.00	1.89E-02	8.46E-03	3.78E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	3.55E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	2.48E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	2.83E-03	80.4	180	402	3.52E-05	1.57E-05	7.04E-06
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	2.39E-03	80.4	180	402	2.97E-05	1.33E-05	5.94E-06
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	4.45E-04	80.4	180	402	5.53E-06	2.47E-06	1.11E-06
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	3.18E-04	80.4	180	402	3.96E-06	1.77E-06	7.91E-07
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	1.85E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.85E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	5.28E-04	7.10	15.9	35.5	7.44E-05	3.33E-05	1.49E-05
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	1.99E-04	7.10	15.9	35.5	2.80E-05	1.25E-05	5.61E-06
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	1.48E-04	7.10	15.9	35.5	2.09E-05	9.34E-06	4.18E-06
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	1.11E-04	7.10	15.9	35.5	1.56E-05	6.96E-06	3.11E-06

ATTACHMENT TABLE L-3-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	1.10E-04	7.10	15.9	35.5	1.55E-05	6.92E-06	3.09E-06
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	2.42E-04	7.10	15.9	35.5	3.41E-05	1.52E-05	6.81E-06
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	1.22E-04	7.10	15.9	35.5	1.72E-05	7.71E-06	3.45E-06
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	9.14E-05	7.10	15.9	35.5	1.29E-05	5.76E-06	2.58E-06
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	1.85E-04	7.10	15.9	35.5	2.61E-05	1.17E-05	5.22E-06
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	5.42E-05	7.10	15.9	35.5	7.63E-06	3.41E-06	1.53E-06
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	2.05E-04	7.10	15.9	35.5	2.88E-05	1.29E-05	5.76E-06
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	4.02E-04	7.10	15.9	35.5	5.66E-05	2.53E-05	1.13E-05
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	2.06E-03	0.113	0.253	0.565	1.82E-02	8.15E-03	3.64E-03
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	2.31E-03	3.39	7.58	17.0	6.82E-04	3.05E-04	1.36E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	1.85E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	7.14E-03	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	1.30E-04	7.10	15.9	35.5	1.83E-05	8.20E-06	3.67E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	8.14E-03	6.73	21.3	67.3	1.21E-03	3.82E-04	1.21E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	2.75E-04	7.10	15.9	35.5	3.88E-05	1.73E-05	7.75E-06
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	2.97E-04	7.10	15.9	35.5	4.19E-05	1.87E-05	8.38E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	1.65E-04	0.00E+00	9.30E-06	0.000014	0.000044	0.00014	6.65E-01	2.10E-01	6.65E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1254 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1010 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.230 = Body weight (kg)

ATTACHMENT TABLE L-3-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	0.126	1.87E+00	6.88E-03	6.86E-02	5.14	8.12	12.8	1.34E-02	8.45E-03	5.35E-03
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	0.164	3.78E-01	3.24E-04	4.80E-02	1.47	3.29	7.35	3.27E-02	1.46E-02	6.53E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	0.038	8.54E-01	1.20E-03	9.81E-02	2.66	5.95	13.3	3.69E-02	1.65E-02	7.37E-03
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	0.100	4.66E+00	6.03E-03	6.27E-01	4.05	7.00	12.1	1.55E-01	8.96E-02	5.18E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	0.070	3.75E+00	1.30E-03	2.07E-01	1.63	2.31	3.26	1.27E-01	8.99E-02	6.36E-02
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	3.250	2.74E-01	1.00E-04	4.61E-03	0.026	0.045	0.078	1.77E-01	1.02E-01	5.91E-02
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	1.000	9.65E+00	8.95E-04	4.82E-02	6.71	15.0	33.6	7.19E-03	3.22E-03	1.44E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	1.000	4.60E-01	1.30E-03	1.20E-02	0.40	0.57	0.80	2.99E-02	2.11E-02	1.49E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	1.000	8.11E-01	7.00E-05	2.46E-03	4.04	9.03	20.2	6.08E-04	2.72E-04	1.22E-04
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	0.147	2.56E+01	2.00E-02	4.51E+00	66.1	148	331	6.82E-02	3.05E-02	1.36E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	5.12E-04	1.50	3.35	7.50	3.41E-04	1.53E-04	6.83E-05
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	1.68E-03	1.50	3.35	7.50	1.12E-03	5.02E-04	2.24E-04
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	9.01E-04	1.50	3.35	7.50	6.01E-04	2.69E-04	1.20E-04
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	5.56E-04	1.50	3.35	7.50	3.71E-04	1.66E-04	7.42E-05
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	4.11E-04	1.50	3.35	7.50	2.74E-04	1.23E-04	5.48E-05
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	1.97E-02	1.50	3.35	7.50	1.31E-02	5.86E-03	2.62E-03
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	1.34E-02	1.50	3.35	7.50	8.91E-03	3.99E-03	1.78E-03
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	5.92	7.85E+00	3.11E-04	3.53E-02	1.50	3.35	7.50	2.35E-02	1.05E-02	4.71E-03
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	1.04E-03	0.12	0.27	0.60	8.63E-03	3.86E-03	1.73E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	9.38E-04	0.12	0.27	0.60	7.82E-03	3.50E-03	1.56E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	9.70E-04	0.60	0.95	1.50	1.62E-03	1.02E-03	6.47E-04
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	1.17E-05	0.155	0.347	0.775	7.52E-05	3.37E-05	1.50E-05
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	1.17E-04	0.56	1.12	2.25	2.08E-04	1.04E-04	5.19E-05
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	4.68E-05	0.80	1.79	4.00	5.85E-05	2.61E-05	1.17E-05
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	1.16E-04	0.56	1.12	2.25	2.07E-04	1.03E-04	5.14E-05
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	9.09E-05	0.56	1.12	2.25	1.62E-04	8.10E-05	4.04E-05
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	3.70E-03	0.071	0.518	3.780	5.21E-02	7.14E-03	9.78E-04
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	3.84E-04	10.0	22.4	50.0	3.84E-05	1.72E-05	7.67E-06
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	2.24E-03	10.0	22.4	50.0	2.24E-04	1.00E-04	4.48E-05
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	2.02E-03	0.30	0.67	1.50	6.74E-03	3.02E-03	1.35E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	6.46E-05	4.00	8.9	20.0	1.61E-05	7.22E-06	3.23E-06
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	1.13E-03	0.80	1.79	4.00	1.42E-03	6.33E-04	2.83E-04
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	1.47E-05	0.48	1.07	2.40	3.06E-05	1.37E-05	6.12E-06
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	9.01E-04	0.48	1.07	2.40	1.88E-03	8.39E-04	3.75E-04
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	1.27E-03	355	794	1,775	3.57E-06	1.60E-06	7.14E-07
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.26E-03	1.00	2.24	5.00	1.26E-03	5.64E-04	2.52E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	3.20E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	1.30E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	7.34E-03	80.4	180	402	9.12E-05	4.08E-05	1.82E-05
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	1.27E-02	80.4	180	402	1.58E-04	7.08E-05	3.17E-05
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	1.20E-02	80.4	180	402	1.49E-04	6.66E-05	2.98E-05
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	1.28E-02	80.4	180	402	1.60E-04	7.14E-05	3.19E-05
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	9.95E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.03E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	1.51E-03	7.10	15.9	35.5	2.12E-04	9.49E-05	4.24E-05
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	1.97E-03	7.10	15.9	35.5	2.77E-04	1.24E-04	5.54E-05
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	3.01E-03	7.10	15.9	35.5	4.24E-04	1.90E-04	8.49E-05
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	1.88E-03	7.10	15.9	35.5	2.65E-04	1.19E-04	5.31E-05

ATTACHMENT TABLE L-3-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	2.11E-03	7.10	15.9	35.5	2.98E-04	1.33E-04	5.95E-05
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	7.59E-03	7.10	15.9	35.5	1.07E-03	4.78E-04	2.14E-04
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	2.17E-03	7.10	15.9	35.5	3.05E-04	1.36E-04	6.10E-05
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	1.86E-03	7.10	15.9	35.5	2.62E-04	1.17E-04	5.23E-05
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	2.64E-03	7.10	15.9	35.5	3.72E-04	1.66E-04	7.44E-05
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	9.30E-04	7.10	15.9	35.5	1.31E-04	5.86E-05	2.62E-05
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	8.95E-03	7.10	15.9	35.5	1.26E-03	5.64E-04	2.52E-04
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	1.70E-03	7.10	15.9	35.5	2.39E-04	1.07E-04	4.78E-05
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	1.82E-03	0.113	0.253	0.565	1.61E-02	7.19E-03	3.21E-03
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	1.05E-02	3.39	7.58	17.0	3.09E-03	1.38E-03	6.18E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	7.63E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	8.40E-03	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	1.75E-03	7.10	15.9	35.5	2.46E-04	1.10E-04	4.92E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	2.78E-02	6.73	21.3	67.3	4.14E-03	1.31E-03	4.14E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	1.30E-02	7.10	15.9	35.5	1.84E-03	8.21E-04	3.67E-04
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	1.65E-02	7.10	15.9	35.5	2.32E-03	1.04E-03	4.64E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0564 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.100 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.867 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.033 = Proportion of diet composed of sediment
WIR = 0.0658 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.177 = Body weight (kg)

ATTACHMENT TABLE L-3-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	Measured	1.14E+00	6.88E-03	6.02E-02	5.14	8.12	12.8	1.17E-02	7.41E-03	4.69E-03
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	Measured	6.65E-01	3.24E-04	3.49E-02	1.47	3.29	7.35	2.38E-02	1.06E-02	4.75E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	Measured	1.03E+00	1.20E-03	5.42E-02	2.66	5.95	13.3	2.04E-02	9.11E-03	4.07E-03
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	Measured	2.89E+00	6.03E-03	1.52E-01	4.05	7.00	12.1	3.76E-02	2.17E-02	1.26E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	Measured	9.09E-01	1.30E-03	4.78E-02	3.85	8.61	19.3	1.24E-02	5.55E-03	2.48E-03
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	Measured	1.22E-01	1.00E-04	6.40E-03	0.49	0.77	1.20	1.31E-02	8.35E-03	5.33E-03
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	Measured	9.09E-01	8.95E-04	4.77E-02	6.71	15.0	33.6	7.12E-03	3.18E-03	1.42E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	Measured	1.85E+00	1.30E-03	9.69E-02	1.80	4.02	9.00	5.39E-02	2.41E-02	1.08E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	Measured	9.09E-01	7.00E-05	4.77E-02	4.04	9.03	20.2	1.18E-02	5.28E-03	2.36E-03
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	Measured	5.39E+01	2.00E-02	2.83E+00	66.1	148	331	4.28E-02	1.91E-02	8.56E-03
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	Measured	1.04E-01	2.65E-04	5.48E-03	0.41	0.92	2.05	1.34E-02	5.98E-03	2.67E-03
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	Measured	1.04E-01	3.71E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.99E-03	2.68E-03
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	Measured	1.20E-01	2.65E-04	6.34E-03	0.41	0.92	2.05	1.55E-02	6.91E-03	3.09E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	Measured	1.04E-01	3.20E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.98E-03	2.68E-03
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	Measured	1.04E-01	3.71E-04	5.49E-03	0.41	0.92	2.05	1.34E-02	5.99E-03	2.68E-03
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	Measured	5.94E-01	2.65E-04	3.12E-02	0.41	0.92	2.05	7.61E-02	3.40E-02	1.52E-02
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	Measured	3.20E+00	3.20E-04	1.68E-01	0.41	0.92	2.05	4.10E-01	1.83E-01	8.19E-02
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	Measured	1.07E+01	3.11E-04	5.59E-01	0.41	0.92	2.05	**1.36E+00**	6.10E-01	2.73E-01
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	6.82E-03	0.30	0.95	3.00	2.27E-02	7.19E-03	2.27E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	1.01E-02	0.30	0.95	3.00	3.35E-02	1.06E-02	3.35E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	1.48E-02	0.30	0.95	3.00	4.93E-02	1.56E-02	4.93E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	3.04E-04	0.155	0.347	0.775	1.96E-03	8.76E-04	3.92E-04
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	4.44E-04	0.56	1.12	2.25	7.93E-04	3.96E-04	1.97E-04
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	4.14E-04	0.80	1.79	4.00	5.18E-04	2.32E-04	1.04E-04
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	4.44E-04	0.56	1.12	2.25	7.93E-04	3.96E-04	1.97E-04
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	4.44E-04	0.56	1.12	2.25	7.93E-04	3.96E-04	1.97E-04
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	1.13E-02	0.071	0.518	3.780	1.59E-01	2.18E-02	2.98E-03
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	1.60E-03	10.0	22.4	50.0	1.60E-04	7.17E-05	3.21E-05
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	1.75E-02	10.0	22.4	50.0	1.75E-03	7.81E-04	3.49E-04
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	2.25E-02	0.021	0.047	0.104	**1.08E+00**	4.85E-01	2.17E-01
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	2.37E-04	4.00	8.9	20.0	5.93E-05	2.65E-05	1.19E-05
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	9.42E-03	0.80	1.79	4.00	1.18E-02	5.27E-03	2.36E-03
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	4.40E-04	0.48	1.07	2.40	9.16E-04	4.10E-04	1.83E-04
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	1.00E-02	0.48	1.07	2.40	2.09E-02	9.34E-03	4.18E-03
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	1.35E-02	355	794	1,775	3.79E-05	1.69E-05	7.58E-06
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.77E-02	1.00	2.24	5.00	1.77E-02	7.90E-03	3.53E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	3.41E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	2.36E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	2.65E-03	80.4	180	402	3.30E-05	1.48E-05	6.60E-06
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	2.23E-03	80.4	180	402	2.78E-05	1.24E-05	5.55E-06
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	4.20E-04	80.4	180	402	5.22E-06	2.34E-06	1.04E-06
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	3.02E-04	80.4	180	402	3.75E-06	1.68E-06	7.50E-07
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	1.73E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.73E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	4.93E-04	7.10	15.9	35.5	6.95E-05	3.11E-05	1.39E-05
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	1.87E-04	7.10	15.9	35.5	2.63E-05	1.18E-05	5.26E-06
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	1.39E-04	7.10	15.9	35.5	1.96E-05	8.77E-06	3.92E-06
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	1.04E-04	7.10	15.9	35.5	1.47E-05	6.56E-06	2.93E-06

ATTACHMENT TABLE L-3-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	1.04E-04	7.10	15.9	35.5	1.46E-05	6.52E-06	2.92E-06
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	2.27E-04	7.10	15.9	35.5	3.19E-05	1.43E-05	6.39E-06
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	1.15E-04	7.10	15.9	35.5	1.62E-05	7.26E-06	3.25E-06
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	8.63E-05	7.10	15.9	35.5	1.22E-05	5.43E-06	2.43E-06
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	1.74E-04	7.10	15.9	35.5	2.45E-05	1.09E-05	4.89E-06
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	5.15E-05	7.10	15.9	35.5	7.25E-06	3.24E-06	1.45E-06
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	1.92E-04	7.10	15.9	35.5	2.71E-05	1.21E-05	5.41E-06
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	3.76E-04	7.10	15.9	35.5	5.30E-05	2.37E-05	1.06E-05
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	1.92E-03	0.113	0.253	0.565	1.70E-02	7.61E-03	3.40E-03
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	2.20E-03	3.39	7.58	17.0	6.50E-04	2.91E-04	1.30E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	1.73E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	6.66E-03	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	1.22E-04	7.10	15.9	35.5	1.72E-05	7.71E-06	3.45E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	7.60E-03	6.73	21.3	67.3	1.13E-03	3.57E-04	1.13E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	2.58E-04	7.10	15.9	35.5	3.63E-05	1.62E-05	7.26E-06
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	2.79E-04	7.10	15.9	35.5	3.93E-05	1.76E-05	7.85E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.42E-04	0.00E+00	2.32E-05	0.000014	0.000044	0.00014	**1.66E+00**	5.24E-01	1.66E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0780	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	1.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0769	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.486	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	0.126	1.87E+00	6.88E-03	1.85E-01	2.46	4.26	7.38	7.51E-02	4.34E-02	2.50E-02
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	0.164	3.78E-01	3.24E-04	3.50E-02	1.47	3.29	7.35	2.38E-02	1.07E-02	4.76E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	0.038	8.54E-01	1.20E-03	2.37E-01	2.66	5.95	13.3	8.90E-02	3.98E-02	1.78E-02
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	0.100	4.66E+00	6.03E-03	1.80E+00	4.05	7.00	12.1	4.45E-01	2.58E-01	1.49E-01
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	0.070	3.75E+00	1.30E-03	1.93E-01	3.85	8.61	19.3	5.01E-02	2.24E-02	1.00E-02
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	3.250	2.74E-01	1.00E-04	4.70E-03	0.026	0.045	0.078	1.81E-01	1.04E-01	6.03E-02
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	1.000	9.65E+00	8.95E-04	8.25E-02	6.71	15.0	33.6	1.23E-02	5.50E-03	2.46E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	1.000	4.60E-01	1.30E-03	2.19E-02	0.40	0.57	0.80	5.46E-02	3.86E-02	2.73E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	1.000	8.11E-01	7.00E-05	6.86E-03	4.04	9.03	20.2	1.70E-03	7.59E-04	3.40E-04
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	0.147	2.56E+01	2.00E-02	6.98E+00	66.1	148	331	1.06E-01	4.72E-02	2.11E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	9.35E-01	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	4.39E-02	1.50	3.35	7.50	2.93E-02	1.31E-02	5.85E-03
Aroclor-1221	3.64E-02	Regression	1.77E+00	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	8.33E-02	1.50	3.35	7.50	5.55E-02	2.48E-02	1.11E-02
Aroclor-1232	2.50E-02	Regression	1.25E+00	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	5.85E-02	1.50	3.35	7.50	3.90E-02	1.75E-02	7.81E-03
Aroclor-1242	1.99E-02	Regression	1.00E+00	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	4.72E-02	1.50	3.35	7.50	3.14E-02	1.41E-02	6.29E-03
Aroclor-1248	1.84E-02	Regression	9.33E-01	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	4.38E-02	1.50	3.35	7.50	2.92E-02	1.31E-02	5.84E-03
Aroclor-1254	7.70E-01	Regression	3.12E+01	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	1.46E+00	1.50	3.35	7.50	9.74E-01	4.36E-01	1.95E-01
Aroclor-1260	5.69E-01	Regression	2.34E+01	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	1.10E+00	1.50	3.35	7.50	7.33E-01	3.28E-01	1.47E-01
PCB (total)	1.33E+00	Regression	5.19E+01	0.139	1.85E-01	5.92	7.85E+00	3.11E-04	2.43E+00	1.50	3.35	7.50	**1.62E+00**	7.25E-01	3.24E-01
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	5.55E-03	0.12	0.27	0.60	4.63E-02	2.07E-02	9.26E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	4.98E-03	0.12	0.27	0.60	4.15E-02	1.86E-02	8.30E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	1.48E-03	0.60	0.95	1.50	2.47E-03	1.56E-03	9.87E-04
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	3.33E-05	0.155	0.347	0.775	2.15E-04	9.62E-05	4.30E-05
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	7.72E-05	0.56	1.12	2.25	1.38E-04	6.88E-05	3.43E-05
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	2.50E-04	2.14	4.79	10.7	1.17E-04	5.21E-05	2.33E-05
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	7.72E-05	0.56	1.12	2.25	1.38E-04	6.88E-05	3.43E-05
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	7.72E-05	0.56	1.12	2.25	1.38E-04	6.88E-05	3.43E-05
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	2.02E-02	0.071	0.518	3.780	2.85E-01	3.90E-02	5.35E-03
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	2.62E-05	10.0	22.4	50.0	2.62E-06	1.17E-06	5.25E-07
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	2.36E-04	10.0	22.4	50.0	2.36E-05	1.06E-05	4.72E-06
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	2.41E-03	0.30	0.67	1.50	8.04E-03	3.59E-03	1.61E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	2.35E-05	4.00	8.9	20.0	5.89E-06	2.63E-06	1.18E-06
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	7.01E-03	2.14	4.79	10.7	3.28E-03	1.47E-03	6.55E-04
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	1.00E-05	0.48	1.07	2.40	2.08E-05	9.31E-06	4.16E-06
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	6.67E-04	0.48	1.07	2.40	1.39E-03	6.22E-04	2.78E-04
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	2.14E-03	355	794	1,775	6.03E-06	2.70E-06	1.21E-06
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	2.85E-03	1.00	2.24	5.00	2.85E-03	1.27E-03	5.69E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	4.72E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	7.52E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	1.63E-03	80.4	180	402	2.02E-05	9.05E-06	4.05E-06
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	5.61E-03	80.4	180	402	6.97E-05	3.12E-05	1.39E-05
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	5.61E-03	80.4	180	402	6.97E-05	3.12E-05	1.39E-05
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	5.61E-03	80.4	180	402	6.97E-05	3.12E-05	1.39E-05
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	1.62E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.62E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	3.02E-04	7.10	15.9	35.5	4.26E-05	1.90E-05	8.52E-06
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	6.82E-04	7.10	15.9	35.5	9.61E-05	4.30E-05	1.92E-05
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	3.61E-03	7.10	15.9	35.5	5.09E-04	2.27E-04	1.02E-04
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	2.67E-03	7.10	15.9	35.5	3.77E-04	1.68E-04	7.53E-05

ATTACHMENT TABLE L-3-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	1.16E-03	7.10	15.9	35.5	1.64E-04	7.33E-05	3.28E-05
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	1.63E-04	7.10	15.9	35.5	2.30E-05	1.03E-05	4.59E-06
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	5.29E-05	7.10	15.9	35.5	7.45E-06	3.33E-06	1.49E-06
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	3.27E-03	7.10	15.9	35.5	4.61E-04	2.06E-04	9.22E-05
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	4.67E-03	7.10	15.9	35.5	6.58E-04	2.94E-04	1.32E-04
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	3.04E-04	7.10	15.9	35.5	4.29E-05	1.92E-05	8.57E-06
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	3.95E-03	7.10	15.9	35.5	5.56E-04	2.49E-04	1.11E-04
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	3.24E-03	7.10	15.9	35.5	4.56E-04	2.04E-04	9.12E-05
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	3.07E-03	0.113	0.253	0.565	2.71E-02	1.21E-02	5.43E-03
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	6.85E-03	3.39	7.58	17.0	2.02E-03	9.04E-04	4.04E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	1.62E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	5.97E-03	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	8.09E-05	7.10	15.9	35.5	1.14E-05	5.09E-06	2.28E-06
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	5.26E-03	6.73	21.3	67.3	7.82E-04	2.47E-04	7.82E-05
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	5.18E-03	7.10	15.9	35.5	7.30E-04	3.26E-04	1.46E-04
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	1.58E-02	7.10	15.9	35.5	2.23E-03	9.95E-04	4.45E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

ATTACHMENT TABLE L-3-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	Measured	1.10E+00	6.88E-03	3.80E-02	1.04	1.31	1.66	3.65E-02	2.89E-02	2.29E-02
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	Measured	2.22E-01	3.24E-04	7.60E-03	0.77	2.43	7.70	9.87E-03	3.12E-03	9.87E-04
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	Measured	9.84E-01	1.20E-03	3.37E-02	2.40	5.37	12.0	1.41E-02	6.28E-03	2.81E-03
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	Measured	7.01E+00	6.03E-03	2.40E-01	11.7	13.3	15.1	2.05E-02	1.81E-02	1.59E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	Measured	9.27E-01	1.30E-03	3.18E-02	4.70	6.47	8.90	6.77E-03	4.92E-03	3.57E-03
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	Measured	6.88E-02	1.00E-04	2.36E-03	0.150	0.192	0.247	1.57E-02	1.23E-02	9.55E-03
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	Measured	6.42E-01	8.95E-04	2.20E-02	1.70	2.40	3.40	1.29E-02	9.16E-03	6.47E-03
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	Measured	1.15E+00	1.30E-03	3.95E-02	0.20	0.26	0.33	1.98E-01	1.54E-01	1.20E-01
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	Measured	5.34E-01	7.00E-05	1.83E-02	12.0	26.9	60.2	1.52E-03	6.79E-04	3.04E-04
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	Measured	1.36E+02	2.00E-02	4.65E+00	75.4	169	377	6.17E-02	2.76E-02	1.23E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	3.74E-03	1.37	2.17	3.43	2.73E-03	1.72E-03	1.09E-03
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	7.39E-03	0.137	0.306	0.685	5.40E-02	2.41E-02	1.08E-02
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	5.08E-03	0.137	0.306	0.685	3.71E-02	1.66E-02	7.42E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	4.03E-03	0.137	0.306	0.685	2.95E-02	1.32E-02	5.89E-03
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	3.73E-03	0.137	0.306	0.685	2.72E-02	1.22E-02	5.45E-03
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	1.56E-01	0.137	0.306	0.685	**1.14E+00**	5.10E-01	2.28E-01
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	1.15E-01	0.137	0.306	0.685	8.42E-01	3.76E-01	1.68E-01
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	Measured	6.68E+00	3.11E-04	2.29E-01	0.137	0.306	0.685	**1.67E+00**	7.47E-01	3.34E-01
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	4.45E-03	0.147	0.329	0.735	3.03E-02	1.35E-02	6.05E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	6.56E-03	0.147	0.329	0.735	4.46E-02	2.00E-02	8.93E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	9.64E-03	0.147	0.329	0.735	6.56E-02	2.93E-02	1.31E-02
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	1.98E-04	0.20	0.45	1.00	9.90E-04	4.43E-04	1.98E-04
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	2.90E-04	1.60	2.26	3.20	1.81E-04	1.28E-04	9.05E-05
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	2.70E-04	4.58	6.48	9.16	5.90E-05	4.17E-05	2.95E-05
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	2.90E-04	1.60	2.26	3.20	1.81E-04	1.28E-04	9.05E-05
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	2.90E-04	1.60	2.26	3.20	1.81E-04	1.28E-04	9.05E-05
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	7.36E-03	0.015	0.021	0.030	4.91E-01	3.47E-01	2.45E-01
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	1.05E-03	0.15	0.34	0.75	6.98E-03	3.12E-03	1.40E-03
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	1.14E-02	0.15	0.34	0.75	7.59E-02	3.39E-02	1.52E-02
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	1.47E-02	0.184	0.411	0.920	7.99E-02	3.57E-02	1.60E-02
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	1.55E-04	8.00	17.9	40.0	1.93E-05	8.64E-06	3.87E-06
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	6.15E-03	4.58	6.48	9.16	1.34E-03	9.49E-04	6.71E-04
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	2.87E-04	0.20	0.45	1.00	1.43E-03	6.41E-04	2.87E-04
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	6.54E-03	0.20	0.45	1.00	3.27E-02	1.46E-02	6.54E-03
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	8.77E-03	4.00	5.66	8.00	2.19E-03	1.55E-03	1.10E-03
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.15E-02	8.00	17.9	40.0	1.44E-03	6.44E-04	2.88E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	2.17E-04	76.0	170	380	2.85E-06	1.27E-06	5.70E-07
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	1.51E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	1.72E-03	53.0	75.0	106	3.25E-05	2.30E-05	1.63E-05
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	1.45E-03	85.7	192	429	1.70E-05	7.58E-06	3.39E-06
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	2.71E-04	85.7	192	429	3.16E-06	1.41E-06	6.33E-07
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	1.94E-04	30.0	52.0	90.0	6.46E-06	3.73E-06	2.15E-06
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	1.12E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.12E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	3.22E-04	65.6	147	328	4.90E-06	2.19E-06	9.80E-07
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	1.21E-04	65.6	147	328	1.85E-06	8.26E-07	3.70E-07
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	9.03E-05	65.6	147	328	1.38E-06	6.16E-07	2.75E-07
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	6.74E-05	0.62	1.37	3.07	1.10E-04	4.90E-05	2.19E-05

ATTACHMENT TABLE L-3-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	6.69E-05	0.62	1.37	3.07	1.09E-04	4.87E-05	2.18E-05
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	1.47E-04	0.62	1.37	3.07	2.39E-04	1.07E-04	4.80E-05
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	7.46E-05	0.62	1.37	3.07	1.21E-04	5.43E-05	2.43E-05
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	5.57E-05	0.62	1.37	3.07	9.06E-05	4.05E-05	1.81E-05
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	1.13E-04	0.62	1.37	3.07	1.84E-04	8.21E-05	3.68E-05
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	3.30E-05	0.62	1.37	3.07	5.37E-05	2.40E-05	1.08E-05
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	1.25E-04	65.6	147	328	1.90E-06	8.49E-07	3.80E-07
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	2.45E-04	65.6	147	328	3.73E-06	1.67E-06	7.47E-07
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	1.25E-03	2.00	2.83	4.00	6.27E-04	4.43E-04	3.13E-04
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	1.41E-03	2.00	6.32	20.0	7.05E-04	2.23E-04	7.05E-05
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	1.12E-02	75.0	168	375	1.50E-04	6.70E-05	3.00E-05
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	4.35E-03	100	224	500	4.35E-05	1.94E-05	8.69E-06
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	7.93E-05	0.62	1.37	3.07	1.29E-04	5.77E-05	2.58E-05
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	4.96E-03	8.42	18.8	42.1	5.89E-04	2.63E-04	1.18E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	1.68E-04	65.6	147	328	2.55E-06	1.14E-06	5.11E-07
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	1.81E-04	0.62	1.37	3.07	2.95E-04	1.32E-04	5.90E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	8.88E-05	0.00E+00	3.04E-06	0.000001	0.000003	0.00001	**3.04E+00**	9.62E-01	3.04E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	0.126	1.87E+00	6.88E-03	1.01E-01	0.25	0.56	1.26	4.00E-01	1.79E-01	8.00E-02
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	0.164	3.78E-01	3.24E-04	5.64E-02	0.77	2.43	7.70	7.33E-02	2.32E-02	7.33E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	0.038	8.54E-01	1.20E-03	1.50E-01	2.40	5.37	12.0	6.27E-02	2.80E-02	1.25E-02
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	0.100	4.66E+00	6.03E-03	6.34E-01	5.60	7.23	9.34	1.13E-01	8.77E-02	6.79E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	0.070	3.75E+00	1.30E-03	3.71E-01	4.70	6.47	8.90	7.89E-02	5.74E-02	4.17E-02
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	3.250	2.74E-01	1.00E-04	4.85E-03	0.032	0.072	0.160	1.52E-01	6.78E-02	3.03E-02
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	1.000	9.65E+00	8.95E-04	7.36E-02	1.70	2.40	3.40	4.33E-02	3.06E-02	2.16E-02
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	1.000	4.60E-01	1.30E-03	1.23E-02	0.20	0.26	0.33	6.14E-02	4.78E-02	3.72E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	1.000	8.11E-01	7.00E-05	4.42E-03	12.0	26.9	60.2	3.67E-04	1.64E-04	7.34E-05
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	0.147	2.56E+01	2.00E-02	4.75E+00	75.4	169	377	6.30E-02	2.82E-02	1.26E-02
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	3.89E-04	0.136	0.304	0.680	2.86E-03	1.28E-03	5.72E-04
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	1.47E-03	0.136	0.304	0.680	1.08E-02	4.84E-03	2.16E-03
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	7.41E-04	0.136	0.304	0.680	5.45E-03	2.44E-03	1.09E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	4.23E-04	0.136	0.304	0.680	3.11E-03	1.39E-03	6.21E-04
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	2.81E-04	0.136	0.304	0.680	2.06E-03	9.22E-04	4.13E-04
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	8.68E-03	0.136	0.304	0.680	6.38E-02	2.85E-02	1.28E-02
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	5.52E-03	0.136	0.304	0.680	4.06E-02	1.82E-02	8.12E-03
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	5.92	7.85E+00	3.11E-04	1.49E-02	0.136	0.304	0.680	1.10E-01	4.91E-02	2.19E-02
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	6.91E-04	0.147	0.329	0.735	4.70E-03	2.10E-03	9.40E-04
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	6.30E-04	0.147	0.329	0.735	4.29E-03	1.92E-03	8.57E-04
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	1.25E-03	0.147	0.329	0.735	8.49E-03	3.80E-03	1.70E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	1.38E-05	0.20	0.45	1.00	6.88E-05	3.08E-05	1.38E-05
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	1.27E-04	1.60	2.26	3.20	7.94E-05	5.61E-05	3.97E-05
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	3.25E-05	4.58	6.48	9.16	7.10E-06	5.02E-06	3.55E-06
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	1.26E-04	1.60	2.26	3.20	7.87E-05	5.56E-05	3.93E-05
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	9.83E-05	1.60	2.26	3.20	6.14E-05	4.34E-05	3.07E-05
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	2.08E-03	0.015	0.021	0.030	1.39E-01	9.82E-02	6.94E-02
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	4.41E-04	0.15	0.34	0.75	2.94E-03	1.32E-03	5.88E-04
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	2.64E-03	0.15	0.34	0.75	1.76E-02	7.88E-03	3.52E-03
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	2.20E-03	0.184	0.411	0.920	1.20E-02	5.36E-03	2.40E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	7.30E-05	8.00	17.9	40.0	9.13E-06	4.08E-06	1.83E-06
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	6.14E-04	4.58	6.48	9.16	1.34E-04	9.47E-05	6.70E-05
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	2.12E-05	0.20	0.45	1.00	1.06E-04	4.73E-05	2.12E-05
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	1.03E-03	0.20	0.45	1.00	5.14E-03	2.30E-03	1.03E-03
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	1.32E-03	4.00	5.66	8.00	3.29E-04	2.33E-04	1.65E-04
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.29E-03	8.00	17.9	40.0	1.61E-04	7.19E-05	3.21E-05
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	3.78E-04	76.0	170	380	4.98E-06	2.23E-06	9.96E-07
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	1.50E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	8.39E-03	53.0	75.0	106	1.58E-04	1.12E-04	7.91E-05
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	1.39E-02	85.7	192	429	1.62E-04	7.25E-05	3.24E-05
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	1.31E-02	85.7	192	429	1.52E-04	6.81E-05	3.05E-05
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	1.40E-02	30.0	52.0	90.0	4.67E-04	2.70E-04	1.56E-04
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	1.05E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	1.09E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	1.90E-03	65.6	147	328	2.89E-05	1.29E-05	5.78E-06
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	2.35E-03	65.6	147	328	3.59E-05	1.60E-05	7.17E-06
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	3.24E-03	65.6	147	328	4.93E-05	2.21E-05	9.87E-06
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	2.55E-03	0.62	1.37	3.07	4.15E-03	1.86E-03	8.31E-04

ATTACHMENT TABLE L-3-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	3.08E-03	0.62	1.37	3.07	5.01E-03	2.24E-03	1.00E-03
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	1.00E-02	0.62	1.37	3.07	1.63E-02	7.29E-03	3.26E-03
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	2.90E-03	0.62	1.37	3.07	4.72E-03	2.11E-03	9.45E-04
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	2.31E-03	0.62	1.37	3.07	3.75E-03	1.68E-03	7.51E-04
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	3.56E-03	0.62	1.37	3.07	5.79E-03	2.59E-03	1.16E-03
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	1.39E-03	0.62	1.37	3.07	2.27E-03	1.02E-03	4.54E-04
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	1.07E-02	65.6	147	328	1.63E-04	7.27E-05	3.25E-05
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	1.81E-03	65.6	147	328	2.75E-05	1.23E-05	5.51E-06
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	2.06E-03	2.00	2.83	4.00	1.03E-03	7.29E-04	5.15E-04
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	1.21E-02	2.00	6.32	20.0	6.07E-03	1.92E-03	6.07E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	7.90E-03	75.0	168	375	1.05E-04	4.71E-05	2.11E-05
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	9.05E-03	100	224	500	9.05E-05	4.05E-05	1.81E-05
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	2.80E-03	0.62	1.37	3.07	4.55E-03	2.04E-03	9.11E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	3.07E-02	8.42	18.8	42.1	3.65E-03	1.63E-03	7.30E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	1.45E-02	65.6	147	328	2.20E-04	9.86E-05	4.41E-05
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	1.80E-02	0.62	1.37	3.07	2.92E-02	1.31E-02	5.86E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.189	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0596	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.906	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.094	= Proportion of diet composed of sediment
WIR =	0.1139	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	1.169	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-3-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	1.49E+01	Regression	3.91E+00	Regresson	6.25E-01	Measured	1.73E+00	6.88E-03	6.08E-02	1.04	1.31	1.66	5.85E-02	4.63E-02	3.66E-02
Cadmium	2.31E+00	Regression	7.45E-01	Regresson	9.81E-01	Measured	3.77E-01	3.24E-04	1.67E-02	0.77	2.43	7.70	2.17E-02	6.86E-03	2.17E-03
Chromium	2.25E+01	Regression	5.04E+00	0.041	9.21E-01	Measured	1.40E+00	1.20E-03	8.30E-02	2.40	5.37	12.0	3.46E-02	1.55E-02	6.92E-03
Copper	4.66E+01	0.824	3.84E+01	Regresson	8.87E+00	Measured	9.83E+00	6.03E-03	4.41E-01	11.7	13.3	15.1	3.76E-02	3.31E-02	2.91E-02
Lead	5.35E+01	Regression	4.11E+00	Regresson	2.47E+00	Measured	1.26E+00	1.30E-03	1.37E-01	4.70	6.47	8.90	2.92E-02	2.12E-02	1.54E-02
Mercury	8.42E-02	1.186	9.98E-02	Regresson	9.61E-02	Measured	6.62E-02	1.00E-04	1.65E-03	0.150	0.192	0.247	1.10E-02	8.56E-03	6.67E-03
Nickel	9.65E+00	Regression	1.76E+00	Regresson	5.90E-01	Measured	7.15E-01	8.95E-04	3.41E-02	1.70	2.40	3.40	2.00E-02	1.42E-02	1.00E-02
Selenium	4.60E-01	1.000	4.60E-01	Regresson	2.15E-01	Measured	1.26E+00	1.30E-03	7.36E-03	0.20	0.26	0.33	3.68E-02	2.87E-02	2.23E-02
Silver	8.11E-01	0.180	1.46E-01	0.014	1.14E-02	Measured	4.99E-01	7.00E-05	3.12E-03	12.0	26.9	60.2	2.59E-04	1.16E-04	5.18E-05
Zinc	1.74E+02	Regression	1.49E+02	Regresson	8.46E+01	Measured	1.24E+02	2.00E-02	2.15E+00	75.4	169	377	2.85E-02	1.27E-02	5.70E-03
Polychlorinated Biphenyls															
Aroclor-1016	1.84E-02	Regression	4.61E-02	0.323	5.94E-03	5.92	1.09E-01	2.65E-04	5.75E-04	1.37	2.17	3.43	4.19E-04	2.65E-04	1.68E-04
Aroclor-1221	3.64E-02	Regression	9.84E-02	0.749	2.73E-02	5.92	2.16E-01	3.71E-04	1.29E-03	0.137	0.306	0.685	9.39E-03	4.20E-03	1.88E-03
Aroclor-1232	2.50E-02	Regression	6.49E-02	0.515	1.29E-02	5.92	1.48E-01	2.65E-04	8.23E-04	0.137	0.306	0.685	6.01E-03	2.69E-03	1.20E-03
Aroclor-1242	1.99E-02	Regression	5.02E-02	0.323	6.41E-03	5.92	1.18E-01	3.20E-04	6.26E-04	0.137	0.306	0.685	4.57E-03	2.04E-03	9.14E-04
Aroclor-1248	1.84E-02	Regression	4.60E-02	0.184	3.38E-03	5.92	1.09E-01	3.71E-04	5.64E-04	0.137	0.306	0.685	4.12E-03	1.84E-03	8.24E-04
Aroclor-1254	7.70E-01	Regression	2.91E+00	0.139	1.07E-01	5.92	4.56E+00	2.65E-04	2.96E-02	0.137	0.306	0.685	2.16E-01	9.66E-02	4.32E-02
Aroclor-1260	5.69E-01	Regression	2.08E+00	0.105	5.99E-02	5.92	3.37E+00	3.20E-04	2.12E-02	0.137	0.306	0.685	1.55E-01	6.92E-02	3.09E-02
PCB (total)	1.33E+00	Regression	5.32E+00	0.139	1.85E-01	Measured	4.84E+00	3.11E-04	4.96E-02	0.137	0.306	0.685	3.62E-01	1.62E-01	7.24E-02
Pesticides															
4,4'-DDD	5.49E-02	2.15	1.18E-01	Regresson	9.14E-03	2.36	1.30E-01	5.17E-05	1.21E-03	0.147	0.329	0.735	8.22E-03	3.68E-03	1.64E-03
4,4'-DDE	4.92E-02	2.15	1.06E-01	Regresson	8.42E-03	3.89	1.92E-01	5.17E-05	1.18E-03	0.147	0.329	0.735	8.01E-03	3.58E-03	1.60E-03
4,4'-DDT	1.10E-01	0.284	3.13E-02	Regresson	1.55E-02	2.55	2.81E-01	5.17E-05	8.70E-04	0.147	0.329	0.735	5.92E-03	2.65E-03	1.18E-03
Aldrin	1.00E-03	0.592	5.92E-04	0.139	1.39E-04	5.76	5.76E-03	2.60E-05	1.62E-05	0.20	0.45	1.00	8.11E-05	3.63E-05	1.62E-05
alpha-BHC	1.46E-03	1.043	1.53E-03	1.735	2.54E-03	5.76	8.44E-03	2.60E-05	4.40E-05	1.60	2.26	3.20	2.75E-05	1.94E-05	1.37E-05
alpha-Chlordane	2.42E-03	2.15	5.20E-03	0.165	3.98E-04	3.25	7.87E-03	2.60E-05	5.78E-05	4.58	6.48	9.16	1.26E-05	8.92E-06	6.31E-06
beta-BHC	1.46E-03	1.043	1.53E-03	1.719	2.52E-03	5.76	8.44E-03	2.60E-05	4.38E-05	1.60	2.26	3.20	2.74E-05	1.94E-05	1.37E-05
delta-BHC	1.46E-03	1.043	1.53E-03	1.311	1.92E-03	5.76	8.44E-03	2.60E-05	3.97E-05	1.60	2.26	3.20	2.48E-05	1.75E-05	1.24E-05
Dieldrin	8.75E-02	4.920	4.31E-01	0.410	3.59E-02	2.45	2.15E-01	5.17E-05	3.92E-03	0.015	0.021	0.030	2.61E-01	1.85E-01	1.31E-01
Endosulfan I	5.30E-03	0.083	4.41E-04	1.687	8.94E-03	5.76	3.05E-02	2.60E-05	1.13E-04	0.15	0.34	0.75	7.55E-04	3.38E-04	1.51E-04
Endosulfan II	5.77E-02	0.083	4.80E-03	0.886	5.11E-02	5.76	3.32E-01	5.17E-05	8.93E-04	0.15	0.34	0.75	5.96E-03	2.66E-03	1.19E-03
Endrin	7.45E-02	0.686	5.12E-02	0.535	3.99E-02	5.76	4.29E-01	5.17E-05	1.31E-03	0.184	0.411	0.920	7.13E-03	3.19E-03	1.43E-03
gamma-BHC (Lindane)	7.80E-04	0.491	3.83E-04	1.852	1.44E-03	5.76	4.49E-03	2.60E-05	2.18E-05	8.00	17.9	40.0	2.73E-06	1.22E-06	5.45E-07
gamma-Chlordane	4.92E-02	3.03	1.49E-01	0.165	8.11E-03	3.64	1.79E-01	2.60E-05	1.49E-03	4.58	6.48	9.16	3.25E-04	2.30E-04	1.62E-04
Heptachlor	1.45E-03	0.065	9.44E-05	0.174	2.53E-04	5.76	8.35E-03	2.60E-05	1.71E-05	0.20	0.45	1.00	8.56E-05	3.83E-05	1.71E-05
Heptachlor epoxide	3.32E-02	0.426	1.41E-02	0.566	1.87E-02	5.76	1.91E-01	2.60E-05	5.25E-04	0.20	0.45	1.00	2.63E-03	1.17E-03	5.25E-04
Methoxychlor	4.44E-02	1.000	4.44E-02	0.525	2.33E-02	5.76	2.56E-01	2.60E-04	9.03E-04	4.00	5.66	8.00	2.26E-04	1.60E-04	1.13E-04
Toxaphene	5.83E-02	1.000	5.83E-02	0.355	2.07E-02	5.76	3.36E-01	5.17E-04	1.13E-03	8.00	17.9	40.0	1.41E-04	6.32E-05	2.83E-05
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.000	5.51E-03	1.00E-03	1.78E-04	76.0	170	380	2.35E-06	1.05E-06	4.69E-07
1,2,4,5-Tetrachlorobenzene	3.50E-01	0.397	1.39E-01	0.792	2.77E-01	0.115	4.04E-02	4.65E-03	3.98E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.17E-01	0.257	3.01E-02	1.426	1.67E-01	0.422	4.95E-02	1.00E-03	1.72E-03	53.0	75.0	106	3.25E-05	2.30E-05	1.63E-05
1,2-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.452	2.87E-01	0.358	4.20E-02	5.00E-04	3.17E-03	85.7	192	429	3.69E-05	1.65E-05	7.39E-06
1,3-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.296	2.69E-01	0.064	7.50E-03	5.00E-04	3.00E-03	85.7	192	429	3.50E-05	1.56E-05	7.00E-06
1,4-Dichlorobenzene	1.17E-01	1.000	1.17E-01	2.475	2.90E-01	0.045	5.25E-03	5.00E-04	3.14E-03	30.0	52.0	90.0	1.05E-04	6.04E-05	3.49E-05
4-Bromophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.566	1.83E-01	1.000	3.24E-01	4.65E-03	5.04E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.24E-01	1.000	3.24E-01	0.593	1.92E-01	1.000	3.24E-01	4.65E-03	5.10E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	8.31E-02	0.074	6.13E-03	Regresson	3.23E-02	0.112	9.33E-03	6.90E-05	4.23E-04	65.6	147	328	6.45E-06	2.88E-06	1.29E-06
Acenaphthylene	7.85E-02	0.180	1.41E-02	Regresson	4.26E-02	0.044	3.46E-03	9.54E-05	5.42E-04	65.6	147	328	8.27E-06	3.70E-06	1.65E-06
Anthracene	9.57E-02	0.800	7.66E-02	Regresson	5.99E-02	0.027	2.56E-03	9.54E-05	1.16E-03	65.6	147	328	1.77E-05	7.92E-06	3.54E-06
Benzo(a)anthracene	2.49E-01	0.227	5.66E-02	Regresson	2.92E-02	0.008	1.89E-03	9.73E-05	1.05E-03	0.62	1.37	3.07	1.70E-03	7.62E-04	3.41E-04

ATTACHMENT TABLE L-3-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - Upstream Pond and Site 4 Streams

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	2.83E-01	0.086	2.43E-02	Regresson	3.71E-02	0.007	1.87E-03	1.05E-04	9.14E-04	0.62	1.37	3.07	1.49E-03	6.65E-04	2.98E-04
Benzo(b)fluoranthene	5.23E-01	0.006	2.97E-03	0.310	1.62E-01	0.008	4.21E-03	1.11E-04	2.02E-03	0.62	1.37	3.07	3.28E-03	1.47E-03	6.57E-04
Benzo(g,h,i)perylene	1.62E-01	0.004	6.69E-04	Regresson	4.58E-02	0.013	2.10E-03	1.00E-04	5.98E-04	0.62	1.37	3.07	9.72E-04	4.35E-04	1.95E-04
Benzo(k)fluoranthene	2.00E-01	0.347	6.93E-02	Regresson	2.90E-02	0.008	1.55E-03	9.76E-05	1.06E-03	0.62	1.37	3.07	1.73E-03	7.72E-04	3.46E-04
Chrysene	3.80E-01	0.261	9.92E-02	Regresson	3.75E-02	0.009	3.23E-03	8.00E-05	1.64E-03	0.62	1.37	3.07	2.67E-03	1.19E-03	5.35E-04
Dibenz(a,h)anthracene	1.28E-01	0.047	6.05E-03	0.130	1.67E-02	0.007	8.86E-04	9.54E-05	3.80E-04	0.62	1.37	3.07	6.18E-04	2.76E-04	1.24E-04
Fluoranthene	3.82E-01	0.219	8.36E-02	0.500	1.91E-01	0.009	3.54E-03	1.23E-04	2.60E-03	65.6	147	328	3.96E-05	1.77E-05	7.91E-06
Fluorene	9.34E-02	0.735	6.86E-02	Regresson	2.92E-02	0.076	7.08E-03	9.05E-05	8.90E-04	65.6	147	328	1.36E-05	6.07E-06	2.71E-06
Hexachlorobenzene	1.27E-01	0.512	6.49E-02	0.246	3.12E-02	0.288	3.65E-02	9.54E-05	9.67E-04	2.00	2.83	4.00	4.84E-04	3.42E-04	2.42E-04
Hexachlorobutadiene	3.24E-01	0.385	1.25E-01	0.675	2.19E-01	0.115	3.74E-02	4.65E-03	3.43E-03	2.00	6.32	20.0	1.71E-03	5.42E-04	1.71E-04
Hexachlorocyclopentadiene	3.24E-01	1.000	3.24E-01	0.393	1.27E-01	1.000	3.24E-01	4.65E-03	4.65E-03	75.0	168	375	6.20E-05	2.77E-05	1.24E-05
Hexachloroethane	1.27E-01	1.000	1.27E-01	1.439	1.83E-01	1.000	1.27E-01	9.54E-05	2.60E-03	100	224	500	2.60E-05	1.16E-05	5.19E-06
Indeno(1,2,3-cd)pyrene	2.82E-01	0.004	1.24E-03	0.110	3.10E-02	0.008	2.23E-03	1.07E-04	6.97E-04	0.62	1.37	3.07	1.13E-03	5.07E-04	2.27E-04
Pentachlorophenol	1.10E-01	1.000	1.10E-01	5.930	6.52E-01	1.312	1.44E-01	4.73E-04	5.75E-03	8.42	18.8	42.1	6.83E-04	3.06E-04	1.37E-04
Phenanthrene	1.82E-01	0.606	1.10E-01	Regresson	2.94E-01	0.027	4.82E-03	8.80E-05	3.18E-03	65.6	147	328	4.85E-05	2.17E-05	9.70E-06
Pyrene	4.72E-01	0.713	3.36E-01	0.720	3.40E-01	0.011	5.18E-03	1.34E-04	5.69E-03	0.62	1.37	3.07	9.25E-03	4.14E-03	1.85E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	7.24E-05	0.00E+00	8.79E-08	0.000001	0.000003	0.00001	8.79E-02	2.78E-02	8.79E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	5.00	5.00	5.00
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.4921 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 5.940 = Body weight (kg)

ATTACHMENT TABLE L-4-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	7.18E-01	1.62E-03	1.28E+00	5.14	8.12	12.8	2.48E-01	1.57E-01	9.94E-02
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	Measured	3.32E-01	2.92E-04	8.55E-02	1.47	3.29	7.35	5.82E-02	2.60E-02	1.16E-02
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	Measured	8.52E-01	3.00E-03	3.48E-01	2.66	5.95	13.3	1.31E-01	5.86E-02	2.62E-02
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	Measured	6.46E+00	1.20E-03	2.44E+01	4.05	7.00	12.1	**6.02E+00**	**3.48E+00**	**2.02E+00**
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	Measured	6.32E-01	8.86E-04	2.86E-01	3.85	8.61	19.3	7.44E-02	3.33E-02	1.49E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	7.34E-02	6.90E-05	8.86E-02	0.026	0.045	0.078	**3.41E+00**	**1.97E+00**	**1.14E+00**
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	Measured	7.05E-01	2.15E-03	1.84E-01	6.71	15.0	33.6	2.74E-02	1.23E-02	5.49E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.24E+00	2.60E-03	4.36E-01	1.80	4.02	9.00	2.42E-01	1.08E-01	4.84E-02
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	Measured	1.42E-01	4.18E-05	2.60E-02	4.04	9.03	20.2	6.42E-03	2.87E-03	1.28E-03
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	Measured	2.33E+02	1.29E-02	4.67E+01	66.1	148	331	7.07E-01	3.16E-01	1.41E-01
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	1.97E-01	1.50	3.35	7.50	1.31E-01	5.87E-02	2.63E-02
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	1.14E-01	1.50	3.35	7.50	7.60E-02	3.40E-02	1.52E-02
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	Measured	1.86E+00	5.00E-04	3.43E-01	1.50	3.35	7.50	2.28E-01	1.02E-01	4.57E-02
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	7.02E-02	0.30	0.95	3.00	2.34E-01	7.40E-02	2.34E-02
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	6.20E-01	0.30	0.95	3.00	**2.07E+00**	6.53E-01	2.07E-01
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	2.24E+00	0.30	0.95	3.00	**7.46E+00**	**2.36E+00**	7.46E-01
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	4.64E-02	0.155	0.347	0.775	2.99E-01	1.34E-01	5.99E-02
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	4.71E-02	0.56	1.12	2.25	8.41E-02	4.19E-02	2.09E-02
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	6.93E-02	0.80	1.79	4.00	8.66E-02	3.87E-02	1.73E-02
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	4.71E-02	0.56	1.12	2.25	8.41E-02	4.19E-02	2.09E-02
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	4.71E-02	0.56	1.12	2.25	8.41E-02	4.19E-02	2.09E-02
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	1.47E-01	0.071	0.518	3.780	**2.08E+00**	2.85E-01	3.90E-02
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	4.56E-02	10.0	22.4	50.0	4.56E-03	2.04E-03	9.13E-04
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	4.56E-02	10.0	22.4	50.0	4.56E-03	2.04E-03	9.13E-04
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	4.66E-02	0.30	0.67	1.50	1.55E-01	6.94E-02	3.10E-02
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	4.89E-02	4.00	8.9	20.0	1.22E-02	5.47E-03	2.44E-03
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	5.52E-02	0.80	1.79	4.00	6.90E-02	3.09E-02	1.38E-02
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	4.56E-02	0.48	1.07	2.40	9.51E-02	4.25E-02	1.90E-02
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	4.62E-02	0.48	1.07	2.40	9.62E-02	4.30E-02	1.92E-02
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	4.77E-02	355	794	1,775	1.34E-04	6.01E-05	2.69E-05
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	9.40E-01	1.00	2.24	5.00	9.40E-01	4.20E-01	1.88E-01
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	2.47E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	4.27E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	1.08E-03	80.4	180	402	1.35E-05	6.03E-06	2.70E-06
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	1.01E-03	80.4	180	402	1.26E-05	5.61E-06	2.51E-06
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	6.22E-04	80.4	180	402	7.73E-06	3.46E-06	1.55E-06
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	5.96E-04	80.4	180	402	7.42E-06	3.32E-06	1.48E-06
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	2.52E-01	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	2.52E-01	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	6.15E-03	7.10	15.9	35.5	8.66E-04	3.87E-04	1.73E-04
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	6.59E-03	7.10	15.9	35.5	9.28E-04	4.15E-04	1.86E-04
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	1.75E-03	7.10	15.9	35.5	2.46E-04	1.10E-04	4.93E-05
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	4.02E-03	7.10	15.9	35.5	5.67E-04	2.53E-04	1.13E-04

ATTACHMENT TABLE L-4-1

Summary of Belted Kingfisher Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	6.54E-03	7.10	15.9	35.5	9.22E-04	4.12E-04	1.84E-04
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	4.98E-03	7.10	15.9	35.5	7.01E-04	3.14E-04	1.40E-04
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	3.33E-03	7.10	15.9	35.5	4.70E-04	2.10E-04	9.39E-05
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	1.62E-03	7.10	15.9	35.5	2.28E-04	1.02E-04	4.56E-05
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	6.09E-03	7.10	15.9	35.5	8.58E-04	3.84E-04	1.72E-04
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	1.13E-03	7.10	15.9	35.5	1.59E-04	7.10E-05	3.17E-05
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	5.75E-03	7.10	15.9	35.5	8.09E-04	3.62E-04	1.62E-04
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	1.46E-02	7.10	15.9	35.5	2.06E-03	9.19E-04	4.11E-04
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	7.63E-02	0.113	0.253	0.565	6.76E-01	3.02E-01	1.35E-01
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	4.22E-02	3.39	7.58	17.0	1.24E-02	5.56E-03	2.49E-03
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	2.52E-01	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	2.52E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	2.05E-03	7.10	15.9	35.5	2.89E-04	1.29E-04	5.77E-05
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	6.69E-01	6.73	21.3	67.3	9.93E-02	3.14E-02	9.93E-03
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	1.20E-02	7.10	15.9	35.5	1.69E-03	7.54E-04	3.37E-04
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	4.13E-02	7.10	15.9	35.5	5.81E-03	2.60E-03	1.16E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	5.95E-05	0.00E+00	1.05E-05	0.000014	0.000044	0.00014	7.47E-01	2.36E-01	7.47E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0262 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.160 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.840 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0211 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.125 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	7.96E-01	1.62E-03	5.15E-02	5.14	8.12	12.8	1.00E-02	6.34E-03	4.01E-03
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	Measured	5.39E-01	2.92E-04	3.48E-02	1.47	3.29	7.35	2.37E-02	1.06E-02	4.74E-03
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	Measured	1.08E+00	3.00E-03	7.01E-02	2.66	5.95	13.3	2.64E-02	1.18E-02	5.27E-03
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	Measured	8.11E+00	1.20E-03	5.24E-01	4.05	7.00	12.1	1.29E-01	7.49E-02	4.33E-02
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	Measured	1.06E+00	8.86E-04	6.83E-02	3.85	8.61	19.3	1.77E-02	7.93E-03	3.55E-03
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	6.34E-02	6.90E-05	4.10E-03	0.026	0.045	0.078	1.58E-01	9.10E-02	5.26E-02
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	Measured	9.70E-01	2.15E-03	6.28E-02	6.71	15.0	33.6	9.35E-03	4.18E-03	1.87E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.40E+00	2.60E-03	9.05E-02	1.80	4.02	9.00	5.03E-02	2.25E-02	1.01E-02
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	Measured	1.39E-01	4.18E-05	9.01E-03	4.04	9.03	20.2	2.23E-03	9.97E-04	4.46E-04
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	Measured	1.96E+02	1.29E-02	1.26E+01	66.1	148	331	1.91E-01	8.55E-02	3.82E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	6.25E-02	1.50	3.35	7.50	4.16E-02	1.86E-02	8.33E-03
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	3.64E-02	1.50	3.35	7.50	2.43E-02	1.09E-02	4.86E-03
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	Measured	1.42E+00	5.00E-04	9.16E-02	1.50	3.35	7.50	6.10E-02	2.73E-02	1.22E-02
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	2.38E-02	0.30	0.95	3.00	7.93E-02	2.51E-02	7.93E-03
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	2.26E-01	0.30	0.95	3.00	7.53E-01	2.38E-01	7.53E-02
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	8.11E-01	0.30	0.95	3.00	**2.70E+00**	8.55E-01	2.70E-01
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.67E-02	0.155	0.347	0.775	1.08E-01	4.82E-02	2.16E-02
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	1.67E-02	0.56	1.12	2.25	2.98E-02	1.49E-02	7.43E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	2.42E-02	0.80	1.79	4.00	3.03E-02	1.35E-02	6.06E-03
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	1.67E-02	0.56	1.12	2.25	2.98E-02	1.49E-02	7.43E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	1.67E-02	0.56	1.12	2.25	2.98E-02	1.49E-02	7.43E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	5.01E-02	0.071	0.518	3.780	7.07E-01	9.68E-02	1.33E-02
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	1.67E-02	10.0	22.4	50.0	1.67E-03	7.47E-04	3.34E-04
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	1.67E-02	10.0	22.4	50.0	1.67E-03	7.47E-04	3.34E-04
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	1.67E-02	0.30	0.67	1.50	5.57E-02	2.49E-02	1.11E-02
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	1.67E-02	4.00	8.9	20.0	4.18E-03	1.87E-03	8.35E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	1.86E-02	0.80	1.79	4.00	2.32E-02	1.04E-02	4.65E-03
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	1.67E-02	0.48	1.07	2.40	3.48E-02	1.56E-02	6.96E-03
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	1.67E-02	0.48	1.07	2.40	3.48E-02	1.56E-02	6.96E-03
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	1.67E-02	355	794	1,775	4.71E-05	2.10E-05	9.41E-06
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	3.29E-01	1.00	2.24	5.00	3.29E-01	1.47E-01	6.58E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	7.62E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	6.39E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	3.23E-04	80.4	180	402	4.01E-06	1.79E-06	8.02E-07
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	2.25E-04	80.4	180	402	2.80E-06	1.25E-06	5.60E-07
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	8.28E-05	80.4	180	402	1.03E-06	4.61E-07	2.06E-07
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	7.36E-05	80.4	180	402	9.15E-07	4.09E-07	1.83E-07
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	7.78E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	7.78E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	9.08E-04	7.10	15.9	35.5	1.28E-04	5.72E-05	2.56E-05
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	5.64E-04	7.10	15.9	35.5	7.95E-05	3.55E-05	1.59E-05
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	8.53E-05	7.10	15.9	35.5	1.20E-05	5.37E-06	2.40E-06
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	7.46E-04	7.10	15.9	35.5	1.05E-04	4.70E-05	2.10E-05

ATTACHMENT TABLE L-4-2

Summary of Great Blue Heron Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	8.37E-05	7.10	15.9	35.5	1.18E-05	5.27E-06	2.36E-06
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	1.82E-04	7.10	15.9	35.5	2.56E-05	1.14E-05	5.12E-06
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	8.81E-04	7.10	15.9	35.5	1.24E-04	5.55E-05	2.48E-05
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	6.56E-05	7.10	15.9	35.5	9.23E-06	4.13E-06	1.85E-06
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	8.52E-04	7.10	15.9	35.5	1.20E-04	5.37E-05	2.40E-05
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	8.08E-05	7.10	15.9	35.5	1.14E-05	5.09E-06	2.28E-06
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	5.86E-04	7.10	15.9	35.5	8.25E-05	3.69E-05	1.65E-05
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	2.63E-03	7.10	15.9	35.5	3.70E-04	1.66E-04	7.40E-05
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	1.53E-02	0.113	0.253	0.565	1.36E-01	6.07E-02	2.72E-02
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	6.39E-03	3.39	7.58	17.0	1.88E-03	8.42E-04	3.77E-04
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	7.78E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	7.77E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	5.21E-04	7.10	15.9	35.5	7.34E-05	3.28E-05	1.47E-05
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	2.02E-01	6.73	21.3	67.3	3.01E-02	9.50E-03	3.01E-03
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	2.64E-03	7.10	15.9	35.5	3.72E-04	1.66E-04	7.43E-05
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	2.60E-03	7.10	15.9	35.5	3.67E-04	1.64E-04	7.33E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.82E-05	0.00E+00	3.11E-06	0.000014	0.000044	0.00014	2.22E-01	7.03E-02	2.22E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1356 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1090 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.10 = Body weight (kg)

ATTACHMENT TABLE L-4-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	1.62E-03	1.75E+00	5.14	8.12	12.8	3.40E-01	2.15E-01	1.36E-01
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	0.164	4.43E-01	2.92E-04	1.28E-01	1.47	3.29	7.35	8.74E-02	3.91E-02	1.75E-02
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	0.038	1.32E+00	3.00E-03	4.99E-01	2.66	5.95	13.3	1.88E-01	8.40E-02	3.75E-02
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	0.100	8.72E+00	1.20E-03	9.62E+00	4.05	7.00	12.1	**2.37E+00**	**1.37E+00**	7.95E-01
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	0.070	5.40E+00	8.86E-04	6.68E-01	1.63	2.31	3.26	4.10E-01	2.90E-01	2.05E-01
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	6.90E-05	6.24E-02	0.026	0.045	0.078	**2.40E+00**	**1.39E+00**	8.00E-01
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	1.000	9.84E+00	2.15E-03	1.20E-01	6.71	15.0	33.6	1.79E-02	7.99E-03	3.57E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	2.60E-03	5.07E-01	0.40	0.57	0.80	**1.27E+00**	8.96E-01	6.34E-01
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	1.000	1.68E-01	4.18E-05	1.64E-03	4.04	9.03	20.2	4.05E-04	1.81E-04	8.10E-05
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	0.147	6.91E+01	1.29E-02	1.87E+01	66.1	148	331	2.83E-01	1.27E-01	5.66E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.82E-02	1.50	3.35	7.50	1.21E-02	5.43E-03	2.43E-03
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	2.86E-02	1.50	3.35	7.50	1.91E-02	8.52E-03	3.81E-03
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	2.29E-02	1.50	3.35	7.50	1.53E-02	6.83E-03	3.05E-03
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.82E-02	1.50	3.35	7.50	1.21E-02	5.43E-03	2.43E-03
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	1.48E-02	1.50	3.35	7.50	9.89E-03	4.42E-03	1.98E-03
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	7.25E-03	1.50	3.35	7.50	4.83E-03	2.16E-03	9.66E-04
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	4.03	5.64E-01	5.00E-04	7.73E-03	1.50	3.35	7.50	5.15E-03	2.30E-03	1.03E-03
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	3.88E-03	0.12	0.27	0.60	3.24E-02	1.45E-02	6.47E-03
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	3.34E-03	0.12	0.27	0.60	2.78E-02	1.24E-02	5.57E-03
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	4.33E-02	0.60	0.95	1.50	7.22E-02	4.56E-02	2.89E-02
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.51E-03	0.155	0.347	0.775	9.72E-03	4.35E-03	1.94E-03
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	1.24E-02	0.56	1.12	2.25	2.22E-02	1.11E-02	5.53E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	2.50E-03	0.80	1.79	4.00	3.12E-03	1.40E-03	6.25E-04
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	1.23E-02	0.56	1.12	2.25	2.20E-02	1.10E-02	5.48E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	9.60E-03	0.56	1.12	2.25	1.71E-02	8.55E-03	4.27E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	1.41E-02	0.071	0.518	3.780	1.99E-01	2.73E-02	3.73E-03
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	1.16E-02	10.0	22.4	50.0	1.16E-03	5.19E-04	2.32E-04
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	6.24E-03	10.0	22.4	50.0	6.24E-04	2.79E-04	1.25E-04
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	4.21E-03	0.30	0.67	1.50	1.40E-02	6.27E-03	2.80E-03
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	1.39E-02	4.00	8.9	20.0	3.46E-03	1.55E-03	6.93E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	2.96E-03	0.80	1.79	4.00	3.70E-03	1.66E-03	7.41E-04
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	1.48E-03	0.48	1.07	2.40	3.07E-03	1.37E-03	6.15E-04
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	4.28E-03	0.48	1.07	2.40	8.91E-03	3.98E-03	1.78E-03
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	4.55E-03	355	794	1,775	1.28E-05	5.74E-06	2.56E-06
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	6.71E-02	1.00	2.24	5.00	6.71E-02	3.00E-02	1.34E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	1.43E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	1.11E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	1.84E-03	80.4	180	402	2.28E-05	1.02E-05	4.57E-06
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	3.05E-03	80.4	180	402	3.79E-05	1.70E-05	7.58E-06
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	2.88E-03	80.4	180	402	3.58E-05	1.60E-05	7.15E-06
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	3.07E-03	80.4	180	402	3.82E-05	1.71E-05	7.65E-06
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	8.84E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	9.17E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	3.85E-03	7.10	15.9	35.5	5.42E-04	2.43E-04	1.08E-04
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	9.57E-03	7.10	15.9	35.5	1.35E-03	6.03E-04	2.70E-04
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	4.03E-03	7.10	15.9	35.5	5.68E-04	2.54E-04	1.14E-04
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	3.72E-03	7.10	15.9	35.5	5.25E-04	2.35E-04	1.05E-04

ATTACHMENT TABLE L-4-3

Summary of Mallard Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	5.00E-03	7.10	15.9	35.5	7.04E-04	3.15E-04	1.41E-04
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	1.84E-02	7.10	15.9	35.5	2.59E-03	1.16E-03	5.19E-04
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	3.70E-03	7.10	15.9	35.5	5.21E-04	2.33E-04	1.04E-04
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	2.87E-03	7.10	15.9	35.5	4.05E-04	1.81E-04	8.10E-05
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	5.48E-03	7.10	15.9	35.5	7.72E-04	3.45E-04	1.54E-04
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	4.41E-03	7.10	15.9	35.5	6.21E-04	2.78E-04	1.24E-04
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	2.08E-01	7.10	15.9	35.5	2.93E-02	1.31E-02	5.87E-03
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	5.17E-03	7.10	15.9	35.5	7.28E-04	3.25E-04	1.46E-04
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	4.71E-02	0.113	0.253	0.565	4.17E-01	1.86E-01	8.34E-02
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	9.64E-02	3.39	7.58	17.0	2.84E-02	1.27E-02	5.69E-03
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	6.74E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	1.95E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	1.99E-03	7.10	15.9	35.5	2.80E-04	1.25E-04	5.60E-05
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	1.08E+01	6.73	21.3	67.3	**1.60E+00**	5.05E-01	1.60E-01
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	4.36E-02	7.10	15.9	35.5	6.14E-03	2.74E-03	1.23E-03
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	1.11E-01	7.10	15.9	35.5	1.56E-02	6.99E-03	3.13E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0717	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.100	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.867	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.033	= Proportion of diet composed of sediment
WIR =	0.0850	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.612	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	1.44E+00	1.62E-03	1.07E-01	5.14	8.12	12.8	2.09E-02	1.32E-02	8.37E-03
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	Measured	7.21E-02	2.92E-04	5.38E-03	1.47	3.29	7.35	3.66E-03	1.64E-03	7.32E-04
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	Measured	7.76E-01	3.00E-03	5.80E-02	2.66	5.95	13.3	2.18E-02	9.75E-03	4.36E-03
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	Measured	1.28E+00	1.20E-03	9.56E-02	4.05	7.00	12.1	2.36E-02	1.37E-02	7.90E-03
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	Measured	1.48E-01	8.86E-04	1.10E-02	3.85	8.61	19.3	2.87E-03	1.28E-03	5.73E-04
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	2.95E-01	6.90E-05	2.19E-02	0.49	0.77	1.20	4.48E-02	2.86E-02	1.83E-02
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	Measured	3.96E-01	2.15E-03	2.96E-02	6.71	15.0	33.6	4.41E-03	1.97E-03	8.81E-04
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	8.86E-01	2.60E-03	6.61E-02	1.80	4.02	9.00	3.67E-02	1.64E-02	7.34E-03
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	Measured	1.44E-01	4.18E-05	1.07E-02	4.04	9.03	20.2	2.66E-03	1.19E-03	5.31E-04
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	Measured	8.25E+01	1.29E-02	6.14E+00	66.1	148	331	9.28E-02	4.15E-02	1.86E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	Measured	1.05E-01	5.00E-04	7.86E-03	0.41	0.92	2.05	1.92E-02	8.57E-03	3.83E-03
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	Measured	1.05E-01	5.00E-04	7.86E-03	0.41	0.92	2.05	1.92E-02	8.57E-03	3.83E-03
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	Measured	1.23E-01	5.00E-04	9.19E-03	0.41	0.92	2.05	2.24E-02	1.00E-02	4.48E-03
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	Measured	1.05E-01	5.00E-04	7.86E-03	0.41	0.92	2.05	1.92E-02	8.57E-03	3.83E-03
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	Measured	1.05E-01	5.00E-04	7.86E-03	0.41	0.92	2.05	1.92E-02	8.57E-03	3.83E-03
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	Measured	1.05E-01	5.00E-04	7.86E-03	0.41	0.92	2.05	1.92E-02	8.57E-03	3.83E-03
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	Measured	6.72E-01	5.00E-04	5.00E-02	0.41	0.92	2.05	1.22E-01	5.46E-02	2.44E-02
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	Measured	1.77E+00	5.00E-04	1.32E-01	0.41	0.92	2.05	3.21E-01	1.44E-01	6.42E-02
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	2.74E-02	0.30	0.95	3.00	9.13E-02	2.89E-02	9.13E-03
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	2.60E-01	0.30	0.95	3.00	8.67E-01	2.74E-01	8.67E-02
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	9.34E-01	0.30	0.95	3.00	**3.11E+00**	9.85E-01	3.11E-01
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.92E-02	0.155	0.347	0.775	1.24E-01	5.55E-02	2.48E-02
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	1.92E-02	0.56	1.12	2.25	3.44E-02	1.71E-02	8.55E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	2.79E-02	0.80	1.79	4.00	3.49E-02	1.56E-02	6.98E-03
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	1.92E-02	0.56	1.12	2.25	3.44E-02	1.71E-02	8.55E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	1.92E-02	0.56	1.12	2.25	3.44E-02	1.71E-02	8.55E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	5.77E-02	0.071	0.518	3.780	8.14E-01	1.12E-01	1.53E-02
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	1.92E-02	10.0	22.4	50.0	1.92E-03	8.61E-04	3.85E-04
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	1.92E-02	10.0	22.4	50.0	1.92E-03	8.61E-04	3.85E-04
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	1.92E-02	0.021	0.047	0.104	9.25E-01	4.14E-01	1.85E-01
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	1.92E-02	4.00	8.9	20.0	4.81E-03	2.15E-03	9.62E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	2.14E-02	0.80	1.79	4.00	2.68E-02	1.20E-02	5.35E-03
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	1.92E-02	0.48	1.07	2.40	4.01E-02	1.79E-02	8.02E-03
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	1.92E-02	0.48	1.07	2.40	4.01E-02	1.79E-02	8.02E-03
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	1.92E-02	355	794	1,775	5.42E-05	2.42E-05	1.08E-05
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	3.79E-01	1.00	2.24	5.00	3.79E-01	1.69E-01	7.58E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	8.88E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	7.41E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	3.81E-04	80.4	180	402	4.74E-06	2.12E-06	9.48E-07
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	2.69E-04	80.4	180	402	3.35E-06	1.50E-06	6.69E-07
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	1.05E-04	80.4	180	402	1.31E-06	5.85E-07	2.62E-07
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	9.44E-05	80.4	180	402	1.17E-06	5.25E-07	2.35E-07
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	8.97E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	8.97E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	1.05E-03	7.10	15.9	35.5	1.47E-04	6.59E-05	2.95E-05
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	6.51E-04	7.10	15.9	35.5	9.17E-05	4.10E-05	1.83E-05
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	9.90E-05	7.10	15.9	35.5	1.39E-05	6.24E-06	2.79E-06
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	8.60E-04	7.10	15.9	35.5	1.21E-04	5.42E-05	2.42E-05

ATTACHMENT TABLE L-4-4

Summary of Osprey Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	9.71E-05	7.10	15.9	35.5	1.37E-05	6.12E-06	2.74E-06
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	2.10E-04	7.10	15.9	35.5	2.96E-05	1.32E-05	5.92E-06
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	1.02E-03	7.10	15.9	35.5	1.43E-04	6.40E-05	2.86E-05
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	7.63E-05	7.10	15.9	35.5	1.07E-05	4.81E-06	2.15E-06
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	9.82E-04	7.10	15.9	35.5	1.38E-04	6.19E-05	2.77E-05
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	9.38E-05	7.10	15.9	35.5	1.32E-05	5.91E-06	2.64E-06
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	6.75E-04	7.10	15.9	35.5	9.51E-05	4.25E-05	1.90E-05
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	3.03E-03	7.10	15.9	35.5	4.26E-04	1.91E-04	8.53E-05
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	1.77E-02	0.113	0.253	0.565	1.57E-01	7.00E-02	3.13E-02
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	7.41E-03	3.39	7.58	17.0	2.19E-03	9.78E-04	4.37E-04
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	8.97E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	8.95E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	6.01E-04	7.10	15.9	35.5	8.46E-05	3.79E-05	1.69E-05
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	2.33E-01	6.73	21.3	67.3	3.46E-02	1.09E-02	3.46E-03
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	3.04E-03	7.10	15.9	35.5	4.28E-04	1.91E-04	8.56E-05
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	3.00E-03	7.10	15.9	35.5	4.22E-04	1.89E-04	8.45E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	6.02E-05	0.00E+00	4.48E-06	0.000014	0.000044	0.00014	3.20E-01	1.01E-01	3.20E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0919 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0858 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.235 = Body weight (kg)

ATTACHMENT TABLE L-4-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	1.62E-03	2.62E+00	2.46	4.26	7.38	**1.06E+00**	6.15E-01	3.55E-01
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	0.164	4.43E-01	2.92E-04	6.18E-02	1.47	3.29	7.35	4.20E-02	1.88E-02	8.41E-03
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	0.038	1.32E+00	3.00E-03	4.52E-01	2.66	5.95	13.3	1.70E-01	7.60E-02	3.40E-02
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	0.100	8.72E+00	1.20E-03	5.30E+01	4.05	7.00	12.1	**1.31E+01**	**7.57E+00**	**4.38E+00**
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	0.070	5.40E+00	8.86E-04	3.99E-01	3.85	8.61	19.3	1.04E-01	4.63E-02	2.07E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	6.90E-05	1.72E-01	0.026	0.045	0.078	**6.63E+00**	**3.83E+00**	**2.21E+00**
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	1.000	9.84E+00	2.15E-03	1.37E-01	6.71	15.0	33.6	2.03E-02	9.10E-03	4.07E-03
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	2.60E-03	4.96E-01	0.40	0.57	0.80	**1.24E+00**	8.76E-01	6.20E-01
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	1.000	1.68E-01	4.18E-05	2.32E-03	4.04	9.03	20.2	5.75E-04	2.57E-04	1.15E-04
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	0.147	6.91E+01	1.29E-02	1.29E+01	66.1	148	331	1.95E-01	8.71E-02	3.90E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	1.04E+01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1221	2.40E-01	Regression	1.04E+01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1232	2.40E-01	Regression	1.04E+01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1242	2.40E-01	Regression	1.04E+01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1248	2.40E-01	Regression	1.04E+01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1254	2.40E-01	Regression	1.04E+01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	7.96E-01	1.50	3.35	7.50	5.31E-01	2.37E-01	1.06E-01
Aroclor-1260	1.40E-01	Regression	6.28E+00	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	4.80E-01	1.50	3.35	7.50	3.20E-01	1.43E-01	6.40E-02
PCB (total)	1.40E-01	Regression	6.28E+00	0.139	1.95E-02	4.03	5.64E-01	5.00E-04	4.80E-01	1.50	3.35	7.50	3.20E-01	1.43E-01	6.40E-02
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	1.23E-02	0.12	0.27	0.60	1.03E-01	4.59E-02	2.05E-02
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	1.04E-02	0.12	0.27	0.60	8.68E-02	3.88E-02	1.74E-02
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	6.72E-02	0.60	0.95	1.50	1.12E-01	7.09E-02	4.48E-02
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	2.05E-03	0.155	0.347	0.775	1.32E-02	5.90E-03	2.64E-03
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	3.59E-03	0.56	1.12	2.25	6.41E-03	3.20E-03	1.60E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	7.39E-03	2.14	4.79	10.7	3.45E-03	1.55E-03	6.91E-04
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	3.59E-03	0.56	1.12	2.25	6.41E-03	3.20E-03	1.60E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	3.59E-03	0.56	1.12	2.25	6.41E-03	3.20E-03	1.60E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	2.48E-02	0.071	0.518	3.780	3.50E-01	4.79E-02	6.56E-03
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	3.01E-04	10.0	22.4	50.0	3.01E-05	1.35E-05	6.03E-06
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	3.01E-04	10.0	22.4	50.0	3.01E-05	1.35E-05	6.03E-06
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	2.37E-03	0.30	0.67	1.50	7.90E-03	3.53E-03	1.58E-03
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	7.68E-03	4.00	8.9	20.0	1.92E-03	8.59E-04	3.84E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	1.04E-02	2.14	4.79	10.7	4.87E-03	2.18E-03	9.74E-04
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	3.10E-04	0.48	1.07	2.40	6.47E-04	2.89E-04	1.29E-04
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	1.48E-03	0.48	1.07	2.40	3.07E-03	1.37E-03	6.15E-04
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	5.06E-03	355	794	1,775	1.42E-05	6.37E-06	2.85E-06
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	9.95E-02	1.00	2.24	5.00	9.95E-02	4.45E-02	1.99E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	1.16E-03	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	5.91E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	7.28E-04	80.4	180	402	9.05E-06	4.05E-06	1.81E-06
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	1.16E-03	80.4	180	402	1.45E-05	6.47E-06	2.89E-06
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	1.16E-03	80.4	180	402	1.45E-05	6.47E-06	2.89E-06
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	1.16E-03	80.4	180	402	1.45E-05	6.47E-06	2.89E-06
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	9.36E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	9.36E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	8.39E-03	7.10	15.9	35.5	1.18E-03	5.29E-04	2.36E-04
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	1.15E-02	7.10	15.9	35.5	1.62E-03	7.26E-04	3.25E-04
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	3.48E-03	7.10	15.9	35.5	4.90E-04	2.19E-04	9.79E-05
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	4.56E-03	7.10	15.9	35.5	6.42E-04	2.87E-04	1.28E-04

ATTACHMENT TABLE L-4-5

Summary of Tree Swallow Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	1.44E-02	7.10	15.9	35.5	2.03E-03	9.08E-04	4.06E-04
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	1.02E-02	7.10	15.9	35.5	1.44E-03	6.45E-04	2.88E-04
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	2.15E-03	7.10	15.9	35.5	3.02E-04	1.35E-04	6.05E-05
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	3.30E-03	7.10	15.9	35.5	4.65E-04	2.08E-04	9.30E-05
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	8.61E-03	7.10	15.9	35.5	1.21E-03	5.42E-04	2.42E-04
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	2.09E-03	7.10	15.9	35.5	2.94E-04	1.31E-04	5.88E-05
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	9.48E-03	7.10	15.9	35.5	1.33E-03	5.97E-04	2.67E-04
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	1.70E-02	7.10	15.9	35.5	2.39E-03	1.07E-03	4.78E-04
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	7.95E-02	0.113	0.253	0.565	7.04E-01	3.15E-01	1.41E-01
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	5.80E-02	3.39	7.58	17.0	1.71E-02	7.65E-03	3.42E-03
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	9.36E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	9.26E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	1.46E-03	7.10	15.9	35.5	2.05E-04	9.17E-05	4.10E-05
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	2.70E-01	6.73	21.3	67.3	4.01E-02	1.27E-02	4.01E-03
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	1.09E-02	7.10	15.9	35.5	1.54E-03	6.88E-04	3.08E-04
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	7.78E-02	7.10	15.9	35.5	1.10E-02	4.90E-03	2.19E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0012 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0050 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0156 = Body weight (kg)

ATTACHMENT TABLE L-4-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	7.18E-01	1.62E-03	3.46E-02	1.04	1.31	1.66	3.33E-02	2.63E-02	2.09E-02
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	Measured	3.32E-01	2.92E-04	1.60E-02	0.77	2.43	7.70	2.08E-02	6.56E-03	2.08E-03
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	Measured	8.52E-01	3.00E-03	4.11E-02	2.40	5.37	12.0	1.71E-02	7.66E-03	3.43E-03
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	Measured	6.46E+00	1.20E-03	3.11E-01	11.7	13.3	15.1	2.65E-02	2.33E-02	2.05E-02
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	Measured	6.32E-01	8.86E-04	3.05E-02	4.70	6.47	8.90	6.48E-03	4.71E-03	3.42E-03
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	7.34E-02	6.90E-05	3.53E-03	0.150	0.192	0.247	2.36E-02	1.84E-02	1.43E-02
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	Measured	7.05E-01	2.15E-03	3.40E-02	1.70	2.40	3.40	2.00E-02	1.41E-02	1.00E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.24E+00	2.60E-03	5.98E-02	0.20	0.26	0.33	2.99E-01	2.33E-01	1.81E-01
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	Measured	1.42E-01	4.18E-05	6.82E-03	12.0	26.9	60.2	5.66E-04	2.53E-04	1.13E-04
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	Measured	2.33E+02	1.29E-02	1.12E+01	75.4	169	377	1.49E-01	6.66E-02	2.98E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	4.65E-02	1.37	2.17	3.43	3.40E-02	2.15E-02	1.36E-02
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	4.65E-02	0.137	0.306	0.685	3.40E-01	1.52E-01	6.79E-02
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	4.65E-02	0.137	0.306	0.685	3.40E-01	1.52E-01	6.79E-02
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	4.65E-02	0.137	0.306	0.685	3.40E-01	1.52E-01	6.79E-02
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	4.65E-02	0.137	0.306	0.685	3.40E-01	1.52E-01	6.79E-02
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	4.65E-02	0.137	0.306	0.685	3.40E-01	1.52E-01	6.79E-02
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	2.72E-02	0.137	0.306	0.685	1.98E-01	8.86E-02	3.96E-02
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	Measured	1.86E+00	5.00E-04	8.97E-02	0.137	0.306	0.685	6.55E-01	2.93E-01	1.31E-01
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	1.77E-02	0.147	0.329	0.735	1.20E-01	5.39E-02	2.41E-02
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	1.68E-01	0.147	0.329	0.735	**1.14E+00**	5.12E-01	2.29E-01
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	6.04E-01	0.147	0.329	0.735	**4.11E+00**	**1.84E+00**	8.22E-01
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.24E-02	0.20	0.45	1.00	6.22E-02	2.78E-02	1.24E-02
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	1.24E-02	1.60	2.26	3.20	7.78E-03	5.50E-03	3.89E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	1.81E-02	4.58	6.48	9.16	3.94E-03	2.79E-03	1.97E-03
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	1.24E-02	1.60	2.26	3.20	7.78E-03	5.50E-03	3.89E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	1.24E-02	1.60	2.26	3.20	7.78E-03	5.50E-03	3.89E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	3.73E-02	0.015	0.021	0.030	**2.49E+00**	**1.76E+00**	**1.24E+00**
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	1.24E-02	0.15	0.34	0.75	8.30E-02	3.71E-02	1.66E-02
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	1.24E-02	0.15	0.34	0.75	8.30E-02	3.71E-02	1.66E-02
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	1.24E-02	0.184	0.411	0.920	6.76E-02	3.03E-02	1.35E-02
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	1.24E-02	8.00	17.9	40.0	1.56E-03	6.96E-04	3.11E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	1.38E-02	4.58	6.48	9.16	3.02E-03	2.14E-03	1.51E-03
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	1.24E-02	0.20	0.45	1.00	6.22E-02	2.78E-02	1.24E-02
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	1.24E-02	0.20	0.45	1.00	6.22E-02	2.78E-02	1.24E-02
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	1.24E-02	4.00	5.66	8.00	3.11E-03	2.20E-03	1.56E-03
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	2.45E-01	8.00	17.9	40.0	3.06E-02	1.37E-02	6.13E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	5.69E-04	76.0	170	380	7.48E-06	3.35E-06	1.50E-06
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	4.76E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	2.41E-04	53.0	75.0	106	4.55E-06	3.22E-06	2.27E-06
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	1.68E-04	85.7	192	429	1.96E-06	8.79E-07	3.93E-07
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	6.24E-05	85.7	192	429	7.28E-07	3.26E-07	1.46E-07
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	5.55E-05	30.0	52.0	90.0	1.85E-06	1.07E-06	6.16E-07
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	5.80E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	5.80E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	6.76E-04	65.6	147	328	1.03E-05	4.61E-06	2.06E-06
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	4.20E-04	65.6	147	328	6.41E-06	2.87E-06	1.28E-06
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	6.36E-05	65.6	147	328	9.70E-07	4.34E-07	1.94E-07
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	5.56E-04	0.62	1.37	3.07	9.04E-04	4.04E-04	1.81E-04

ATTACHMENT TABLE L-4-6

Summary of Mink Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	6.24E-05	0.62	1.37	3.07	1.01E-04	4.54E-05	2.03E-05
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	1.35E-04	0.62	1.37	3.07	2.20E-04	9.86E-05	4.41E-05
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	6.57E-04	0.62	1.37	3.07	1.07E-03	4.78E-04	2.14E-04
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	4.89E-05	0.62	1.37	3.07	7.95E-05	3.56E-05	1.59E-05
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	6.35E-04	0.62	1.37	3.07	1.03E-03	4.62E-04	2.07E-04
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	6.02E-05	0.62	1.37	3.07	9.79E-05	4.38E-05	1.96E-05
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	4.36E-04	65.6	147	328	6.65E-06	2.98E-06	1.33E-06
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	1.96E-03	65.6	147	328	2.98E-05	1.33E-05	5.97E-06
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	1.14E-02	2.00	2.83	4.00	5.72E-03	4.04E-03	2.86E-03
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	4.76E-03	2.00	6.32	20.0	2.38E-03	7.53E-04	2.38E-04
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	5.80E-02	75.0	168	375	7.73E-04	3.46E-04	1.55E-04
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	5.79E-02	100	224	500	5.79E-04	2.59E-04	1.16E-04
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	3.88E-04	0.62	1.37	3.07	6.31E-04	2.83E-04	1.26E-04
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	1.51E-01	8.42	18.8	42.1	1.79E-02	8.00E-03	3.58E-03
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	1.97E-03	65.6	147	328	3.00E-05	1.34E-05	5.99E-06
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	1.94E-03	0.62	1.37	3.07	3.15E-03	1.41E-03	6.32E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	5.65E-05	0.00E+00	2.72E-06	0.000001	0.000003	0.00001	**2.72E+00**	8.60E-01	2.72E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0349 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0286 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.726 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	0.126	3.34E+01	1.62E-03	2.83E+00	0.25	0.56	1.26	**1.12E+01**	**5.03E+00**	**2.25E+00**
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	0.164	4.43E-01	2.92E-04	1.25E-01	0.77	2.43	7.70	1.62E-01	5.12E-02	1.62E-02
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	0.038	1.32E+00	3.00E-03	6.02E-01	2.40	5.37	12.0	2.51E-01	1.12E-01	5.02E-02
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	0.100	8.72E+00	1.20E-03	1.89E+00	5.60	7.23	9.34	3.37E-01	2.61E-01	2.02E-01
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	0.070	5.40E+00	8.86E-04	1.02E+00	4.70	6.47	8.90	2.17E-01	1.58E-01	1.15E-01
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	4.580	3.60E+00	6.90E-05	3.75E-02	0.032	0.072	0.160	**1.17E+00**	5.24E-01	2.35E-01
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	1.000	9.84E+00	2.15E-03	1.50E-01	1.70	2.40	3.40	8.83E-02	6.24E-02	4.41E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	1.000	6.48E+00	2.60E-03	4.32E-01	0.20	0.26	0.33	**2.16E+00**	**1.68E+00**	**1.31E+00**
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	1.000	1.68E-01	4.18E-05	2.19E-03	12.0	26.9	60.2	1.82E-04	8.13E-05	3.64E-05
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	0.147	6.91E+01	1.29E-02	1.81E+01	75.4	169	377	2.40E-01	1.07E-01	4.80E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	9.56E-03	0.136	0.304	0.680	7.03E-02	3.14E-02	1.41E-02
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	1.90E-02	0.136	0.304	0.680	1.40E-01	6.25E-02	2.79E-02
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	1.38E-02	0.136	0.304	0.680	1.02E-01	4.54E-02	2.03E-02
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	9.56E-03	0.136	0.304	0.680	7.03E-02	3.14E-02	1.41E-02
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	6.49E-03	0.136	0.304	0.680	4.77E-02	2.13E-02	9.54E-03
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	5.49E-03	0.136	0.304	0.680	4.03E-02	1.80E-02	8.07E-03
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	2.80E-03	0.136	0.304	0.680	2.06E-02	9.20E-03	4.12E-03
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	4.03	5.64E-01	5.00E-04	3.24E-03	0.136	0.304	0.680	2.38E-02	1.07E-02	4.76E-03
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	2.49E-03	0.147	0.329	0.735	1.69E-02	7.57E-03	3.39E-03
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	2.16E-03	0.147	0.329	0.735	1.47E-02	6.56E-03	2.93E-03
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	5.01E-02	0.147	0.329	0.735	3.41E-01	1.52E-01	6.81E-02
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.49E-03	0.20	0.45	1.00	7.46E-03	3.34E-03	1.49E-03
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	1.12E-02	1.60	2.26	3.20	7.02E-03	4.96E-03	3.51E-03
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	1.65E-03	4.58	6.48	9.16	3.60E-04	2.54E-04	1.80E-04
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	1.11E-02	1.60	2.26	3.20	6.95E-03	4.92E-03	3.48E-03
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	8.64E-03	1.60	2.26	3.20	5.40E-03	3.82E-03	2.70E-03
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	9.79E-03	0.015	0.021	0.030	6.53E-01	4.62E-01	3.26E-01
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	1.09E-02	0.15	0.34	0.75	7.29E-02	3.26E-02	1.46E-02
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	6.04E-03	0.15	0.34	0.75	4.03E-02	1.80E-02	8.06E-03
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	3.90E-03	0.184	0.411	0.920	2.12E-02	9.49E-03	4.24E-03
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	1.19E-02	8.00	17.9	40.0	1.49E-03	6.67E-04	2.99E-04
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	1.65E-03	4.58	6.48	9.16	3.60E-04	2.54E-04	1.80E-04
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	1.71E-03	0.20	0.45	1.00	8.53E-03	3.81E-03	1.71E-03
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	4.09E-03	0.20	0.45	1.00	2.05E-02	9.15E-03	4.09E-03
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	3.84E-03	4.00	5.66	8.00	9.61E-04	6.79E-04	4.80E-04
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	5.52E-02	8.00	17.9	40.0	6.90E-03	3.08E-03	1.38E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	1.31E-03	76.0	170	380	1.73E-05	7.72E-06	3.45E-06
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	1.00E-01	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	1.75E-03	53.0	75.0	106	3.29E-05	2.33E-05	1.65E-05
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	2.79E-03	85.7	192	429	3.25E-05	1.45E-05	6.51E-06
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	2.63E-03	85.7	192	429	3.07E-05	1.37E-05	6.14E-06
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	2.81E-03	30.0	52.0	90.0	9.37E-05	5.41E-05	3.12E-05
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	7.54E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	7.84E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	3.25E-03	65.6	147	328	4.96E-05	2.22E-05	9.92E-06
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	8.02E-03	65.6	147	328	1.22E-04	5.47E-05	2.44E-05
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	3.46E-03	65.6	147	328	5.27E-05	2.36E-05	1.05E-05
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	3.79E-03	0.62	1.37	3.07	6.17E-03	2.76E-03	1.24E-03

ATTACHMENT TABLE L-4-7

Summary of Muskrat Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	3.52E-03	0.62	1.37	3.07	5.72E-03	2.56E-03	1.15E-03
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	1.73E-02	0.62	1.37	3.07	2.81E-02	1.26E-02	5.63E-03
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	3.74E-03	0.62	1.37	3.07	6.09E-03	2.73E-03	1.22E-03
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	2.89E-03	0.62	1.37	3.07	4.70E-03	2.10E-03	9.42E-04
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	5.43E-03	0.62	1.37	3.07	8.84E-03	3.95E-03	1.77E-03
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	4.64E-03	0.62	1.37	3.07	7.55E-03	3.38E-03	1.51E-03
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	1.91E-01	65.6	147	328	2.91E-03	1.30E-03	5.82E-04
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	3.25E-03	65.6	147	328	4.96E-05	2.22E-05	9.92E-06
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	3.94E-02	2.00	2.83	4.00	1.97E-02	1.39E-02	9.85E-03
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	8.75E-02	2.00	6.32	20.0	4.38E-02	1.38E-02	4.38E-03
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	5.62E-02	75.0	168	375	7.50E-04	3.35E-04	1.50E-04
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	1.72E-01	100	224	500	1.72E-03	7.68E-04	3.43E-04
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	2.17E-03	0.62	1.37	3.07	3.53E-03	1.58E-03	7.08E-04
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	9.77E+00	8.42	18.8	42.1	**1.16E+00**	5.19E-01	2.32E-01
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	4.00E-02	65.6	147	328	6.09E-04	2.72E-04	1.22E-04
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	9.26E-02	0.62	1.37	3.07	1.51E-01	6.74E-02	3.02E-02
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0765 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1426 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.750 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	2.65E+02	Regression	3.43E+01	Regresson	3.17E+00	Measured	7.96E-01	1.62E-03	1.27E+00	1.04	1.31	1.66	**1.22E+00**	9.68E-01	7.67E-01
Cadmium	2.70E+00	Regression	8.08E-01	Regresson	1.07E+00	Measured	5.39E-01	2.92E-04	3.31E-02	0.77	2.43	7.70	4.30E-02	1.36E-02	4.30E-03
Chromium	3.47E+01	Regression	5.91E+00	0.084	2.91E+00	Measured	1.08E+00	3.00E-03	2.19E-01	2.40	5.37	12.0	9.13E-02	4.08E-02	1.83E-02
Copper	8.72E+01	7.957	6.94E+02	Regresson	1.14E+01	Measured	8.11E+00	1.20E-03	9.76E+00	11.7	13.3	15.1	8.33E-01	7.33E-01	6.44E-01
Lead	7.72E+01	Regression	5.22E+00	Regresson	3.04E+00	Measured	1.06E+00	8.86E-04	3.34E-01	4.70	6.47	8.90	7.11E-02	5.17E-02	3.76E-02
Mercury	7.87E-01	2.868	2.26E+00	Regresson	3.24E-01	Measured	6.34E-02	6.90E-05	3.68E-02	0.150	0.192	0.247	2.46E-01	1.91E-01	1.49E-01
Nickel	9.84E+00	Regression	1.78E+00	Regresson	5.98E-01	Measured	9.70E-01	2.15E-03	6.23E-02	1.70	2.40	3.40	3.67E-02	2.59E-02	1.83E-02
Selenium	6.48E+00	1.000	6.48E+00	Regresson	4.00E+00	Measured	1.40E+00	2.60E-03	1.59E-01	0.20	0.26	0.33	7.94E-01	6.18E-01	4.81E-01
Silver	1.68E-01	0.180	3.02E-02	0.037	6.17E-03	Measured	1.39E-01	4.18E-05	1.28E-03	12.0	26.9	60.2	1.06E-04	4.75E-05	2.12E-05
Zinc	4.70E+02	Regression	1.69E+02	Regresson	1.47E+02	Measured	1.96E+02	1.29E-02	5.87E+00	75.4	169	377	7.79E-02	3.48E-02	1.56E-02
Polychlorinated Biphenyls															
Aroclor-1016	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.46E-02	1.37	2.17	3.43	1.06E-02	6.72E-03	4.25E-03
Aroclor-1221	2.40E-01	Regression	7.98E-01	0.749	1.80E-01	4.03	9.67E-01	5.00E-04	1.58E-02	0.137	0.306	0.685	1.16E-01	5.17E-02	2.31E-02
Aroclor-1232	2.40E-01	Regression	7.98E-01	0.515	1.24E-01	4.03	9.67E-01	5.00E-04	1.51E-02	0.137	0.306	0.685	1.10E-01	4.94E-02	2.21E-02
Aroclor-1242	2.40E-01	Regression	7.98E-01	0.323	7.75E-02	4.03	9.67E-01	5.00E-04	1.46E-02	0.137	0.306	0.685	1.06E-01	4.75E-02	2.13E-02
Aroclor-1248	2.40E-01	Regression	7.98E-01	0.184	4.42E-02	4.03	9.67E-01	5.00E-04	1.42E-02	0.137	0.306	0.685	1.03E-01	4.62E-02	2.07E-02
Aroclor-1254	2.40E-01	Regression	7.98E-01	0.139	3.34E-02	4.03	9.67E-01	5.00E-04	1.40E-02	0.137	0.306	0.685	1.02E-01	4.58E-02	2.05E-02
Aroclor-1260	1.40E-01	Regression	4.39E-01	0.105	1.47E-02	4.03	5.64E-01	5.00E-04	7.79E-03	0.137	0.306	0.685	5.69E-02	2.54E-02	1.14E-02
PCB (total)	1.40E-01	Regression	4.39E-01	0.139	1.95E-02	Measured	1.42E+00	5.00E-04	9.69E-03	0.137	0.306	0.685	7.08E-02	3.16E-02	1.42E-02
Pesticides															
4,4'-DDD	1.10E-01	1.46	1.61E-01	Regresson	1.54E-02	3.35	3.68E-01	5.00E-05	3.48E-03	0.147	0.329	0.735	2.37E-02	1.06E-02	4.74E-03
4,4'-DDE	9.30E-02	1.46	1.36E-01	Regresson	1.36E-02	37.6	3.50E+00	5.00E-05	9.84E-03	0.147	0.329	0.735	6.69E-02	2.99E-02	1.34E-02
4,4'-DDT	3.30E+00	0.267	8.80E-01	Regresson	1.99E-01	3.80	1.26E+01	5.00E-05	5.11E-02	0.147	0.329	0.735	3.47E-01	1.55E-01	6.95E-02
Aldrin	6.60E-02	0.403	2.66E-02	0.139	9.19E-03	3.92	2.59E-01	5.00E-05	1.23E-03	0.20	0.45	1.00	6.15E-03	2.75E-03	1.23E-03
alpha-BHC	6.60E-02	0.710	4.68E-02	1.735	1.15E-01	3.92	2.59E-01	5.00E-05	2.80E-03	1.60	2.26	3.20	1.75E-03	1.24E-03	8.76E-04
alpha-Chlordane	6.60E-02	1.46	9.66E-02	0.165	1.09E-02	5.68	3.75E-01	5.00E-05	2.45E-03	4.58	6.48	9.16	5.34E-04	3.78E-04	2.67E-04
beta-BHC	6.60E-02	0.710	4.68E-02	1.719	1.13E-01	3.92	2.59E-01	5.00E-05	2.79E-03	1.60	2.26	3.20	1.74E-03	1.23E-03	8.72E-04
delta-BHC	6.60E-02	0.710	4.68E-02	1.311	8.65E-02	3.92	2.59E-01	5.00E-05	2.46E-03	1.60	2.26	3.20	1.54E-03	1.09E-03	7.68E-04
Dieldrin	6.60E-02	4.920	3.25E-01	1.500	9.90E-02	11.8	7.76E-01	5.00E-05	7.47E-03	0.015	0.021	0.030	4.98E-01	3.52E-01	2.49E-01
Endosulfan I	6.60E-02	0.057	3.73E-03	1.687	1.11E-01	3.92	2.59E-01	5.00E-05	2.18E-03	0.15	0.34	0.75	1.46E-02	6.51E-03	2.91E-03
Endosulfan II	6.60E-02	0.057	3.73E-03	0.886	5.84E-02	3.92	2.59E-01	5.00E-05	1.53E-03	0.15	0.34	0.75	1.02E-02	4.56E-03	2.04E-03
Endrin	6.60E-02	0.467	3.08E-02	0.535	3.53E-02	3.92	2.59E-01	5.00E-05	1.61E-03	0.184	0.411	0.920	8.75E-03	3.91E-03	1.75E-03
gamma-BHC (Lindane)	6.60E-02	1.52	1.00E-01	1.852	1.22E-01	3.92	2.59E-01	5.00E-05	3.62E-03	8.00	17.9	40.0	4.53E-04	2.02E-04	9.05E-05
gamma-Chlordane	6.60E-02	2.06	1.36E-01	0.165	1.09E-02	4.36	2.88E-01	5.00E-05	2.79E-03	4.58	6.48	9.16	6.09E-04	4.31E-04	3.05E-04
Heptachlor	6.60E-02	0.058	3.85E-03	0.174	1.15E-02	3.92	2.59E-01	5.00E-05	9.52E-04	0.20	0.45	1.00	4.76E-03	2.13E-03	9.52E-04
Heptachlor epoxide	6.60E-02	0.290	1.91E-02	0.566	3.73E-02	3.92	2.59E-01	5.00E-05	1.48E-03	0.20	0.45	1.00	7.38E-03	3.30E-03	1.48E-03
Methoxychlor	6.60E-02	1.000	6.60E-02	0.525	3.46E-02	3.92	2.59E-01	5.00E-05	2.08E-03	4.00	5.66	8.00	5.19E-04	3.67E-04	2.59E-04
Toxaphene	1.30E+00	1.000	1.30E+00	0.355	4.61E-01	3.92	5.09E+00	6.40E-04	3.81E-02	8.00	17.9	40.0	4.76E-03	2.13E-03	9.52E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.000	1.10E-02	1.00E-03	4.84E-04	76.0	170	380	6.37E-06	2.85E-06	1.27E-06
1,2,4,5-Tetrachlorobenzene	1.20E+00	0.624	7.49E-01	0.792	9.50E-01	0.078	9.40E-02	6.00E-03	2.64E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.10E-02	0.482	5.30E-03	1.426	1.57E-02	0.381	4.19E-03	1.00E-03	4.50E-04	53.0	75.0	106	8.50E-06	6.01E-06	4.25E-06
1,2-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.452	2.70E-02	0.244	2.68E-03	1.00E-03	6.63E-04	85.7	192	429	7.74E-06	3.46E-06	1.55E-06
1,3-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.296	2.53E-02	0.044	4.79E-04	1.00E-03	6.37E-04	85.7	192	429	7.44E-06	3.33E-06	1.49E-06
1,4-Dichlorobenzene	1.10E-02	1.000	1.10E-02	2.475	2.72E-02	0.030	3.35E-04	1.00E-03	6.61E-04	30.0	52.0	90.0	2.20E-05	1.27E-05	7.35E-06
4-Bromophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.566	6.79E-01	1.000	1.20E+00	6.00E-03	3.15E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	1.20E+00	1.000	1.20E+00	0.593	7.11E-01	1.000	1.20E+00	6.00E-03	3.19E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	1.50E-01	0.731	1.10E-01	Regresson	1.95E-02	0.093	1.40E-02	8.00E-05	2.19E-03	65.6	147	328	3.34E-05	1.50E-05	6.69E-06
Acenaphthylene	1.50E-01	1.004	1.51E-01	Regresson	7.10E-02	0.058	8.67E-03	8.00E-05	3.37E-03	65.6	147	328	5.14E-05	2.30E-05	1.03E-05
Anthracene	4.40E-02	1.027	4.52E-02	Regresson	3.27E-02	0.029	1.26E-03	8.00E-05	1.15E-03	65.6	147	328	1.76E-05	7.87E-06	3.52E-06
Benzo(a)anthracene	1.70E-01	0.349	5.93E-02	Regresson	2.33E-02	0.068	1.15E-02	8.00E-05	1.62E-03	0.62	1.37	3.07	2.63E-03	1.18E-03	5.26E-04

ATTACHMENT TABLE L-4-8

Summary of Raccoon Exposure Doses - Screening (Step 2) - Maximum - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Maximum Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	1.60E-01	1.177	1.88E-01	Regresson	2.13E-02	0.008	1.23E-03	8.00E-05	3.28E-03	0.62	1.37	3.07	5.33E-03	2.39E-03	1.07E-03
Benzo(b)fluoranthene	3.20E-01	0.418	1.34E-01	0.480	1.54E-01	0.009	2.75E-03	8.00E-05	4.65E-03	0.62	1.37	3.07	7.55E-03	3.38E-03	1.51E-03
Benzo(g,h,i)perylene	1.10E-01	0.253	2.78E-02	Regresson	2.89E-02	0.123	1.36E-02	8.00E-05	1.09E-03	0.62	1.37	3.07	1.78E-03	7.95E-04	3.56E-04
Benzo(k)fluoranthene	1.20E-01	0.357	4.29E-02	Regresson	1.87E-02	0.008	9.51E-04	8.00E-05	1.17E-03	0.62	1.37	3.07	1.90E-03	8.52E-04	3.81E-04
Chrysene	2.70E-01	0.416	1.12E-01	Regresson	3.06E-02	0.049	1.31E-02	8.00E-05	2.72E-03	0.62	1.37	3.07	4.42E-03	1.98E-03	8.85E-04
Dibenz(a,h)anthracene	1.50E-01	0.180	2.70E-02	0.230	3.45E-02	0.008	1.19E-03	8.00E-05	1.24E-03	0.62	1.37	3.07	2.02E-03	9.02E-04	4.04E-04
Fluoranthene	4.30E-01	0.288	1.24E-01	4.700	2.02E+00	0.021	9.00E-03	8.00E-05	2.79E-02	65.6	147	328	4.26E-04	1.90E-04	8.51E-05
Fluorene	1.50E-01	1.48	2.22E-01	Regresson	1.95E-02	0.271	4.06E-02	8.00E-05	3.76E-03	65.6	147	328	5.74E-05	2.57E-05	1.15E-05
Hexachlorobenzene	1.20E+00	0.857	1.03E+00	0.246	2.96E-01	0.196	2.35E-01	3.00E-03	2.19E-02	2.00	2.83	4.00	1.10E-02	7.75E-03	5.48E-03
Hexachlorobutadiene	1.20E+00	0.612	7.34E-01	0.675	8.11E-01	0.078	9.40E-02	6.00E-03	2.45E-02	2.00	6.32	20.0	1.22E-02	3.87E-03	1.22E-03
Hexachlorocyclopentadiene	1.20E+00	1.000	1.20E+00	0.393	4.71E-01	1.000	1.20E+00	6.00E-03	2.89E-02	75.0	168	375	3.86E-04	1.73E-04	7.72E-05
Hexachloroethane	1.20E+00	1.000	1.20E+00	1.439	1.73E+00	1.000	1.20E+00	3.00E-03	4.40E-02	100	224	500	4.40E-04	1.97E-04	8.80E-05
Indeno(1,2,3-cd)pyrene	9.20E-02	0.203	1.87E-02	0.150	1.38E-02	0.087	8.00E-03	8.00E-05	7.19E-04	0.62	1.37	3.07	1.17E-03	5.23E-04	2.34E-04
Pentachlorophenol	3.50E+00	1.000	3.50E+00	30.10	1.05E+02	0.893	3.12E+00	9.00E-03	1.37E+00	8.42	18.8	42.1	1.62E-01	7.26E-02	3.25E-02
Phenanthrene	3.00E-01	0.476	1.43E-01	Regresson	4.01E-01	0.136	4.08E-02	8.00E-05	7.85E-03	65.6	147	328	1.20E-04	5.35E-05	2.39E-05
Pyrene	4.00E-01	2.55	1.02E+00	2.400	9.60E-01	0.101	4.02E-02	8.00E-05	2.68E-02	0.62	1.37	3.07	4.37E-02	1.95E-02	8.75E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.66E-05	0.00E+00	1.01E-07	0.000001	0.000003	0.00001	1.01E-01	3.18E-02	1.01E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.1307	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.436	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.400	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.070	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.094	= Proportion of diet composed of sediment
WIR =	0.6092	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	4.23	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	Measured	7.18E-01	1.59E-03	3.80E-01	5.14	8.12	12.8	7.40E-02	4.68E-02	2.96E-02
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	Measured	3.26E-01	2.92E-04	4.40E-02	1.47	3.29	7.35	2.99E-02	1.34E-02	5.99E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	Measured	8.52E-01	1.50E-03	1.87E-01	2.66	5.95	13.3	7.04E-02	3.15E-02	1.41E-02
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	Measured	6.25E+00	9.82E-04	1.18E+00	4.05	7.00	12.1	2.90E-01	1.68E-01	9.72E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	Measured	5.55E-01	5.94E-04	1.26E-01	3.85	8.61	19.3	3.28E-02	1.47E-02	6.56E-03
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	Measured	6.75E-02	3.45E-05	1.22E-02	0.026	0.045	0.078	4.68E-01	2.70E-01	1.56E-01
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	Measured	4.05E-01	1.55E-03	6.89E-02	6.71	15.0	33.6	1.03E-02	4.59E-03	2.05E-03
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	Measured	1.20E+00	1.30E-03	1.86E-01	1.80	4.02	9.00	1.03E-01	4.63E-02	2.07E-02
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	7.84E-02	4.18E-05	8.61E-03	4.04	9.03	20.2	2.13E-03	9.53E-04	4.26E-04
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	Measured	2.11E+02	1.03E-02	2.46E+01	66.1	148	331	3.72E-01	1.66E-01	7.44E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	3.50E-02	1.50	3.35	7.50	2.33E-02	1.04E-02	4.66E-03
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	4.44E-02	1.50	3.35	7.50	2.96E-02	1.32E-02	5.92E-03
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	Measured	1.77E+00	2.50E-04	1.86E-01	1.50	3.35	7.50	1.24E-01	5.56E-02	2.48E-02
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	9.65E-03	0.30	0.95	3.00	3.22E-02	1.02E-02	3.22E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	1.18E-02	0.30	0.95	3.00	3.92E-02	1.24E-02	3.92E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	1.56E-01	0.30	0.95	3.00	5.19E-01	1.64E-01	5.19E-02
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	1.00E-02	0.155	0.347	0.775	6.47E-02	2.89E-02	1.29E-02
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	1.02E-02	0.56	1.12	2.25	1.82E-02	9.07E-03	4.52E-03
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	6.26E-03	0.80	1.79	4.00	7.82E-03	3.50E-03	1.56E-03
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	1.02E-02	0.56	1.12	2.25	1.82E-02	9.07E-03	4.52E-03
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	1.02E-02	0.56	1.12	2.25	1.82E-02	9.07E-03	4.52E-03
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	6.55E-03	0.071	0.518	3.780	9.23E-02	1.26E-02	1.73E-03
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	9.86E-03	10.0	22.4	50.0	9.86E-04	4.41E-04	1.97E-04
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	9.86E-03	10.0	22.4	50.0	9.86E-04	4.41E-04	1.97E-04
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	1.01E-02	0.30	0.67	1.50	3.35E-02	1.50E-02	6.71E-03
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	1.00E-02	4.00	8.9	20.0	2.50E-03	1.12E-03	5.00E-04
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	7.21E-03	0.80	1.79	4.00	9.01E-03	4.03E-03	1.80E-03
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	9.86E-03	0.48	1.07	2.40	2.05E-02	9.18E-03	4.11E-03
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	9.97E-03	0.48	1.07	2.40	2.08E-02	9.29E-03	4.16E-03
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	1.03E-02	355	794	1,775	2.91E-05	1.30E-05	5.81E-06
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	2.06E-01	1.00	2.24	5.00	2.06E-01	9.20E-02	4.11E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	3.80E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	6.33E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	1.47E-04	80.4	180	402	1.83E-06	8.18E-07	3.66E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	1.74E-04	80.4	180	402	2.16E-06	9.66E-07	4.32E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	1.19E-04	80.4	180	402	1.48E-06	6.63E-07	2.96E-07
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	1.16E-04	80.4	180	402	1.44E-06	6.43E-07	2.88E-07
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	4.67E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	4.67E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	4.40E-04	7.10	15.9	35.5	6.19E-05	2.77E-05	1.24E-05
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	2.74E-04	7.10	15.9	35.5	3.86E-05	1.73E-05	7.73E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	5.53E-04	7.10	15.9	35.5	7.79E-05	3.48E-05	1.56E-05
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	3.92E-04	7.10	15.9	35.5	5.52E-05	2.47E-05	1.10E-05

ATTACHMENT TABLE L-4-9

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	1.62E-04	7.10	15.9	35.5	2.29E-05	1.02E-05	4.58E-06
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	1.25E-04	7.10	15.9	35.5	1.76E-05	7.88E-06	3.52E-06
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	7.04E-05	7.10	15.9	35.5	9.91E-06	4.43E-06	1.98E-06
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	3.80E-04	7.10	15.9	35.5	5.36E-05	2.40E-05	1.07E-05
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	5.71E-04	7.10	15.9	35.5	8.04E-05	3.60E-05	1.61E-05
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	5.92E-05	7.10	15.9	35.5	8.34E-06	3.73E-06	1.67E-06
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	8.69E-04	7.10	15.9	35.5	1.22E-04	5.48E-05	2.45E-05
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	7.47E-04	7.10	15.9	35.5	1.05E-04	4.71E-05	2.11E-05
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	1.16E-02	0.113	0.253	0.565	1.03E-01	4.59E-02	2.05E-02
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	6.24E-03	3.39	7.58	17.0	1.84E-03	8.23E-04	3.68E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	4.67E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	4.65E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	4.23E-05	7.10	15.9	35.5	5.95E-06	2.66E-06	1.19E-06
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	1.26E-01	6.73	21.3	67.3	1.87E-02	5.91E-03	1.87E-03
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	1.38E-03	7.10	15.9	35.5	1.95E-04	8.71E-05	3.90E-05
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	2.19E-03	7.10	15.9	35.5	3.08E-04	1.38E-04	6.16E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	5.66E-05	0.00E+00	5.79E-06	0.000014	0.000044	0.00014	4.14E-01	1.31E-01	4.14E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0180 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.160 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.840 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0164 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.1480 = Body weight (kg)

ATTACHMENT TABLE L-4-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	Measured	7.96E-01	1.59E-03	4.49E-02	5.14	8.12	12.8	8.73E-03	5.52E-03	3.49E-03
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	Measured	5.35E-01	2.92E-04	3.01E-02	1.47	3.29	7.35	2.05E-02	9.16E-03	4.09E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	Measured	1.08E+00	1.50E-03	6.10E-02	2.66	5.95	13.3	2.29E-02	1.03E-02	4.59E-03
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	Measured	7.97E+00	9.82E-04	4.49E-01	4.05	7.00	12.1	1.11E-01	6.41E-02	3.71E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	Measured	1.00E+00	5.94E-04	5.66E-02	3.85	8.61	19.3	1.47E-02	6.57E-03	2.94E-03
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	Measured	5.95E-02	3.45E-05	3.35E-03	0.026	0.045	0.078	1.29E-01	7.43E-02	4.29E-02
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	Measured	5.89E-01	1.55E-03	3.32E-02	6.71	15.0	33.6	4.95E-03	2.21E-03	9.90E-04
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	Measured	1.37E+00	1.30E-03	7.72E-02	1.80	4.02	9.00	4.29E-02	1.92E-02	8.58E-03
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	8.04E-02	4.18E-05	4.52E-03	4.04	9.03	20.2	1.12E-03	5.01E-04	2.24E-04
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	Measured	1.81E+02	1.03E-02	1.02E+01	66.1	148	331	1.54E-01	6.87E-02	3.07E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	1.69E-02	1.50	3.35	7.50	1.13E-02	5.04E-03	2.25E-03
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	2.14E-02	1.50	3.35	7.50	1.43E-02	6.38E-03	2.85E-03
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	Measured	1.35E+00	2.50E-04	7.61E-02	1.50	3.35	7.50	5.07E-02	2.27E-02	1.01E-02
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	4.52E-03	0.30	0.95	3.00	1.51E-02	4.77E-03	1.51E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	5.85E-03	0.30	0.95	3.00	1.95E-02	6.16E-03	1.95E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	8.38E-02	0.30	0.95	3.00	2.79E-01	8.83E-02	2.79E-02
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	5.41E-03	0.155	0.347	0.775	3.49E-02	1.56E-02	6.98E-03
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	5.41E-03	0.56	1.12	2.25	9.66E-03	4.82E-03	2.40E-03
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	3.05E-03	0.80	1.79	4.00	3.82E-03	1.71E-03	7.64E-04
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	5.41E-03	0.56	1.12	2.25	9.66E-03	4.82E-03	2.40E-03
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	5.41E-03	0.56	1.12	2.25	9.66E-03	4.82E-03	2.40E-03
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	2.31E-03	0.071	0.518	3.780	3.25E-02	4.45E-03	6.10E-04
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	5.41E-03	10.0	22.4	50.0	5.41E-04	2.42E-04	1.08E-04
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	5.41E-03	10.0	22.4	50.0	5.41E-04	2.42E-04	1.08E-04
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	5.41E-03	0.30	0.67	1.50	1.80E-02	8.06E-03	3.60E-03
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	5.41E-03	4.00	8.9	20.0	1.35E-03	6.05E-04	2.70E-04
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	3.42E-03	0.80	1.79	4.00	4.28E-03	1.91E-03	8.55E-04
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	5.41E-03	0.48	1.07	2.40	1.13E-02	5.04E-03	2.25E-03
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	5.41E-03	0.48	1.07	2.40	1.13E-02	5.04E-03	2.25E-03
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	5.41E-03	355	794	1,775	1.52E-05	6.81E-06	3.05E-06
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	1.08E-01	1.00	2.24	5.00	1.08E-01	4.82E-02	2.16E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	1.72E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	1.81E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	6.57E-05	80.4	180	402	8.17E-07	3.65E-07	1.63E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	5.91E-05	80.4	180	402	7.36E-07	3.29E-07	1.47E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	2.92E-05	80.4	180	402	3.63E-07	1.62E-07	7.25E-08
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	2.72E-05	80.4	180	402	3.38E-07	1.51E-07	6.77E-08
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	2.15E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	2.15E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	2.15E-04	7.10	15.9	35.5	3.02E-05	1.35E-05	6.04E-06
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	8.53E-05	7.10	15.9	35.5	1.20E-05	5.37E-06	2.40E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	4.68E-05	7.10	15.9	35.5	6.59E-06	2.95E-06	1.32E-06
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	3.36E-05	7.10	15.9	35.5	4.73E-06	2.11E-06	9.45E-07

ATTACHMENT TABLE L-4-10

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	2.68E-05	7.10	15.9	35.5	3.77E-06	1.69E-06	7.54E-07
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	6.03E-05	7.10	15.9	35.5	8.49E-06	3.80E-06	1.70E-06
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	3.60E-05	7.10	15.9	35.5	5.07E-06	2.27E-06	1.01E-06
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	2.35E-05	7.10	15.9	35.5	3.31E-06	1.48E-06	6.62E-07
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	4.73E-05	7.10	15.9	35.5	6.66E-06	2.98E-06	1.33E-06
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	1.49E-05	7.10	15.9	35.5	2.10E-06	9.38E-07	4.20E-07
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	8.83E-05	7.10	15.9	35.5	1.24E-05	5.56E-06	2.49E-06
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	1.45E-04	7.10	15.9	35.5	2.05E-05	9.15E-06	4.09E-06
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	4.26E-03	0.113	0.253	0.565	3.77E-02	1.69E-02	7.54E-03
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	1.81E-03	3.39	7.58	17.0	5.35E-04	2.39E-04	1.07E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	2.15E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	2.15E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	2.06E-05	7.10	15.9	35.5	2.90E-06	1.30E-06	5.81E-07
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	5.69E-02	6.73	21.3	67.3	8.46E-03	2.67E-03	8.46E-04
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	1.43E-04	7.10	15.9	35.5	2.02E-05	9.04E-06	4.04E-06
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	9.16E-05	7.10	15.9	35.5	1.29E-05	5.77E-06	2.58E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.63E-05	0.00E+00	2.60E-06	0.000014	0.000044	0.00014	1.86E-01	5.88E-02	1.86E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1254 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1010 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.230 = Body weight (kg)

ATTACHMENT TABLE L-4-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	0.126	1.19E+01	1.59E-03	2.98E-01	5.14	8.12	12.8	5.80E-02	3.67E-02	2.32E-02
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	0.164	2.05E-01	2.92E-04	3.38E-02	1.47	3.29	7.35	2.30E-02	1.03E-02	4.60E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	0.038	8.96E-01	1.50E-03	1.02E-01	2.66	5.95	13.3	3.84E-02	1.72E-02	7.68E-03
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	0.100	3.34E+00	9.82E-04	5.09E-01	4.05	7.00	12.1	1.26E-01	7.26E-02	4.20E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	0.070	3.01E+00	5.94E-04	1.76E-01	1.63	2.31	3.26	1.08E-01	7.64E-02	5.40E-02
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	3.250	7.41E-01	3.45E-05	8.52E-03	0.026	0.045	0.078	3.28E-01	1.89E-01	1.09E-01
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	1.000	6.97E+00	1.55E-03	3.70E-02	6.71	15.0	33.6	5.52E-03	2.47E-03	1.10E-03
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	1.000	3.25E+00	1.30E-03	9.84E-02	0.40	0.57	0.80	2.46E-01	1.74E-01	1.23E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	5.11E-04	4.04	9.03	20.2	1.26E-04	5.65E-05	2.53E-05
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	0.147	3.32E+01	1.03E-02	5.16E+00	66.1	148	331	7.80E-02	3.49E-02	1.56E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	2.18E-03	1.50	3.35	7.50	1.45E-03	6.49E-04	2.90E-04
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	3.49E-03	1.50	3.35	7.50	2.33E-03	1.04E-03	4.66E-04
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	2.77E-03	1.50	3.35	7.50	1.85E-03	8.26E-04	3.70E-04
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	2.18E-03	1.50	3.35	7.50	1.45E-03	6.49E-04	2.90E-04
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	1.75E-03	1.50	3.35	7.50	1.16E-03	5.21E-04	2.33E-04
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	1.61E-03	1.50	3.35	7.50	1.07E-03	4.79E-04	2.14E-04
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	1.93E-03	1.50	3.35	7.50	1.29E-03	5.76E-04	2.58E-04
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	4.03	3.80E-01	2.50E-04	2.07E-03	1.50	3.35	7.50	1.38E-03	6.16E-04	2.76E-04
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	7.85E-04	0.12	0.27	0.60	6.54E-03	2.93E-03	1.31E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	6.34E-04	0.12	0.27	0.60	5.28E-03	2.36E-03	1.06E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	5.16E-03	0.60	0.95	1.50	8.60E-03	5.44E-03	3.44E-03
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	2.30E-04	0.155	0.347	0.775	1.48E-03	6.62E-04	2.96E-04
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	1.89E-03	0.56	1.12	2.25	3.38E-03	1.69E-03	8.41E-04
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	3.80E-04	0.80	1.79	4.00	4.75E-04	2.13E-04	9.51E-05
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	1.88E-03	0.56	1.12	2.25	3.35E-03	1.67E-03	8.34E-04
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	1.46E-03	0.56	1.12	2.25	2.61E-03	1.30E-03	6.49E-04
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	1.04E-03	0.071	0.518	3.780	1.46E-02	2.00E-03	2.74E-04
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	1.77E-03	10.0	22.4	50.0	1.77E-04	7.90E-05	3.53E-05
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	9.50E-04	10.0	22.4	50.0	9.50E-05	4.25E-05	1.90E-05
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	6.40E-04	0.30	0.67	1.50	2.13E-03	9.54E-04	4.27E-04
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	1.97E-03	4.00	8.9	20.0	4.92E-04	2.20E-04	9.84E-05
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	4.51E-04	0.80	1.79	4.00	5.64E-04	2.52E-04	1.13E-04
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	2.23E-04	0.48	1.07	2.40	4.65E-04	2.08E-04	9.30E-05
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	6.51E-04	0.48	1.07	2.40	1.36E-03	6.06E-04	2.71E-04
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	6.93E-04	355	794	1,775	1.95E-06	8.73E-07	3.90E-07
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	1.03E-02	1.00	2.24	5.00	1.03E-02	4.63E-03	2.07E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	1.56E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	1.40E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	1.93E-04	80.4	180	402	2.40E-06	1.07E-06	4.81E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	3.16E-04	80.4	180	402	3.93E-06	1.76E-06	7.87E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	2.99E-04	80.4	180	402	3.72E-06	1.66E-06	7.44E-07
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	3.19E-04	80.4	180	402	3.96E-06	1.77E-06	7.93E-07
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	1.15E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	1.20E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	2.18E-03	7.10	15.9	35.5	3.07E-04	1.37E-04	6.15E-05
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	1.34E-03	7.10	15.9	35.5	1.88E-04	8.43E-05	3.77E-05
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	1.55E-03	7.10	15.9	35.5	2.18E-04	9.74E-05	4.36E-05
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	1.00E-03	7.10	15.9	35.5	1.41E-04	6.30E-05	2.82E-05

ATTACHMENT TABLE L-4-11

Summary of Mallard Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	7.40E-04	7.10	15.9	35.5	1.04E-04	4.66E-05	2.08E-05
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	2.75E-03	7.10	15.9	35.5	3.88E-04	1.73E-04	7.75E-05
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	8.06E-04	7.10	15.9	35.5	1.13E-04	5.07E-05	2.27E-05
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	7.08E-04	7.10	15.9	35.5	9.98E-05	4.46E-05	2.00E-05
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	1.20E-03	7.10	15.9	35.5	1.69E-04	7.57E-05	3.39E-05
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	3.56E-04	7.10	15.9	35.5	5.01E-05	2.24E-05	1.00E-05
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	5.63E-03	7.10	15.9	35.5	7.93E-04	3.55E-04	1.59E-04
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	2.29E-03	7.10	15.9	35.5	3.22E-04	1.44E-04	6.45E-05
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	5.51E-03	0.113	0.253	0.565	4.88E-02	2.18E-02	9.76E-03
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	1.22E-02	3.39	7.58	17.0	3.58E-03	1.60E-03	7.17E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	8.81E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	2.53E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	3.86E-04	7.10	15.9	35.5	5.44E-05	2.43E-05	1.09E-05
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	2.86E-01	6.73	21.3	67.3	4.25E-02	1.34E-02	4.25E-03
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	1.09E-02	7.10	15.9	35.5	1.53E-03	6.84E-04	3.06E-04
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	7.23E-03	7.10	15.9	35.5	1.02E-03	4.56E-04	2.04E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0564 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.100 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.867 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.033 = Proportion of diet composed of sediment
WIR = 0.0658 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.177 = Body weight (kg)

ATTACHMENT TABLE L-4-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	Measured	1.44E+00	1.59E-03	7.58E-02	5.14	8.12	12.8	1.48E-02	9.33E-03	5.91E-03
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	Measured	7.21E-02	2.92E-04	3.80E-03	1.47	3.29	7.35	2.58E-03	1.16E-03	5.17E-04
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	Measured	7.76E-01	1.50E-03	4.08E-02	2.66	5.95	13.3	1.54E-02	6.87E-03	3.07E-03
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	Measured	1.28E+00	9.82E-04	6.75E-02	4.05	7.00	12.1	1.67E-02	9.64E-03	5.58E-03
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	Measured	1.48E-01	5.94E-04	7.78E-03	3.85	8.61	19.3	2.02E-03	9.03E-04	4.04E-04
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	Measured	2.95E-01	3.45E-05	1.55E-02	0.49	0.77	1.20	3.16E-02	2.02E-02	1.29E-02
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	Measured	3.96E-01	1.55E-03	2.08E-02	6.71	15.0	33.6	3.11E-03	1.39E-03	6.21E-04
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	Measured	8.86E-01	1.30E-03	4.66E-02	1.80	4.02	9.00	2.59E-02	1.16E-02	5.17E-03
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	1.44E-01	4.18E-05	7.58E-03	4.04	9.03	20.2	1.88E-03	8.39E-04	3.75E-04
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	Measured	8.25E+01	1.03E-02	4.33E+00	66.1	148	331	6.55E-02	2.93E-02	1.31E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	Measured	1.23E-01	2.50E-04	6.47E-03	0.41	0.92	2.05	1.58E-02	7.06E-03	3.16E-03
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	Measured	6.72E-01	2.50E-04	3.53E-02	0.41	0.92	2.05	8.61E-02	3.85E-02	1.72E-02
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	Measured	1.77E+00	2.50E-04	9.29E-02	0.41	0.92	2.05	2.27E-01	1.01E-01	4.53E-02
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	4.22E-03	0.30	0.95	3.00	1.41E-02	4.45E-03	1.41E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	5.46E-03	0.30	0.95	3.00	1.82E-02	5.75E-03	1.82E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	7.82E-02	0.30	0.95	3.00	2.61E-01	8.24E-02	2.61E-02
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	5.05E-03	0.155	0.347	0.775	3.26E-02	1.46E-02	6.51E-03
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	5.05E-03	0.56	1.12	2.25	9.01E-03	4.50E-03	2.24E-03
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	2.85E-03	0.80	1.79	4.00	3.56E-03	1.59E-03	7.13E-04
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	5.05E-03	0.56	1.12	2.25	9.01E-03	4.50E-03	2.24E-03
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	5.05E-03	0.56	1.12	2.25	9.01E-03	4.50E-03	2.24E-03
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	2.15E-03	0.071	0.518	3.780	3.03E-02	4.16E-03	5.69E-04
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	5.05E-03	10.0	22.4	50.0	5.05E-04	2.26E-04	1.01E-04
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	5.05E-03	10.0	22.4	50.0	5.05E-04	2.26E-04	1.01E-04
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	5.05E-03	0.021	0.047	0.104	2.43E-01	1.09E-01	4.85E-02
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	5.05E-03	4.00	8.9	20.0	1.26E-03	5.64E-04	2.52E-04
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	3.19E-03	0.80	1.79	4.00	3.99E-03	1.79E-03	7.98E-04
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	5.05E-03	0.48	1.07	2.40	1.05E-02	4.70E-03	2.10E-03
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	5.05E-03	0.48	1.07	2.40	1.05E-02	4.70E-03	2.10E-03
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	5.05E-03	355	794	1,775	1.42E-05	6.36E-06	2.84E-06
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	1.01E-01	1.00	2.24	5.00	1.01E-01	4.50E-02	2.01E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	1.66E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	1.72E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	6.60E-05	80.4	180	402	8.21E-07	3.67E-07	1.64E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	6.00E-05	80.4	180	402	7.46E-07	3.34E-07	1.49E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	3.20E-05	80.4	180	402	3.98E-07	1.78E-07	7.95E-08
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	3.01E-05	80.4	180	402	3.75E-07	1.68E-07	7.50E-08
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	2.01E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	2.01E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	2.01E-04	7.10	15.9	35.5	2.83E-05	1.26E-05	5.65E-06
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	8.00E-05	7.10	15.9	35.5	1.13E-05	5.04E-06	2.25E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	4.41E-05	7.10	15.9	35.5	6.21E-06	2.78E-06	1.24E-06
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	3.17E-05	7.10	15.9	35.5	4.46E-06	2.00E-06	8.93E-07

ATTACHMENT TABLE L-4-12

Summary of Osprey Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	2.54E-05	7.10	15.9	35.5	3.57E-06	1.60E-06	7.15E-07
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	5.66E-05	7.10	15.9	35.5	7.98E-06	3.57E-06	1.60E-06
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	3.40E-05	7.10	15.9	35.5	4.78E-06	2.14E-06	9.57E-07
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	2.23E-05	7.10	15.9	35.5	3.14E-06	1.41E-06	6.28E-07
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	4.45E-05	7.10	15.9	35.5	6.27E-06	2.80E-06	1.25E-06
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	1.43E-05	7.10	15.9	35.5	2.01E-06	9.00E-07	4.02E-07
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	8.28E-05	7.10	15.9	35.5	1.17E-05	5.21E-06	2.33E-06
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	1.36E-04	7.10	15.9	35.5	1.92E-05	8.57E-06	3.83E-06
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	3.99E-03	0.113	0.253	0.565	3.53E-02	1.58E-02	7.06E-03
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	1.72E-03	3.39	7.58	17.0	5.08E-04	2.27E-04	1.02E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	2.01E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	2.01E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	1.96E-05	7.10	15.9	35.5	2.76E-06	1.24E-06	5.53E-07
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	5.32E-02	6.73	21.3	67.3	7.90E-03	2.50E-03	7.90E-04
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	1.34E-04	7.10	15.9	35.5	1.89E-05	8.46E-06	3.78E-06
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	8.59E-05	7.10	15.9	35.5	1.21E-05	5.41E-06	2.42E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	6.02E-05	0.00E+00	3.16E-06	0.000014	0.000044	0.00014	2.26E-01	7.14E-02	2.26E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0780 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0769 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.486 = Body weight (kg)

ATTACHMENT TABLE L-4-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	0.126	1.19E+01	1.59E-03	7.38E-01	2.46	4.26	7.38	3.00E-01	1.73E-01	1.00E-01
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	0.164	2.05E-01	2.92E-04	2.56E-02	1.47	3.29	7.35	1.74E-02	7.79E-03	3.48E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	0.038	8.96E-01	1.50E-03	2.41E-01	2.66	5.95	13.3	9.06E-02	4.05E-02	1.81E-02
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	0.100	3.34E+00	9.82E-04	1.29E+00	4.05	7.00	12.1	3.19E-01	1.85E-01	1.07E-01
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	0.070	3.01E+00	5.94E-04	1.67E-01	3.85	8.61	19.3	4.35E-02	1.94E-02	8.69E-03
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	3.250	7.41E-01	3.45E-05	1.27E-02	0.026	0.045	0.078	4.88E-01	2.82E-01	1.63E-01
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	1.000	6.97E+00	1.55E-03	6.60E-02	6.71	15.0	33.6	9.83E-03	4.40E-03	1.97E-03
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	1.000	3.25E+00	1.30E-03	1.53E-01	0.40	0.57	0.80	3.82E-01	2.70E-01	1.91E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	1.43E-03	4.04	9.03	20.2	3.53E-04	1.58E-04	7.07E-05
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	0.147	3.32E+01	1.03E-02	7.21E+00	66.1	148	331	1.09E-01	4.88E-02	2.18E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	3.48E+00	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1221	7.45E-02	Regression	3.48E+00	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1232	7.45E-02	Regression	3.48E+00	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1242	7.45E-02	Regression	3.48E+00	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1248	7.45E-02	Regression	3.48E+00	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1254	7.45E-02	Regression	3.48E+00	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	1.63E-01	1.50	3.35	7.50	1.09E-01	4.86E-02	2.17E-02
Aroclor-1260	9.44E-02	Regression	4.34E+00	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	2.04E-01	1.50	3.35	7.50	1.36E-01	6.07E-02	2.71E-02
PCB (total)	9.44E-02	Regression	4.34E+00	0.139	1.31E-02	4.03	3.80E-01	2.50E-04	2.04E-01	1.50	3.35	7.50	1.36E-01	6.07E-02	2.71E-02
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	3.44E-03	0.12	0.27	0.60	2.86E-02	1.28E-02	5.73E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	2.70E-03	0.12	0.27	0.60	2.25E-02	1.01E-02	4.50E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	7.78E-03	0.60	0.95	1.50	1.30E-02	8.20E-03	5.19E-03
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	4.69E-04	0.155	0.347	0.775	3.02E-03	1.35E-03	6.05E-04
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	8.22E-04	0.56	1.12	2.25	1.47E-03	7.32E-04	3.65E-04
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	1.69E-03	2.14	4.79	10.7	7.89E-04	3.53E-04	1.58E-04
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	8.22E-04	0.56	1.12	2.25	1.47E-03	7.32E-04	3.65E-04
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	8.22E-04	0.56	1.12	2.25	1.47E-03	7.32E-04	3.65E-04
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	5.67E-03	0.071	0.518	3.780	7.99E-02	1.09E-02	1.50E-03
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	7.04E-05	10.0	22.4	50.0	7.04E-06	3.15E-06	1.41E-06
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	7.04E-05	10.0	22.4	50.0	7.04E-06	3.15E-06	1.41E-06
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	5.43E-04	0.30	0.67	1.50	1.81E-03	8.09E-04	3.62E-04
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	3.90E-04	4.00	8.9	20.0	9.75E-05	4.36E-05	1.95E-05
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	2.38E-03	2.14	4.79	10.7	1.11E-03	4.97E-04	2.22E-04
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	5.63E-05	0.48	1.07	2.40	1.17E-04	5.25E-05	2.35E-05
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	3.38E-04	0.48	1.07	2.40	7.05E-04	3.15E-04	1.41E-04
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	1.16E-03	355	794	1,775	3.26E-06	1.46E-06	6.51E-07
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	2.30E-02	1.00	2.24	5.00	2.30E-02	1.03E-02	4.60E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	2.32E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	7.73E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	1.39E-04	80.4	180	402	1.73E-06	7.74E-07	3.46E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	2.32E-04	80.4	180	402	2.89E-06	1.29E-06	5.77E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	2.32E-04	80.4	180	402	2.89E-06	1.29E-06	5.77E-07
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	2.32E-04	80.4	180	402	2.89E-06	1.29E-06	5.77E-07
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	1.85E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	1.85E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	1.25E-04	7.10	15.9	35.5	1.76E-05	7.88E-06	3.53E-06
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	2.92E-04	7.10	15.9	35.5	4.12E-05	1.84E-05	8.24E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	1.13E-03	7.10	15.9	35.5	1.59E-04	7.13E-05	3.19E-05
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	8.02E-04	7.10	15.9	35.5	1.13E-04	5.05E-05	2.26E-05

ATTACHMENT TABLE L-4-13

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	2.80E-04	7.10	15.9	35.5	3.94E-05	1.76E-05	7.88E-06
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	4.29E-05	7.10	15.9	35.5	6.05E-06	2.70E-06	1.21E-06
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	1.77E-05	7.10	15.9	35.5	2.49E-06	1.11E-06	4.97E-07
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	8.19E-04	7.10	15.9	35.5	1.15E-04	5.16E-05	2.31E-05
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	1.17E-03	7.10	15.9	35.5	1.65E-04	7.39E-05	3.30E-05
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	8.31E-05	7.10	15.9	35.5	1.17E-05	5.23E-06	2.34E-06
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	1.71E-03	7.10	15.9	35.5	2.41E-04	1.08E-04	4.82E-05
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	1.17E-03	7.10	15.9	35.5	1.65E-04	7.36E-05	3.29E-05
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	9.46E-03	0.113	0.253	0.565	8.37E-02	3.74E-02	1.67E-02
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	7.51E-03	3.39	7.58	17.0	2.22E-03	9.91E-04	4.43E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	1.85E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	1.82E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	1.73E-05	7.10	15.9	35.5	2.43E-06	1.09E-06	4.87E-07
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	5.40E-02	6.73	21.3	67.3	8.02E-03	2.54E-03	8.02E-04
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	2.71E-03	7.10	15.9	35.5	3.81E-04	1.70E-04	7.62E-05
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	4.87E-03	7.10	15.9	35.5	6.86E-04	3.07E-04	1.37E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

ATTACHMENT TABLE L-4-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	Measured	7.18E-01	1.59E-03	2.46E-02	1.04	1.31	1.66	2.37E-02	1.88E-02	1.48E-02
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	Measured	3.26E-01	2.92E-04	1.12E-02	0.77	2.43	7.70	1.45E-02	4.59E-03	1.45E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	Measured	8.52E-01	1.50E-03	2.92E-02	2.40	5.37	12.0	1.22E-02	5.44E-03	2.43E-03
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	Measured	6.25E+00	9.82E-04	2.14E-01	11.7	13.3	15.1	1.83E-02	1.61E-02	1.41E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	Measured	5.55E-01	5.94E-04	1.90E-02	4.70	6.47	8.90	4.05E-03	2.94E-03	2.14E-03
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	Measured	6.75E-02	3.45E-05	2.31E-03	0.150	0.192	0.247	1.54E-02	1.20E-02	9.36E-03
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	Measured	4.05E-01	1.55E-03	1.39E-02	1.70	2.40	3.40	8.18E-03	5.79E-03	4.09E-03
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	Measured	1.20E+00	1.30E-03	4.11E-02	0.20	0.26	0.33	2.06E-01	1.60E-01	1.25E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	7.84E-02	4.18E-05	2.69E-03	12.0	26.9	60.2	2.23E-04	9.97E-05	4.46E-05
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	Measured	2.11E+02	1.03E-02	7.23E+00	75.4	169	377	9.58E-02	4.29E-02	1.92E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.03E-02	1.37	2.17	3.43	7.51E-03	4.74E-03	3.00E-03
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	1.03E-02	0.137	0.306	0.685	7.51E-02	3.36E-02	1.50E-02
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	1.03E-02	0.137	0.306	0.685	7.51E-02	3.36E-02	1.50E-02
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.03E-02	0.137	0.306	0.685	7.51E-02	3.36E-02	1.50E-02
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	1.03E-02	0.137	0.306	0.685	7.51E-02	3.36E-02	1.50E-02
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	1.03E-02	0.137	0.306	0.685	7.51E-02	3.36E-02	1.50E-02
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	1.30E-02	0.137	0.306	0.685	9.50E-02	4.25E-02	1.90E-02
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	Measured	1.77E+00	2.50E-04	6.05E-02	0.137	0.306	0.685	4.42E-01	1.98E-01	8.84E-02
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	2.75E-03	0.147	0.329	0.735	1.87E-02	8.37E-03	3.75E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	3.56E-03	0.147	0.329	0.735	2.42E-02	1.08E-02	4.84E-03
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	5.10E-02	0.147	0.329	0.735	3.47E-01	1.55E-01	6.94E-02
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	3.29E-03	0.20	0.45	1.00	1.65E-02	7.36E-03	3.29E-03
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	3.29E-03	1.60	2.26	3.20	2.06E-03	1.46E-03	1.03E-03
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	1.86E-03	4.58	6.48	9.16	4.06E-04	2.87E-04	2.03E-04
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	3.29E-03	1.60	2.26	3.20	2.06E-03	1.46E-03	1.03E-03
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	3.29E-03	1.60	2.26	3.20	2.06E-03	1.46E-03	1.03E-03
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	1.40E-03	0.015	0.021	0.030	9.36E-02	6.62E-02	4.68E-02
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	3.29E-03	0.15	0.34	0.75	2.20E-02	9.82E-03	4.39E-03
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	3.29E-03	0.15	0.34	0.75	2.20E-02	9.82E-03	4.39E-03
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	3.29E-03	0.184	0.411	0.920	1.79E-02	8.00E-03	3.58E-03
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	3.29E-03	8.00	17.9	40.0	4.12E-04	1.84E-04	8.23E-05
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	2.08E-03	4.58	6.48	9.16	4.55E-04	3.22E-04	2.27E-04
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	3.29E-03	0.20	0.45	1.00	1.65E-02	7.36E-03	3.29E-03
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	3.29E-03	0.20	0.45	1.00	1.65E-02	7.36E-03	3.29E-03
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	3.29E-03	4.00	5.66	8.00	8.23E-04	5.82E-04	4.12E-04
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	6.57E-02	8.00	17.9	40.0	8.21E-03	3.67E-03	1.64E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	1.05E-04	76.0	170	380	1.38E-06	6.19E-07	2.77E-07
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	1.11E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	4.02E-05	53.0	75.0	106	7.59E-07	5.36E-07	3.79E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	3.62E-05	85.7	192	429	4.23E-07	1.89E-07	8.46E-08
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	1.80E-05	85.7	192	429	2.10E-07	9.38E-08	4.19E-08
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	1.68E-05	30.0	52.0	90.0	5.59E-07	3.23E-07	1.86E-07
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	1.31E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	1.31E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	1.31E-04	65.6	147	328	1.99E-06	8.91E-07	3.98E-07
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	5.20E-05	65.6	147	328	7.92E-07	3.54E-07	1.58E-07
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	2.85E-05	65.6	147	328	4.35E-07	1.94E-07	8.69E-08
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	2.04E-05	0.62	1.37	3.07	3.32E-05	1.49E-05	6.66E-06

ATTACHMENT TABLE L-4-14

Summary of Mink Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	1.63E-05	0.62	1.37	3.07	2.65E-05	1.19E-05	5.32E-06
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	3.67E-05	0.62	1.37	3.07	5.97E-05	2.67E-05	1.20E-05
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	2.19E-05	0.62	1.37	3.07	3.56E-05	1.60E-05	7.14E-06
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	1.43E-05	0.62	1.37	3.07	2.33E-05	1.04E-05	4.67E-06
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	2.88E-05	0.62	1.37	3.07	4.68E-05	2.10E-05	9.38E-06
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	9.09E-06	0.62	1.37	3.07	1.48E-05	6.61E-06	2.96E-06
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	5.38E-05	65.6	147	328	8.19E-07	3.66E-07	1.64E-07
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	8.85E-05	65.6	147	328	1.35E-06	6.03E-07	2.70E-07
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	2.60E-03	2.00	2.83	4.00	1.30E-03	9.18E-04	6.49E-04
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	1.11E-03	2.00	6.32	20.0	5.53E-04	1.75E-04	5.53E-05
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	1.31E-02	75.0	168	375	1.75E-04	7.82E-05	3.50E-05
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	1.31E-02	100	224	500	1.31E-04	5.85E-05	2.61E-05
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	1.26E-05	0.62	1.37	3.07	2.04E-05	9.15E-06	4.09E-06
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	3.47E-02	8.42	18.8	42.1	4.12E-03	1.84E-03	8.23E-04
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	8.74E-05	65.6	147	328	1.33E-06	5.96E-07	2.66E-07
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	5.58E-05	0.62	1.37	3.07	9.07E-05	4.06E-05	1.82E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	5.47E-05	0.00E+00	1.87E-06	0.000001	0.000003	0.00001	**1.87E+00**	5.92E-01	1.87E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

ATTACHMENT TABLE L-4-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	0.126	1.19E+01	1.59E-03	5.34E-01	0.25	0.56	1.26	**2.12E+00**	9.48E-01	4.24E-01
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	0.164	2.05E-01	2.92E-04	3.85E-02	0.77	2.43	7.70	5.00E-02	1.58E-02	5.00E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	0.038	8.96E-01	1.50E-03	1.58E-01	2.40	5.37	12.0	6.58E-02	2.94E-02	1.32E-02
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	0.100	3.34E+00	9.82E-04	5.20E-01	5.60	7.23	9.34	9.29E-02	7.19E-02	5.57E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	0.070	3.01E+00	5.94E-04	3.08E-01	4.70	6.47	8.90	6.54E-02	4.76E-02	3.46E-02
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	3.250	7.41E-01	3.45E-05	8.73E-03	0.032	0.072	0.160	2.73E-01	1.22E-01	5.46E-02
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	1.000	6.97E+00	1.55E-03	5.49E-02	1.70	2.40	3.40	3.23E-02	2.28E-02	1.62E-02
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	1.000	3.25E+00	1.30E-03	1.02E-01	0.20	0.26	0.33	5.10E-01	3.97E-01	3.09E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	9.18E-04	12.0	26.9	60.2	7.63E-05	3.41E-05	1.53E-05
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	0.147	3.32E+01	1.03E-02	5.60E+00	75.4	169	377	7.42E-02	3.32E-02	1.48E-02
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.49E-03	0.136	0.304	0.680	1.10E-02	4.91E-03	2.20E-03
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	2.96E-03	0.136	0.304	0.680	2.18E-02	9.73E-03	4.35E-03
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	2.16E-03	0.136	0.304	0.680	1.58E-02	7.09E-03	3.17E-03
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	1.49E-03	0.136	0.304	0.680	1.10E-02	4.91E-03	2.20E-03
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	1.02E-03	0.136	0.304	0.680	7.47E-03	3.34E-03	1.49E-03
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	8.61E-04	0.136	0.304	0.680	6.33E-03	2.83E-03	1.27E-03
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	9.36E-04	0.136	0.304	0.680	6.88E-03	3.08E-03	1.38E-03
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	4.03	3.80E-01	2.50E-04	1.08E-03	0.136	0.304	0.680	7.97E-03	3.56E-03	1.59E-03
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	6.35E-04	0.147	0.329	0.735	4.32E-03	1.93E-03	8.64E-04
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	5.19E-04	0.147	0.329	0.735	3.53E-03	1.58E-03	7.06E-04
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	7.46E-03	0.147	0.329	0.735	5.08E-02	2.27E-02	1.02E-02
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	2.78E-04	0.20	0.45	1.00	1.39E-03	6.21E-04	2.78E-04
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	2.09E-03	1.60	2.26	3.20	1.30E-03	9.22E-04	6.52E-04
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	3.07E-04	4.58	6.48	9.16	6.70E-05	4.74E-05	3.35E-05
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	2.07E-03	1.60	2.26	3.20	1.29E-03	9.14E-04	6.46E-04
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	1.61E-03	1.60	2.26	3.20	1.00E-03	7.10E-04	5.02E-04
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	5.85E-04	0.015	0.021	0.030	3.90E-02	2.76E-02	1.95E-02
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	2.03E-03	0.15	0.34	0.75	1.35E-02	6.06E-03	2.71E-03
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	1.12E-03	0.15	0.34	0.75	7.49E-03	3.35E-03	1.50E-03
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	7.26E-04	0.184	0.411	0.920	3.95E-03	1.76E-03	7.89E-04
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	2.22E-03	8.00	17.9	40.0	2.77E-04	1.24E-04	5.55E-05
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	3.07E-04	4.58	6.48	9.16	6.70E-05	4.74E-05	3.35E-05
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	3.18E-04	0.20	0.45	1.00	1.59E-03	7.10E-04	3.18E-04
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	7.61E-04	0.20	0.45	1.00	3.81E-03	1.70E-03	7.61E-04
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	7.15E-04	4.00	5.66	8.00	1.79E-04	1.26E-04	8.94E-05
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	1.04E-02	8.00	17.9	40.0	1.30E-03	5.81E-04	2.60E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	1.85E-04	76.0	170	380	2.43E-06	1.09E-06	4.86E-07
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	1.60E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	2.37E-04	53.0	75.0	106	4.47E-06	3.16E-06	2.24E-06
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	3.63E-04	85.7	192	429	4.24E-06	1.89E-06	8.47E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	3.44E-04	85.7	192	429	4.01E-06	1.80E-06	8.03E-07
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	3.66E-04	30.0	52.0	90.0	1.22E-05	7.04E-06	4.07E-06
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	1.21E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	1.25E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	2.56E-03	65.6	147	328	3.91E-05	1.75E-05	7.82E-06
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	1.61E-03	65.6	147	328	2.45E-05	1.10E-05	4.90E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	1.73E-03	65.6	147	328	2.63E-05	1.18E-05	5.26E-06
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	1.36E-03	0.62	1.37	3.07	2.21E-03	9.87E-04	4.42E-04

ATTACHMENT TABLE L-4-15

Summary of Muskrat Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	1.09E-03	0.62	1.37	3.07	1.78E-03	7.95E-04	3.56E-04
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	3.63E-03	0.62	1.37	3.07	5.91E-03	2.64E-03	1.18E-03
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	1.11E-03	0.62	1.37	3.07	1.80E-03	8.05E-04	3.60E-04
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	9.19E-04	0.62	1.37	3.07	1.49E-03	6.69E-04	2.99E-04
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	1.63E-03	0.62	1.37	3.07	2.65E-03	1.19E-03	5.31E-04
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	5.38E-04	0.62	1.37	3.07	8.76E-04	3.92E-04	1.75E-04
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	6.81E-03	65.6	147	328	1.04E-04	4.64E-05	2.08E-05
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	2.56E-03	65.6	147	328	3.91E-05	1.75E-05	7.82E-06
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	6.30E-03	2.00	2.83	4.00	3.15E-03	2.23E-03	1.57E-03
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	1.40E-02	2.00	6.32	20.0	7.00E-03	2.21E-03	7.00E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	9.02E-03	75.0	168	375	1.20E-04	5.38E-05	2.41E-05
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	2.73E-02	100	224	500	2.73E-04	1.22E-04	5.46E-05
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	6.19E-04	0.62	1.37	3.07	1.01E-03	4.50E-04	2.02E-04
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	3.15E-01	8.42	18.8	42.1	3.75E-02	1.68E-02	7.49E-03
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	1.22E-02	65.6	147	328	1.86E-04	8.32E-05	3.72E-05
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	8.14E-03	0.62	1.37	3.07	1.32E-02	5.92E-03	2.65E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0596 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1139 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.169 = Body weight (kg)

ATTACHMENT TABLE L-4-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	9.43E+01	Regression	1.57E+01	Regresson	1.77E+00	Measured	7.96E-01	1.59E-03	2.86E-01	1.04	1.31	1.66	2.75E-01	2.18E-01	1.72E-01
Cadmium	1.25E+00	Regression	5.44E-01	Regresson	7.02E-01	Measured	5.35E-01	2.92E-04	1.17E-02	0.77	2.43	7.70	1.52E-02	4.81E-03	1.52E-03
Chromium	2.36E+01	Regression	5.13E+00	0.041	9.67E-01	Measured	1.08E+00	1.50E-03	8.54E-02	2.40	5.37	12.0	3.56E-02	1.59E-02	7.12E-03
Copper	3.34E+01	0.824	2.76E+01	Regresson	7.78E+00	Measured	7.97E+00	9.82E-04	3.27E-01	11.7	13.3	15.1	2.79E-02	2.46E-02	2.16E-02
Lead	4.31E+01	Regression	3.56E+00	Regresson	2.19E+00	Measured	1.00E+00	5.94E-04	1.14E-01	4.70	6.47	8.90	2.42E-02	1.76E-02	1.28E-02
Mercury	2.28E-01	1.186	2.70E-01	Regresson	1.65E-01	Measured	5.95E-02	3.45E-05	3.64E-03	0.150	0.192	0.247	2.43E-02	1.89E-02	1.47E-02
Nickel	6.97E+00	Regression	1.40E+00	Regresson	4.62E-01	Measured	5.89E-01	1.55E-03	2.60E-02	1.70	2.40	3.40	1.53E-02	1.08E-02	7.65E-03
Selenium	3.25E+00	1.000	3.25E+00	Regresson	1.87E+00	Measured	1.37E+00	1.30E-03	4.46E-02	0.20	0.26	0.33	2.23E-01	1.74E-01	1.35E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	8.04E-02	4.18E-05	6.20E-04	12.0	26.9	60.2	5.15E-05	2.30E-05	1.03E-05
Zinc	2.26E+02	Regression	1.54E+02	Regresson	9.77E+01	Measured	1.81E+02	1.03E-02	2.43E+00	75.4	169	377	3.22E-02	1.44E-02	6.44E-03
Polychlorinated Biphenyls															
Aroclor-1016	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	2.32E-03	1.37	2.17	3.43	1.69E-03	1.07E-03	6.77E-04
Aroclor-1221	7.45E-02	Regression	2.18E-01	0.749	5.58E-02	4.03	3.00E-01	2.50E-04	2.54E-03	0.137	0.306	0.685	1.86E-02	8.30E-03	3.71E-03
Aroclor-1232	7.45E-02	Regression	2.18E-01	0.515	3.84E-02	4.03	3.00E-01	2.50E-04	2.42E-03	0.137	0.306	0.685	1.77E-02	7.90E-03	3.54E-03
Aroclor-1242	7.45E-02	Regression	2.18E-01	0.323	2.41E-02	4.03	3.00E-01	2.50E-04	2.32E-03	0.137	0.306	0.685	1.69E-02	7.58E-03	3.39E-03
Aroclor-1248	7.45E-02	Regression	2.18E-01	0.184	1.37E-02	4.03	3.00E-01	2.50E-04	2.25E-03	0.137	0.306	0.685	1.64E-02	7.35E-03	3.29E-03
Aroclor-1254	7.45E-02	Regression	2.18E-01	0.139	1.04E-02	4.03	3.00E-01	2.50E-04	2.23E-03	0.137	0.306	0.685	1.63E-02	7.27E-03	3.25E-03
Aroclor-1260	9.44E-02	Regression	2.83E-01	0.105	9.93E-03	4.03	3.80E-01	2.50E-04	2.85E-03	0.137	0.306	0.685	2.08E-02	9.30E-03	4.16E-03
PCB (total)	9.44E-02	Regression	2.83E-01	0.139	1.31E-02	Measured	1.35E+00	2.50E-04	4.05E-03	0.137	0.306	0.685	2.96E-02	1.32E-02	5.91E-03
Pesticides															
4,4'-DDD	5.00E-02	1.46	7.31E-02	Regresson	8.51E-03	1.61	8.03E-02	2.50E-05	7.94E-04	0.147	0.329	0.735	5.40E-03	2.41E-03	1.08E-03
4,4'-DDE	3.93E-02	1.46	5.75E-02	Regresson	7.10E-03	2.65	1.04E-01	2.50E-05	6.76E-04	0.147	0.329	0.735	4.60E-03	2.06E-03	9.20E-04
4,4'-DDT	8.59E-01	0.193	1.66E-01	Regresson	7.23E-02	1.73	1.49E+00	2.50E-05	4.97E-03	0.147	0.329	0.735	3.38E-02	1.51E-02	6.76E-03
Aldrin	2.45E-02	0.403	9.88E-03	0.139	3.42E-03	3.92	9.61E-02	2.50E-05	2.57E-04	0.20	0.45	1.00	1.29E-03	5.75E-04	2.57E-04
alpha-BHC	2.45E-02	0.710	1.74E-02	1.735	4.26E-02	3.92	9.61E-02	2.50E-05	5.86E-04	1.60	2.26	3.20	3.66E-04	2.59E-04	1.83E-04
alpha-Chlordane	2.45E-02	1.46	3.59E-02	0.165	4.04E-03	2.21	5.43E-02	2.50E-05	4.08E-04	4.58	6.48	9.16	8.90E-05	6.30E-05	4.45E-05
beta-BHC	2.45E-02	0.710	1.74E-02	1.719	4.22E-02	3.92	9.61E-02	2.50E-05	5.83E-04	1.60	2.26	3.20	3.65E-04	2.58E-04	1.82E-04
delta-BHC	2.45E-02	0.710	1.74E-02	1.311	3.22E-02	3.92	9.61E-02	2.50E-05	5.14E-04	1.60	2.26	3.20	3.21E-04	2.27E-04	1.61E-04
Dieldrin	2.45E-02	4.920	1.21E-01	0.410	1.01E-02	1.67	4.10E-02	2.50E-05	1.07E-03	0.015	0.021	0.030	7.17E-02	5.07E-02	3.58E-02
Endosulfan I	2.45E-02	0.057	1.39E-03	1.687	4.14E-02	3.92	9.61E-02	2.50E-05	4.57E-04	0.15	0.34	0.75	3.04E-03	1.36E-03	6.09E-04
Endosulfan II	2.45E-02	0.057	1.39E-03	0.886	2.17E-02	3.92	9.61E-02	2.50E-05	3.20E-04	0.15	0.34	0.75	2.13E-03	9.54E-04	4.27E-04
Endrin	2.45E-02	0.467	1.15E-02	0.535	1.31E-02	3.92	9.61E-02	2.50E-05	3.37E-04	0.184	0.411	0.920	1.83E-03	8.18E-04	3.66E-04
gamma-BHC (Lindane)	2.45E-02	0.334	8.20E-03	1.852	4.54E-02	3.92	9.61E-02	2.50E-05	5.36E-04	8.00	17.9	40.0	6.70E-05	3.00E-05	1.34E-05
gamma-Chlordane	2.45E-02	2.06	5.06E-02	0.165	4.04E-03	2.48	6.08E-02	2.50E-05	5.27E-04	4.58	6.48	9.16	1.15E-04	8.14E-05	5.75E-05
Heptachlor	2.45E-02	0.044	1.09E-03	0.174	4.28E-03	3.92	9.61E-02	2.50E-05	1.97E-04	0.20	0.45	1.00	9.84E-04	4.40E-04	1.97E-04
Heptachlor epoxide	2.45E-02	0.290	7.10E-03	0.566	1.39E-02	3.92	9.61E-02	2.50E-05	3.09E-04	0.20	0.45	1.00	1.54E-03	6.91E-04	3.09E-04
Methoxychlor	2.45E-02	1.000	2.45E-02	0.525	1.29E-02	3.92	9.61E-02	2.50E-05	4.34E-04	4.00	5.66	8.00	1.08E-04	7.67E-05	5.42E-05
Toxaphene	4.89E-01	1.000	4.89E-01	0.355	1.73E-01	3.92	1.92E+00	3.20E-04	8.06E-03	8.00	17.9	40.0	1.01E-03	4.50E-04	2.01E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	1.000	2.66E-03	5.00E-04	8.76E-05	76.0	170	380	1.15E-06	5.16E-07	2.31E-07
1,2,4,5-Tetrachlorobenzene	3.80E-01	0.397	1.51E-01	0.792	3.01E-01	0.078	2.98E-02	3.00E-03	4.14E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	2.66E-03	0.257	6.84E-04	1.426	3.80E-03	0.287	7.65E-04	5.00E-04	7.82E-05	53.0	75.0	106	1.48E-06	1.04E-06	7.38E-07
1,2-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.452	6.53E-03	0.244	6.49E-04	5.00E-04	1.12E-04	85.7	192	429	1.31E-06	5.84E-07	2.61E-07
1,3-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.296	6.11E-03	0.044	1.16E-04	5.00E-04	1.08E-04	85.7	192	429	1.27E-06	5.66E-07	2.53E-07
1,4-Dichlorobenzene	2.66E-03	1.000	2.66E-03	2.475	6.59E-03	0.030	8.11E-05	5.00E-04	1.12E-04	30.0	52.0	90.0	3.72E-06	2.15E-06	1.24E-06
4-Bromophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.566	2.15E-01	1.000	3.80E-01	3.00E-03	5.70E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.80E-01	1.000	3.80E-01	0.593	2.25E-01	1.000	3.80E-01	3.00E-03	5.78E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	4.95E-02	0.050	2.49E-03	Regresson	5.03E-02	0.076	3.78E-03	4.00E-05	4.56E-04	65.6	147	328	6.96E-06	3.11E-06	1.39E-06
Acenaphthylene	4.95E-02	0.122	6.05E-03	Regresson	2.95E-02	0.030	1.48E-03	4.00E-05	3.37E-04	65.6	147	328	5.13E-06	2.30E-06	1.03E-06
Anthracene	4.40E-02	0.544	2.39E-02	Regresson	3.27E-02	0.018	8.00E-04	4.00E-05	4.84E-04	65.6	147	328	7.38E-06	3.30E-06	1.48E-06
Benzo(a)anthracene	1.09E-01	0.154	1.69E-02	Regresson	1.79E-02	0.005	5.64E-04	4.00E-05	4.35E-04	0.62	1.37	3.07	7.07E-04	3.16E-04	1.42E-04

ATTACHMENT TABLE L-4-16

Summary of Raccoon Exposure Doses - Baseline (Step 7) - 95% UCL - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	95% UCL Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	9.88E-02	0.059	5.78E-03	Regresson	1.33E-02	0.004	4.44E-04	4.00E-05	3.01E-04	0.62	1.37	3.07	4.90E-04	2.19E-04	9.81E-05
Benzo(b)fluoranthene	1.90E-01	0.004	7.33E-04	0.310	5.88E-02	0.005	1.04E-03	4.00E-05	7.28E-04	0.62	1.37	3.07	1.18E-03	5.30E-04	2.37E-04
Benzo(g,h,i)perylene	6.90E-02	0.003	1.94E-04	Regresson	1.67E-02	0.009	6.07E-04	4.00E-05	2.34E-04	0.62	1.37	3.07	3.80E-04	1.70E-04	7.62E-05
Benzo(k)fluoranthene	7.32E-02	0.236	1.73E-02	Regresson	1.22E-02	0.005	3.85E-04	4.00E-05	3.39E-04	0.62	1.37	3.07	5.51E-04	2.46E-04	1.10E-04
Chrysene	1.40E-01	0.178	2.48E-02	Regresson	2.07E-02	0.006	8.08E-04	4.00E-05	5.64E-04	0.62	1.37	3.07	9.17E-04	4.10E-04	1.84E-04
Dibenz(a,h)anthracene	4.95E-02	0.032	1.59E-03	0.130	6.43E-03	0.005	2.33E-04	4.00E-05	1.41E-04	0.62	1.37	3.07	2.29E-04	1.03E-04	4.59E-05
Fluoranthene	2.44E-01	0.149	3.63E-02	0.500	1.22E-01	0.006	1.54E-03	4.00E-05	1.52E-03	65.6	147	328	2.32E-05	1.04E-05	4.65E-06
Fluorene	4.95E-02	0.500	2.47E-02	Regresson	5.03E-02	0.052	2.55E-03	4.00E-05	6.23E-04	65.6	147	328	9.50E-06	4.25E-06	1.90E-06
Hexachlorobenzene	3.80E-01	0.512	1.95E-01	0.246	9.37E-02	0.196	7.45E-02	1.50E-03	2.96E-03	2.00	2.83	4.00	1.48E-03	1.05E-03	7.40E-04
Hexachlorobutadiene	3.80E-01	0.385	1.46E-01	0.675	2.57E-01	0.078	2.98E-02	3.00E-03	3.80E-03	2.00	6.32	20.0	1.90E-03	6.00E-04	1.90E-04
Hexachlorocyclopentadiene	3.80E-01	1.000	3.80E-01	0.393	1.49E-01	1.000	3.80E-01	3.00E-03	5.25E-03	75.0	168	375	7.00E-05	3.13E-05	1.40E-05
Hexachloroethane	3.80E-01	1.000	3.80E-01	1.439	5.48E-01	1.000	3.80E-01	1.50E-03	7.89E-03	100	224	500	7.89E-05	3.53E-05	1.58E-05
Indeno(1,2,3-cd)pyrene	6.23E-02	0.003	1.86E-04	0.110	6.85E-03	0.005	3.34E-04	4.00E-05	1.54E-04	0.62	1.37	3.07	2.51E-04	1.12E-04	5.02E-05
Pentachlorophenol	1.13E+00	1.000	1.13E+00	5.930	6.70E+00	0.893	1.01E+00	4.50E-03	5.85E-02	8.42	18.8	42.1	6.95E-03	3.11E-03	1.39E-03
Phenanthrene	1.39E-01	0.412	5.75E-02	Regresson	2.49E-01	0.018	2.52E-03	4.00E-05	2.40E-03	65.6	147	328	3.66E-05	1.64E-05	7.32E-06
Pyrene	2.14E-01	0.485	1.04E-01	0.720	1.54E-01	0.007	1.60E-03	4.00E-05	2.21E-03	0.62	1.37	3.07	3.59E-03	1.61E-03	7.19E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	4.53E-05	0.00E+00	5.51E-08	0.000001	0.000003	0.00001	5.51E-02	1.74E-02	5.51E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.4921 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 5.940 = Body weight (kg)

ATTACHMENT TABLE L-4-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	Measured	6.09E-01	1.45E-03	2.53E-01	5.14	8.12	12.8	4.92E-02	3.11E-02	1.97E-02
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	Measured	2.05E-01	2.92E-04	3.00E-02	1.47	3.29	7.35	2.04E-02	9.13E-03	4.08E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	Measured	7.08E-01	1.50E-03	1.65E-01	2.66	5.95	13.3	6.21E-02	2.78E-02	1.24E-02
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	Measured	4.50E+00	6.69E-04	8.17E-01	4.05	7.00	12.1	2.02E-01	1.17E-01	6.75E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	Measured	3.17E-01	3.98E-04	9.02E-02	3.85	8.61	19.3	2.34E-02	1.05E-02	4.68E-03
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	Measured	4.60E-02	3.45E-05	7.40E-03	0.026	0.045	0.078	2.85E-01	1.64E-01	9.49E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	Measured	2.12E-01	1.09E-03	4.53E-02	6.71	15.0	33.6	6.76E-03	3.02E-03	1.35E-03
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	Measured	9.21E-01	1.30E-03	1.42E-01	1.80	4.02	9.00	7.90E-02	3.53E-02	1.58E-02
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	5.19E-02	4.18E-05	5.90E-03	4.04	9.03	20.2	1.46E-03	6.53E-04	2.92E-04
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	Measured	1.21E+02	6.77E-03	1.52E+01	66.1	148	331	2.30E-01	1.03E-01	4.61E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	2.84E-02	1.50	3.35	7.50	1.89E-02	8.46E-03	3.79E-03
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	3.65E-02	1.50	3.35	7.50	2.43E-02	1.09E-02	4.87E-03
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	Measured	1.23E+00	2.50E-04	1.31E-01	1.50	3.35	7.50	8.71E-02	3.90E-02	1.74E-02
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	6.57E-03	0.30	0.95	3.00	2.19E-02	6.92E-03	2.19E-03
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	7.95E-03	0.30	0.95	3.00	2.65E-02	8.38E-03	2.65E-03
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	5.77E-02	0.30	0.95	3.00	1.92E-01	6.09E-02	1.92E-02
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	8.33E-03	0.155	0.347	0.775	5.37E-02	2.40E-02	1.07E-02
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	8.45E-03	0.56	1.12	2.25	1.51E-02	7.53E-03	3.75E-03
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	5.19E-03	0.80	1.79	4.00	6.49E-03	2.90E-03	1.30E-03
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	8.45E-03	0.56	1.12	2.25	1.51E-02	7.53E-03	3.75E-03
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	8.45E-03	0.56	1.12	2.25	1.51E-02	7.53E-03	3.75E-03
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	5.43E-03	0.071	0.518	3.780	7.66E-02	1.05E-02	1.44E-03
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	8.19E-03	10.0	22.4	50.0	8.19E-04	3.66E-04	1.64E-04
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	8.19E-03	10.0	22.4	50.0	8.19E-04	3.66E-04	1.64E-04
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	8.35E-03	0.30	0.67	1.50	2.78E-02	1.25E-02	5.57E-03
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	8.30E-03	4.00	8.9	20.0	2.07E-03	9.28E-04	4.15E-04
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	5.99E-03	0.80	1.79	4.00	7.48E-03	3.35E-03	1.50E-03
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	8.18E-03	0.48	1.07	2.40	1.71E-02	7.63E-03	3.41E-03
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	8.28E-03	0.48	1.07	2.40	1.73E-02	7.72E-03	3.45E-03
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	8.56E-03	355	794	1,775	2.41E-05	1.08E-05	4.82E-06
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	1.71E-01	1.00	2.24	5.00	1.71E-01	7.65E-02	3.42E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	2.96E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	5.30E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	1.24E-04	80.4	180	402	1.54E-06	6.87E-07	3.07E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	1.43E-04	80.4	180	402	1.78E-06	7.97E-07	3.57E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	1.03E-04	80.4	180	402	1.28E-06	5.72E-07	2.56E-07
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	1.00E-04	80.4	180	402	1.25E-06	5.57E-07	2.49E-07
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	3.88E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	3.88E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	3.73E-04	7.10	15.9	35.5	5.25E-05	2.35E-05	1.05E-05
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	2.33E-04	7.10	15.9	35.5	3.28E-05	1.47E-05	6.56E-06
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	5.41E-04	7.10	15.9	35.5	7.62E-05	3.41E-05	1.52E-05
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	3.09E-04	7.10	15.9	35.5	4.36E-05	1.95E-05	8.71E-06

ATTACHMENT TABLE L-4-17

Summary of Belted Kingfisher Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	1.25E-04	7.10	15.9	35.5	1.77E-05	7.90E-06	3.54E-06
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	9.19E-05	7.10	15.9	35.5	1.29E-05	5.79E-06	2.59E-06
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	5.76E-05	7.10	15.9	35.5	8.11E-06	3.63E-06	1.62E-06
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	2.99E-04	7.10	15.9	35.5	4.22E-05	1.89E-05	8.44E-06
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	4.01E-04	7.10	15.9	35.5	5.65E-05	2.53E-05	1.13E-05
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	5.08E-05	7.10	15.9	35.5	7.15E-06	3.20E-06	1.43E-06
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	6.12E-04	7.10	15.9	35.5	8.62E-05	3.85E-05	1.72E-05
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	6.33E-04	7.10	15.9	35.5	8.92E-05	3.99E-05	1.78E-05
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	9.64E-03	0.113	0.253	0.565	8.53E-02	3.81E-02	1.71E-02
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	5.23E-03	3.39	7.58	17.0	1.54E-03	6.90E-04	3.08E-04
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	3.88E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	3.86E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	3.54E-05	7.10	15.9	35.5	4.99E-06	2.23E-06	9.97E-07
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	1.05E-01	6.73	21.3	67.3	1.55E-02	4.91E-03	1.55E-03
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	9.21E-04	7.10	15.9	35.5	1.30E-04	5.80E-05	2.60E-05
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	1.54E-03	7.10	15.9	35.5	2.16E-04	9.68E-05	4.33E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	3.51E-05	0.00E+00	3.59E-06	0.000014	0.000044	0.00014	2.57E-01	8.12E-02	2.57E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0180	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi =	0.160	= Proportion of diet composed of food item (aquatic invertebrates)
FCxi =	Chemical-specific	= Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi =	0.000	= Proportion of diet composed of food item (aquatic plants)
FCxi =	Chemical-specific	= Concentration of chemical in food item (fish, dry weight basis)
PDFi =	0.840	= Proportion of diet composed of food item (fish)
SCx =	Chemical-specific	= Concentration of chemical in sediment (mg/kg, dry weight)
PDS =	0.000	= Proportion of diet composed of sediment
WIR =	0.0164	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.1480	= Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	Measured	6.48E-01	1.45E-03	3.65E-02	5.14	8.12	12.8	7.10E-03	4.49E-03	2.84E-03
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	Measured	3.48E-01	2.92E-04	1.96E-02	1.47	3.29	7.35	1.33E-02	5.95E-03	2.66E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	Measured	8.76E-01	1.50E-03	4.93E-02	2.66	5.95	13.3	1.86E-02	8.30E-03	3.71E-03
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	Measured	6.16E+00	6.69E-04	3.46E-01	4.05	7.00	12.1	8.55E-02	4.95E-02	2.86E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	Measured	5.38E-01	3.98E-04	3.03E-02	3.85	8.61	19.3	7.86E-03	3.52E-03	1.57E-03
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	Measured	4.51E-02	3.45E-05	2.54E-03	0.026	0.045	0.078	9.77E-02	5.64E-02	3.26E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	Measured	2.53E-01	1.09E-03	1.43E-02	6.71	15.0	33.6	2.13E-03	9.52E-04	4.26E-04
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	Measured	1.04E+00	1.30E-03	5.87E-02	1.80	4.02	9.00	3.26E-02	1.46E-02	6.52E-03
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	4.47E-02	4.18E-05	2.51E-03	4.04	9.03	20.2	6.22E-04	2.78E-04	1.24E-04
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	Measured	1.12E+02	6.77E-03	6.31E+00	66.1	148	331	9.55E-02	4.27E-02	1.91E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	1.37E-02	1.50	3.35	7.50	9.16E-03	4.10E-03	1.83E-03
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	1.76E-02	1.50	3.35	7.50	1.18E-02	5.26E-03	2.35E-03
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	Measured	9.47E-01	2.50E-04	5.33E-02	1.50	3.35	7.50	3.55E-02	1.59E-02	7.11E-03
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	3.08E-03	0.30	0.95	3.00	1.03E-02	3.24E-03	1.03E-03
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	3.95E-03	0.30	0.95	3.00	1.32E-02	4.17E-03	1.32E-03
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	3.11E-02	0.30	0.95	3.00	1.04E-01	3.28E-02	1.04E-02
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	4.49E-03	0.155	0.347	0.775	2.90E-02	1.30E-02	5.79E-03
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	4.49E-03	0.56	1.12	2.25	8.02E-03	4.00E-03	2.00E-03
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	2.54E-03	0.80	1.79	4.00	3.17E-03	1.42E-03	6.34E-04
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	4.49E-03	0.56	1.12	2.25	8.02E-03	4.00E-03	2.00E-03
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	4.49E-03	0.56	1.12	2.25	8.02E-03	4.00E-03	2.00E-03
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	1.91E-03	0.071	0.518	3.780	2.70E-02	3.70E-03	5.06E-04
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	4.49E-03	10.0	22.4	50.0	4.49E-04	2.01E-04	8.98E-05
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	4.49E-03	10.0	22.4	50.0	4.49E-04	2.01E-04	8.98E-05
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	4.49E-03	0.30	0.67	1.50	1.50E-02	6.69E-03	2.99E-03
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	4.49E-03	4.00	8.9	20.0	1.12E-03	5.02E-04	2.24E-04
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	2.84E-03	0.80	1.79	4.00	3.55E-03	1.59E-03	7.10E-04
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	4.49E-03	0.48	1.07	2.40	9.35E-03	4.18E-03	1.87E-03
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	4.49E-03	0.48	1.07	2.40	9.35E-03	4.18E-03	1.87E-03
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	4.49E-03	355	794	1,775	1.26E-05	5.66E-06	2.53E-06
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	8.97E-02	1.00	2.24	5.00	8.97E-02	4.01E-02	1.79E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	1.34E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	1.53E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	5.46E-05	80.4	180	402	6.79E-07	3.04E-07	1.36E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	4.98E-05	80.4	180	402	6.19E-07	2.77E-07	1.24E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	2.75E-05	80.4	180	402	3.42E-07	1.53E-07	6.84E-08
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	2.60E-05	80.4	180	402	3.24E-07	1.45E-07	6.48E-08
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	1.79E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	1.79E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	1.82E-04	7.10	15.9	35.5	2.56E-05	1.15E-05	5.12E-06
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	7.25E-05	7.10	15.9	35.5	1.02E-05	4.56E-06	2.04E-06
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	4.58E-05	7.10	15.9	35.5	6.45E-06	2.89E-06	1.29E-06
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	2.68E-05	7.10	15.9	35.5	3.77E-06	1.69E-06	7.55E-07

ATTACHMENT TABLE L-4-18

Summary of Great Blue Heron Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	2.09E-05	7.10	15.9	35.5	2.95E-06	1.32E-06	5.90E-07
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	4.42E-05	7.10	15.9	35.5	6.23E-06	2.78E-06	1.25E-06
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	2.94E-05	7.10	15.9	35.5	4.14E-06	1.85E-06	8.27E-07
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	1.88E-05	7.10	15.9	35.5	2.65E-06	1.19E-06	5.30E-07
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	3.36E-05	7.10	15.9	35.5	4.74E-06	2.12E-06	9.47E-07
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	1.29E-05	7.10	15.9	35.5	1.81E-06	8.12E-07	3.63E-07
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	6.25E-05	7.10	15.9	35.5	8.80E-06	3.94E-06	1.76E-06
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	1.23E-04	7.10	15.9	35.5	1.74E-05	7.76E-06	3.47E-06
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	3.54E-03	0.113	0.253	0.565	3.14E-02	1.40E-02	6.27E-03
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	1.53E-03	3.39	7.58	17.0	4.50E-04	2.01E-04	9.00E-05
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	1.79E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	1.78E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	1.72E-05	7.10	15.9	35.5	2.42E-06	1.08E-06	4.85E-07
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	4.74E-02	6.73	21.3	67.3	7.04E-03	2.22E-03	7.04E-04
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	9.60E-05	7.10	15.9	35.5	1.35E-05	6.05E-06	2.71E-06
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	6.48E-05	7.10	15.9	35.5	9.13E-06	4.08E-06	1.83E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.92E-05	0.00E+00	1.64E-06	0.000014	0.000044	0.00014	1.17E-01	3.71E-02	1.17E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1254 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.1010 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 2.230 = Body weight (kg)

ATTACHMENT TABLE L-4-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	0.126	6.31E+00	1.45E-03	1.78E-01	5.14	8.12	12.8	3.46E-02	2.19E-02	1.38E-02
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	0.164	1.50E-01	2.92E-04	2.83E-02	1.47	3.29	7.35	1.92E-02	8.60E-03	3.85E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	0.038	7.24E-01	1.50E-03	8.54E-02	2.66	5.95	13.3	3.21E-02	1.44E-02	6.42E-03
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	0.100	2.22E+00	6.69E-04	3.98E-01	4.05	7.00	12.1	9.83E-02	5.68E-02	3.29E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	0.070	2.27E+00	3.98E-04	1.43E-01	1.63	2.31	3.26	8.78E-02	6.21E-02	4.39E-02
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	3.250	3.79E-01	3.45E-05	5.62E-03	0.026	0.045	0.078	2.16E-01	1.25E-01	7.20E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	1.000	5.65E+00	1.09E-03	3.12E-02	6.71	15.0	33.6	4.65E-03	2.08E-03	9.30E-04
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	1.000	2.45E+00	1.30E-03	7.24E-02	0.40	0.57	0.80	1.81E-01	1.28E-01	9.05E-02
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	5.11E-04	4.04	9.03	20.2	1.26E-04	5.65E-05	2.53E-05
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	0.147	2.39E+01	6.77E-03	4.35E+00	66.1	148	331	6.59E-02	2.95E-02	1.32E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.75E-03	1.50	3.35	7.50	1.17E-03	5.23E-04	2.34E-04
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	2.83E-03	1.50	3.35	7.50	1.88E-03	8.43E-04	3.77E-04
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	2.24E-03	1.50	3.35	7.50	1.49E-03	6.68E-04	2.99E-04
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.75E-03	1.50	3.35	7.50	1.17E-03	5.23E-04	2.34E-04
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	1.41E-03	1.50	3.35	7.50	9.37E-04	4.19E-04	1.87E-04
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	1.29E-03	1.50	3.35	7.50	8.61E-04	3.85E-04	1.72E-04
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	1.57E-03	1.50	3.35	7.50	1.05E-03	4.69E-04	2.10E-04
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	4.03	3.13E-01	2.50E-04	1.68E-03	1.50	3.35	7.50	1.12E-03	5.02E-04	2.24E-04
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	5.59E-04	0.12	0.27	0.60	4.65E-03	2.08E-03	9.31E-04
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	4.49E-04	0.12	0.27	0.60	3.75E-03	1.67E-03	7.49E-04
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	2.23E-03	0.60	0.95	1.50	3.71E-03	2.35E-03	1.48E-03
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	1.91E-04	0.155	0.347	0.775	1.23E-03	5.51E-04	2.46E-04
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	1.57E-03	0.56	1.12	2.25	2.81E-03	1.40E-03	6.98E-04
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	3.16E-04	0.80	1.79	4.00	3.95E-04	1.77E-04	7.90E-05
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	1.56E-03	0.56	1.12	2.25	2.78E-03	1.39E-03	6.92E-04
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	1.21E-03	0.56	1.12	2.25	2.17E-03	1.08E-03	5.39E-04
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	8.61E-04	0.071	0.518	3.780	1.21E-02	1.66E-03	2.28E-04
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	1.47E-03	10.0	22.4	50.0	1.47E-04	6.56E-05	2.93E-05
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	7.89E-04	10.0	22.4	50.0	7.89E-05	3.53E-05	1.58E-05
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	5.32E-04	0.30	0.67	1.50	1.77E-03	7.93E-04	3.55E-04
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	1.63E-03	4.00	8.9	20.0	4.09E-04	1.83E-04	8.17E-05
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	3.75E-04	0.80	1.79	4.00	4.68E-04	2.09E-04	9.36E-05
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	1.85E-04	0.48	1.07	2.40	3.86E-04	1.73E-04	7.73E-05
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	5.41E-04	0.48	1.07	2.40	1.13E-03	5.04E-04	2.25E-04
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	5.75E-04	355	794	1,775	1.62E-06	7.25E-07	3.24E-07
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	8.61E-03	1.00	2.24	5.00	8.61E-03	3.85E-03	1.72E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	1.23E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	1.16E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	1.51E-04	80.4	180	402	1.88E-06	8.39E-07	3.75E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	2.42E-04	80.4	180	402	3.01E-06	1.35E-06	6.03E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	2.29E-04	80.4	180	402	2.85E-06	1.28E-06	5.71E-07
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	2.44E-04	80.4	180	402	3.04E-06	1.36E-06	6.07E-07
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	9.59E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	9.95E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	2.49E-03	7.10	15.9	35.5	3.51E-04	1.57E-04	7.01E-05
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	1.17E-03	7.10	15.9	35.5	1.65E-04	7.36E-05	3.29E-05
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	1.52E-03	7.10	15.9	35.5	2.14E-04	9.57E-05	4.28E-05
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	8.48E-04	7.10	15.9	35.5	1.19E-04	5.34E-05	2.39E-05

ATTACHMENT TABLE L-4-19

Summary of Mallard Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	5.70E-04	7.10	15.9	35.5	8.03E-05	3.59E-05	1.61E-05
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	2.00E-03	7.10	15.9	35.5	2.81E-04	1.26E-04	5.62E-05
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	6.29E-04	7.10	15.9	35.5	8.85E-05	3.96E-05	1.77E-05
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	5.70E-04	7.10	15.9	35.5	8.03E-05	3.59E-05	1.61E-05
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	9.36E-04	7.10	15.9	35.5	1.32E-04	5.89E-05	2.64E-05
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	3.01E-04	7.10	15.9	35.5	4.24E-05	1.90E-05	8.48E-06
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	3.96E-03	7.10	15.9	35.5	5.57E-04	2.49E-04	1.11E-04
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	2.58E-03	7.10	15.9	35.5	3.63E-04	1.62E-04	7.27E-05
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	4.59E-03	0.113	0.253	0.565	4.06E-02	1.81E-02	8.12E-03
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	1.01E-02	3.39	7.58	17.0	2.98E-03	1.33E-03	5.96E-04
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	7.33E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	2.10E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	3.17E-04	7.10	15.9	35.5	4.46E-05	1.99E-05	8.92E-06
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	2.38E-01	6.73	21.3	67.3	3.53E-02	1.12E-02	3.53E-03
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	8.38E-03	7.10	15.9	35.5	1.18E-03	5.28E-04	2.36E-04
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	5.08E-03	7.10	15.9	35.5	7.15E-04	3.20E-04	1.43E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0564 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.100 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.867 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.033 = Proportion of diet composed of sediment
WIR = 0.0658 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.177 = Body weight (kg)

ATTACHMENT TABLE L-4-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	Measured	1.44E+00	1.45E-03	7.58E-02	5.14	8.12	12.8	1.48E-02	9.33E-03	5.90E-03
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	Measured	7.21E-02	2.92E-04	3.80E-03	1.47	3.29	7.35	2.58E-03	1.16E-03	5.17E-04
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	Measured	7.76E-01	1.50E-03	4.08E-02	2.66	5.95	13.3	1.54E-02	6.87E-03	3.07E-03
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	Measured	1.28E+00	6.69E-04	6.75E-02	4.05	7.00	12.1	1.67E-02	9.64E-03	5.58E-03
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	Measured	1.48E-01	3.98E-04	7.77E-03	3.85	8.61	19.3	2.02E-03	9.02E-04	4.04E-04
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	Measured	2.95E-01	3.45E-05	1.55E-02	0.49	0.77	1.20	3.16E-02	2.02E-02	1.29E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	Measured	3.96E-01	1.09E-03	2.08E-02	6.71	15.0	33.6	3.10E-03	1.39E-03	6.21E-04
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	Measured	8.86E-01	1.30E-03	4.66E-02	1.80	4.02	9.00	2.59E-02	1.16E-02	5.17E-03
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	1.44E-01	4.18E-05	7.58E-03	4.04	9.03	20.2	1.88E-03	8.39E-04	3.75E-04
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	Measured	8.25E+01	6.77E-03	4.33E+00	66.1	148	331	6.55E-02	2.93E-02	1.31E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	Measured	1.23E-01	2.50E-04	6.47E-03	0.41	0.92	2.05	1.58E-02	7.06E-03	3.16E-03
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	Measured	1.05E-01	2.50E-04	5.53E-03	0.41	0.92	2.05	1.35E-02	6.04E-03	2.70E-03
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	Measured	6.72E-01	2.50E-04	3.53E-02	0.41	0.92	2.05	8.61E-02	3.85E-02	1.72E-02
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	Measured	1.77E+00	2.50E-04	9.29E-02	0.41	0.92	2.05	2.27E-01	1.01E-01	4.53E-02
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	2.87E-03	0.30	0.95	3.00	9.57E-03	3.03E-03	9.57E-04
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	3.69E-03	0.30	0.95	3.00	1.23E-02	3.89E-03	1.23E-03
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	2.90E-02	0.30	0.95	3.00	9.67E-02	3.06E-02	9.67E-03
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	4.19E-03	0.155	0.347	0.775	2.70E-02	1.21E-02	5.41E-03
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	4.19E-03	0.56	1.12	2.25	7.48E-03	3.73E-03	1.86E-03
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	2.37E-03	0.80	1.79	4.00	2.96E-03	1.32E-03	5.92E-04
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	4.19E-03	0.56	1.12	2.25	7.48E-03	3.73E-03	1.86E-03
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	4.19E-03	0.56	1.12	2.25	7.48E-03	3.73E-03	1.86E-03
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	1.79E-03	0.071	0.518	3.780	2.52E-02	3.45E-03	4.73E-04
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	4.19E-03	10.0	22.4	50.0	4.19E-04	1.87E-04	8.38E-05
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	4.19E-03	10.0	22.4	50.0	4.19E-04	1.87E-04	8.38E-05
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	4.19E-03	0.021	0.047	0.104	2.01E-01	9.01E-02	4.03E-02
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	4.19E-03	4.00	8.9	20.0	1.05E-03	4.68E-04	2.10E-04
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	2.65E-03	0.80	1.79	4.00	3.31E-03	1.48E-03	6.63E-04
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	4.19E-03	0.48	1.07	2.40	8.73E-03	3.90E-03	1.75E-03
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	4.19E-03	0.48	1.07	2.40	8.73E-03	3.90E-03	1.75E-03
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	4.19E-03	355	794	1,775	1.18E-05	5.28E-06	2.36E-06
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	8.37E-02	1.00	2.24	5.00	8.37E-02	3.74E-02	1.67E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	1.30E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	1.45E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	5.57E-05	80.4	180	402	6.93E-07	3.10E-07	1.39E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	5.12E-05	80.4	180	402	6.37E-07	2.85E-07	1.27E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	3.04E-05	80.4	180	402	3.78E-07	1.69E-07	7.56E-08
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	2.91E-05	80.4	180	402	3.61E-07	1.62E-07	7.23E-08
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	1.67E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	1.67E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	1.70E-04	7.10	15.9	35.5	2.40E-05	1.07E-05	4.79E-06
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	6.80E-05	7.10	15.9	35.5	9.58E-06	4.28E-06	1.92E-06
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	4.31E-05	7.10	15.9	35.5	6.08E-06	2.72E-06	1.22E-06
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	2.54E-05	7.10	15.9	35.5	3.58E-06	1.60E-06	7.15E-07

ATTACHMENT TABLE L-4-20

Summary of Osprey Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	1.99E-05	7.10	15.9	35.5	2.81E-06	1.25E-06	5.61E-07
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	4.16E-05	7.10	15.9	35.5	5.86E-06	2.62E-06	1.17E-06
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	2.78E-05	7.10	15.9	35.5	3.91E-06	1.75E-06	7.83E-07
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	1.79E-05	7.10	15.9	35.5	2.53E-06	1.13E-06	5.06E-07
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	3.18E-05	7.10	15.9	35.5	4.47E-06	2.00E-06	8.95E-07
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	1.24E-05	7.10	15.9	35.5	1.75E-06	7.81E-07	3.49E-07
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	5.87E-05	7.10	15.9	35.5	8.27E-06	3.70E-06	1.65E-06
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	1.15E-04	7.10	15.9	35.5	1.63E-05	7.27E-06	3.25E-06
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	3.32E-03	0.113	0.253	0.565	2.94E-02	1.31E-02	5.88E-03
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	1.45E-03	3.39	7.58	17.0	4.29E-04	1.92E-04	8.57E-05
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	1.67E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	1.66E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	1.64E-05	7.10	15.9	35.5	2.32E-06	1.04E-06	4.63E-07
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	4.42E-02	6.73	21.3	67.3	6.57E-03	2.08E-03	6.57E-04
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	9.00E-05	7.10	15.9	35.5	1.27E-05	5.67E-06	2.54E-06
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	6.09E-05	7.10	15.9	35.5	8.58E-06	3.84E-06	1.72E-06
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	6.02E-05	0.00E+00	3.16E-06	0.000014	0.000044	0.00014	2.26E-01	7.14E-02	2.26E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0780 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0769 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.486 = Body weight (kg)

ATTACHMENT TABLE L-4-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	0.126	6.31E+00	1.45E-03	4.58E-01	2.46	4.26	7.38	1.86E-01	1.08E-01	6.21E-02
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	0.164	1.50E-01	2.92E-04	2.18E-02	1.47	3.29	7.35	1.48E-02	6.63E-03	2.97E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	0.038	7.24E-01	1.50E-03	2.23E-01	2.66	5.95	13.3	8.38E-02	3.75E-02	1.68E-02
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	0.100	2.22E+00	6.69E-04	8.58E-01	4.05	7.00	12.1	2.12E-01	1.23E-01	7.09E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	0.070	2.27E+00	3.98E-04	1.39E-01	3.85	8.61	19.3	3.61E-02	1.61E-02	7.22E-03
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	3.250	3.79E-01	3.45E-05	6.49E-03	0.026	0.045	0.078	2.50E-01	1.44E-01	8.32E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	1.000	5.65E+00	1.09E-03	5.70E-02	6.71	15.0	33.6	8.49E-03	3.80E-03	1.70E-03
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	1.000	2.45E+00	1.30E-03	1.15E-01	0.40	0.57	0.80	2.88E-01	2.04E-01	1.44E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	1.43E-03	4.04	9.03	20.2	3.53E-04	1.58E-04	7.07E-05
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	0.147	2.39E+01	6.77E-03	6.92E+00	66.1	148	331	1.05E-01	4.68E-02	2.09E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	2.86E+00	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1221	6.06E-02	Regression	2.86E+00	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1232	6.06E-02	Regression	2.86E+00	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1242	6.06E-02	Regression	2.86E+00	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1248	6.06E-02	Regression	2.86E+00	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1254	6.06E-02	Regression	2.86E+00	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	1.34E-01	1.50	3.35	7.50	8.96E-02	4.01E-02	1.79E-02
Aroclor-1260	7.78E-02	Regression	3.62E+00	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	1.70E-01	1.50	3.35	7.50	1.13E-01	5.06E-02	2.26E-02
PCB (total)	7.78E-02	Regression	3.62E+00	0.139	1.08E-02	4.03	3.13E-01	2.50E-04	1.70E-01	1.50	3.35	7.50	1.13E-01	5.06E-02	2.26E-02
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	2.34E-03	0.12	0.27	0.60	1.95E-02	8.72E-03	3.90E-03
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	1.83E-03	0.12	0.27	0.60	1.52E-02	6.81E-03	3.05E-03
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	2.89E-03	0.60	0.95	1.50	4.82E-03	3.05E-03	1.93E-03
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	3.90E-04	0.155	0.347	0.775	2.52E-03	1.13E-03	5.03E-04
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	6.83E-04	0.56	1.12	2.25	1.22E-03	6.08E-04	3.04E-04
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	1.40E-03	2.14	4.79	10.7	6.56E-04	2.93E-04	1.31E-04
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	6.83E-04	0.56	1.12	2.25	1.22E-03	6.08E-04	3.04E-04
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	6.83E-04	0.56	1.12	2.25	1.22E-03	6.08E-04	3.04E-04
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	4.70E-03	0.071	0.518	3.780	6.64E-02	9.09E-03	1.24E-03
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	5.94E-05	10.0	22.4	50.0	5.94E-06	2.66E-06	1.19E-06
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	5.94E-05	10.0	22.4	50.0	5.94E-06	2.66E-06	1.19E-06
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	4.51E-04	0.30	0.67	1.50	1.50E-03	6.73E-04	3.01E-04
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	3.25E-04	4.00	8.9	20.0	8.12E-05	3.63E-05	1.62E-05
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	1.98E-03	2.14	4.79	10.7	9.24E-04	4.13E-04	1.85E-04
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	4.77E-05	0.48	1.07	2.40	9.93E-05	4.44E-05	1.99E-05
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	2.82E-04	0.48	1.07	2.40	5.87E-04	2.63E-04	1.17E-04
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	9.60E-04	355	794	1,775	2.71E-06	1.21E-06	5.41E-07
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	1.91E-02	1.00	2.24	5.00	1.91E-02	8.56E-03	3.83E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	2.00E-04	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	6.52E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	1.31E-04	80.4	180	402	1.63E-06	7.28E-07	3.26E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	2.00E-04	80.4	180	402	2.49E-06	1.11E-06	4.97E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	2.00E-04	80.4	180	402	2.49E-06	1.11E-06	4.97E-07
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	2.00E-04	80.4	180	402	2.49E-06	1.11E-06	4.97E-07
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	1.54E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	1.54E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	1.07E-04	7.10	15.9	35.5	1.51E-05	6.75E-06	3.02E-06
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	2.49E-04	7.10	15.9	35.5	3.50E-05	1.57E-05	7.01E-06
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	1.11E-03	7.10	15.9	35.5	1.56E-04	6.97E-05	3.12E-05
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	6.33E-04	7.10	15.9	35.5	8.91E-05	3.99E-05	1.78E-05

ATTACHMENT TABLE L-4-21

Summary of Tree Swallow Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	2.16E-04	7.10	15.9	35.5	3.04E-05	1.36E-05	6.09E-06
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	3.35E-05	7.10	15.9	35.5	4.72E-06	2.11E-06	9.44E-07
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	1.59E-05	7.10	15.9	35.5	2.24E-06	1.00E-06	4.48E-07
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	6.44E-04	7.10	15.9	35.5	9.07E-05	4.06E-05	1.81E-05
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	8.24E-04	7.10	15.9	35.5	1.16E-04	5.19E-05	2.32E-05
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	7.16E-05	7.10	15.9	35.5	1.01E-05	4.51E-06	2.02E-06
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	1.20E-03	7.10	15.9	35.5	1.70E-04	7.59E-05	3.39E-05
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	9.90E-04	7.10	15.9	35.5	1.39E-04	6.24E-05	2.79E-05
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	7.90E-03	0.113	0.253	0.565	6.99E-02	3.12E-02	1.40E-02
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	6.34E-03	3.39	7.58	17.0	1.87E-03	8.36E-04	3.74E-04
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	1.54E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	1.51E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	1.57E-05	7.10	15.9	35.5	2.21E-06	9.89E-07	4.42E-07
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	4.50E-02	6.73	21.3	67.3	6.69E-03	2.11E-03	6.69E-04
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	1.80E-03	7.10	15.9	35.5	2.54E-04	1.14E-04	5.08E-05
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	3.42E-03	7.10	15.9	35.5	4.82E-04	2.15E-04	9.64E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000014	0.000044	0.00014	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.00094 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0043 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0201 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	Measured	6.09E-01	1.45E-03	2.09E-02	1.04	1.31	1.66	2.01E-02	1.59E-02	1.26E-02
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	Measured	2.05E-01	2.92E-04	7.02E-03	0.77	2.43	7.70	9.12E-03	2.88E-03	9.12E-04
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	Measured	7.08E-01	1.50E-03	2.43E-02	2.40	5.37	12.0	1.01E-02	4.53E-03	2.03E-03
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	Measured	4.50E+00	6.69E-04	1.54E-01	11.7	13.3	15.1	1.32E-02	1.16E-02	1.02E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	Measured	3.17E-01	3.98E-04	1.09E-02	4.70	6.47	8.90	2.31E-03	1.68E-03	1.22E-03
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	Measured	4.60E-02	3.45E-05	1.58E-03	0.150	0.192	0.247	1.05E-02	8.18E-03	6.38E-03
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	Measured	2.12E-01	1.09E-03	7.27E-03	1.70	2.40	3.40	4.28E-03	3.03E-03	2.14E-03
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	Measured	9.21E-01	1.30E-03	3.16E-02	0.20	0.26	0.33	1.58E-01	1.23E-01	9.57E-02
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	5.19E-02	4.18E-05	1.78E-03	12.0	26.9	60.2	1.48E-04	6.61E-05	2.95E-05
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	Measured	1.21E+02	6.77E-03	4.14E+00	75.4	169	377	5.49E-02	2.45E-02	1.10E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	8.37E-03	1.37	2.17	3.43	6.11E-03	3.86E-03	2.44E-03
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	8.37E-03	0.137	0.306	0.685	6.11E-02	2.73E-02	1.22E-02
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	8.37E-03	0.137	0.306	0.685	6.11E-02	2.73E-02	1.22E-02
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	8.37E-03	0.137	0.306	0.685	6.11E-02	2.73E-02	1.22E-02
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	8.37E-03	0.137	0.306	0.685	6.11E-02	2.73E-02	1.22E-02
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	8.37E-03	0.137	0.306	0.685	6.11E-02	2.73E-02	1.22E-02
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	1.07E-02	0.137	0.306	0.685	7.84E-02	3.50E-02	1.57E-02
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	Measured	1.23E+00	2.50E-04	4.23E-02	0.137	0.306	0.685	3.08E-01	1.38E-01	6.17E-02
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	1.87E-03	0.147	0.329	0.735	1.27E-02	5.70E-03	2.55E-03
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	2.41E-03	0.147	0.329	0.735	1.64E-02	7.32E-03	3.27E-03
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	1.89E-02	0.147	0.329	0.735	1.29E-01	5.76E-02	2.58E-02
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	2.73E-03	0.20	0.45	1.00	1.37E-02	6.11E-03	2.73E-03
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	2.73E-03	1.60	2.26	3.20	1.71E-03	1.21E-03	8.54E-04
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	1.54E-03	4.58	6.48	9.16	3.37E-04	2.38E-04	1.69E-04
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	2.73E-03	1.60	2.26	3.20	1.71E-03	1.21E-03	8.54E-04
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	2.73E-03	1.60	2.26	3.20	1.71E-03	1.21E-03	8.54E-04
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	1.17E-03	0.015	0.021	0.030	7.77E-02	5.49E-02	3.88E-02
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	2.73E-03	0.15	0.34	0.75	1.82E-02	8.15E-03	3.64E-03
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	2.73E-03	0.15	0.34	0.75	1.82E-02	8.15E-03	3.64E-03
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	2.73E-03	0.184	0.411	0.920	1.49E-02	6.64E-03	2.97E-03
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	2.73E-03	8.00	17.9	40.0	3.42E-04	1.53E-04	6.83E-05
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	1.73E-03	4.58	6.48	9.16	3.78E-04	2.67E-04	1.89E-04
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	2.73E-03	0.20	0.45	1.00	1.37E-02	6.11E-03	2.73E-03
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	2.73E-03	0.20	0.45	1.00	1.37E-02	6.11E-03	2.73E-03
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	2.73E-03	4.00	5.66	8.00	6.83E-04	4.83E-04	3.42E-04
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	5.46E-02	8.00	17.9	40.0	6.83E-03	3.05E-03	1.37E-03
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	8.18E-05	76.0	170	380	1.08E-06	4.81E-07	2.15E-07
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	9.31E-04	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	3.35E-05	53.0	75.0	106	6.32E-07	4.47E-07	3.16E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	3.05E-05	85.7	192	429	3.56E-07	1.59E-07	7.12E-08
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	1.70E-05	85.7	192	429	1.98E-07	8.85E-08	3.96E-08
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	1.61E-05	30.0	52.0	90.0	5.36E-07	3.09E-07	1.79E-07
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	1.09E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	1.09E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	1.11E-04	65.6	147	328	1.69E-06	7.55E-07	3.38E-07
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	4.41E-05	65.6	147	328	6.73E-07	3.01E-07	1.35E-07
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	2.79E-05	65.6	147	328	4.26E-07	1.90E-07	8.51E-08
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	1.63E-05	0.62	1.37	3.07	2.66E-05	1.19E-05	5.32E-06

ATTACHMENT TABLE L-4-22

Summary of Mink Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	1.28E-05	0.62	1.37	3.07	2.08E-05	9.29E-06	4.16E-06
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	2.69E-05	0.62	1.37	3.07	4.38E-05	1.96E-05	8.77E-06
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	1.79E-05	0.62	1.37	3.07	2.91E-05	1.30E-05	5.83E-06
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	1.15E-05	0.62	1.37	3.07	1.87E-05	8.35E-06	3.74E-06
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	2.05E-05	0.62	1.37	3.07	3.33E-05	1.49E-05	6.67E-06
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	7.86E-06	0.62	1.37	3.07	1.28E-05	5.72E-06	2.56E-06
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	3.81E-05	65.6	147	328	5.81E-07	2.60E-07	1.16E-07
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	7.51E-05	65.6	147	328	1.14E-06	5.12E-07	2.29E-07
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	2.16E-03	2.00	2.83	4.00	1.08E-03	7.63E-04	5.40E-04
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	9.31E-04	2.00	6.32	20.0	4.65E-04	1.47E-04	4.65E-05
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	1.09E-02	75.0	168	375	1.45E-04	6.49E-05	2.90E-05
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	1.08E-02	100	224	500	1.08E-04	4.85E-05	2.17E-05
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	1.05E-05	0.62	1.37	3.07	1.71E-05	7.64E-06	3.42E-06
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	2.88E-02	8.42	18.8	42.1	3.42E-03	1.53E-03	6.85E-04
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	5.85E-05	65.6	147	328	8.92E-07	3.99E-07	1.78E-07
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	3.95E-05	0.62	1.37	3.07	6.42E-05	2.87E-05	1.29E-05
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	3.12E-05	0.00E+00	1.07E-06	0.000001	0.000003	0.00001	**1.07E+00**	3.37E-01	1.07E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0266 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of sediment
WIR = 0.0218 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.777 = Body weight (kg)

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

ATTACHMENT TABLE L-4-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	0.126	6.31E+00	1.45E-03	2.97E-01	0.25	0.56	1.26	**1.18E+00**	5.28E-01	2.36E-01
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	0.164	1.50E-01	2.92E-04	3.17E-02	0.77	2.43	7.70	4.12E-02	1.30E-02	4.12E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	0.038	7.24E-01	1.50E-03	1.28E-01	2.40	5.37	12.0	5.31E-02	2.38E-02	1.06E-02
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	0.100	2.22E+00	6.69E-04	4.12E-01	5.60	7.23	9.34	7.36E-02	5.70E-02	4.41E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	0.070	2.27E+00	3.98E-04	2.42E-01	4.70	6.47	8.90	5.14E-02	3.74E-02	2.72E-02
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	3.250	3.79E-01	3.45E-05	5.86E-03	0.032	0.072	0.160	1.83E-01	8.19E-02	3.66E-02
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	1.000	5.65E+00	1.09E-03	4.54E-02	1.70	2.40	3.40	2.67E-02	1.89E-02	1.34E-02
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	1.000	2.45E+00	1.30E-03	7.49E-02	0.20	0.26	0.33	3.75E-01	2.92E-01	2.27E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	1.000	1.68E-01	4.18E-05	9.18E-04	12.0	26.9	60.2	7.63E-05	3.41E-05	1.53E-05
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	0.147	2.39E+01	6.77E-03	4.55E+00	75.4	169	377	6.03E-02	2.70E-02	1.21E-02
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.22E-03	0.136	0.304	0.680	8.97E-03	4.01E-03	1.79E-03
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	2.41E-03	0.136	0.304	0.680	1.77E-02	7.93E-03	3.55E-03
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	1.76E-03	0.136	0.304	0.680	1.29E-02	5.78E-03	2.59E-03
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.22E-03	0.136	0.304	0.680	8.97E-03	4.01E-03	1.79E-03
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	8.32E-04	0.136	0.304	0.680	6.11E-03	2.73E-03	1.22E-03
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	7.05E-04	0.136	0.304	0.680	5.19E-03	2.32E-03	1.04E-03
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	7.75E-04	0.136	0.304	0.680	5.70E-03	2.55E-03	1.14E-03
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	4.03	3.13E-01	2.50E-04	8.98E-04	0.136	0.304	0.680	6.60E-03	2.95E-03	1.32E-03
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	4.60E-04	0.147	0.329	0.735	3.13E-03	1.40E-03	6.26E-04
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	3.74E-04	0.147	0.329	0.735	2.54E-03	1.14E-03	5.09E-04
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	3.12E-03	0.147	0.329	0.735	2.12E-02	9.48E-03	4.24E-03
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	2.31E-04	0.20	0.45	1.00	1.16E-03	5.17E-04	2.31E-04
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	1.73E-03	1.60	2.26	3.20	1.08E-03	7.66E-04	5.41E-04
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	2.55E-04	4.58	6.48	9.16	5.57E-05	3.94E-05	2.79E-05
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	1.72E-03	1.60	2.26	3.20	1.07E-03	7.59E-04	5.37E-04
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	1.33E-03	1.60	2.26	3.20	8.34E-04	5.89E-04	4.17E-04
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	4.86E-04	0.015	0.021	0.030	3.24E-02	2.29E-02	1.62E-02
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	1.69E-03	0.15	0.34	0.75	1.13E-02	5.03E-03	2.25E-03
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	9.33E-04	0.15	0.34	0.75	6.22E-03	2.78E-03	1.24E-03
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	6.03E-04	0.184	0.411	0.920	3.28E-03	1.47E-03	6.56E-04
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	1.84E-03	8.00	17.9	40.0	2.30E-04	1.03E-04	4.61E-05
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	2.55E-04	4.58	6.48	9.16	5.57E-05	3.94E-05	2.79E-05
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	2.64E-04	0.20	0.45	1.00	1.32E-03	5.90E-04	2.64E-04
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	6.32E-04	0.20	0.45	1.00	3.16E-03	1.41E-03	6.32E-04
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	5.94E-04	4.00	5.66	8.00	1.48E-04	1.05E-04	7.42E-05
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	8.65E-03	8.00	17.9	40.0	1.08E-03	4.83E-04	2.16E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	1.50E-04	76.0	170	380	1.97E-06	8.81E-07	3.94E-07
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	1.33E-02	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	1.89E-04	53.0	75.0	106	3.56E-06	2.52E-06	1.78E-06
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	2.82E-04	85.7	192	429	3.30E-06	1.47E-06	6.59E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	2.68E-04	85.7	192	429	3.13E-06	1.40E-06	6.26E-07
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	2.85E-04	30.0	52.0	90.0	9.48E-06	5.48E-06	3.16E-06
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	1.00E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	1.04E-02	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	2.89E-03	65.6	147	328	4.40E-05	1.97E-05	8.80E-06
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	1.40E-03	65.6	147	328	2.14E-05	9.55E-06	4.27E-06
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	1.70E-03	65.6	147	328	2.59E-05	1.16E-05	5.17E-06
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	1.13E-03	0.62	1.37	3.07	1.84E-03	8.26E-04	3.70E-04

ATTACHMENT TABLE L-4-23

Summary of Muskrat Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	8.41E-04	0.62	1.37	3.07	1.37E-03	6.12E-04	2.74E-04
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	2.64E-03	0.62	1.37	3.07	4.29E-03	1.92E-03	8.59E-04
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	8.68E-04	0.62	1.37	3.07	1.41E-03	6.32E-04	2.83E-04
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	7.37E-04	0.62	1.37	3.07	1.20E-03	5.37E-04	2.40E-04
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	1.25E-03	0.62	1.37	3.07	2.03E-03	9.07E-04	4.06E-04
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	4.56E-04	0.62	1.37	3.07	7.42E-04	3.32E-04	1.49E-04
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	4.78E-03	65.6	147	328	7.29E-05	3.26E-05	1.46E-05
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	2.89E-03	65.6	147	328	4.40E-05	1.97E-05	8.80E-06
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	5.25E-03	2.00	2.83	4.00	2.62E-03	1.86E-03	1.31E-03
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	1.16E-02	2.00	6.32	20.0	5.82E-03	1.84E-03	5.82E-04
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	7.53E-03	75.0	168	375	1.00E-04	4.49E-05	2.01E-05
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	2.26E-02	100	224	500	2.26E-04	1.01E-04	4.53E-05
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	5.07E-04	0.62	1.37	3.07	8.25E-04	3.69E-04	1.65E-04
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	2.62E-01	8.42	18.8	42.1	3.11E-02	1.39E-02	6.23E-03
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	9.40E-03	65.6	147	328	1.43E-04	6.41E-05	2.87E-05
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	5.72E-03	0.62	1.37	3.07	9.29E-03	4.16E-03	1.86E-03
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	0.128	0.00E+00	0.00E+00	0.00E+00	0.000001	0.000003	0.00001	0.00E+00	0.00E+00	0.00E+00

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0596 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.906 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.1139 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.169 = Body weight (kg)

ATTACHMENT TABLE L-4-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Arsenic	5.01E+01	Regression	9.76E+00	Regresson	1.24E+00	Measured	6.48E-01	1.45E-03	1.65E-01	1.04	1.31	1.66	1.59E-01	1.26E-01	9.94E-02
Cadmium	9.14E-01	Regression	4.63E-01	Regresson	5.91E-01	Measured	3.48E-01	2.92E-04	9.55E-03	0.77	2.43	7.70	1.24E-02	3.92E-03	1.24E-03
Chromium	1.90E+01	Regression	4.75E+00	0.041	7.81E-01	Measured	8.76E-01	1.50E-03	7.36E-02	2.40	5.37	12.0	3.07E-02	1.37E-02	6.13E-03
Copper	2.22E+01	0.824	1.83E+01	Regresson	6.62E+00	Measured	6.16E+00	6.69E-04	2.28E-01	11.7	13.3	15.1	1.95E-02	1.71E-02	1.51E-02
Lead	3.24E+01	Regression	2.96E+00	Regresson	1.87E+00	Measured	5.38E-01	3.98E-04	8.89E-02	4.70	6.47	8.90	1.89E-02	1.38E-02	9.99E-03
Mercury	1.17E-01	1.186	1.38E-01	Regresson	1.15E-01	Measured	4.51E-02	3.45E-05	2.09E-03	0.150	0.192	0.247	1.39E-02	1.09E-02	8.46E-03
Nickel	5.65E+00	Regression	1.21E+00	Regresson	3.95E-01	Measured	2.53E-01	1.09E-03	2.15E-02	1.70	2.40	3.40	1.27E-02	8.95E-03	6.33E-03
Selenium	2.45E+00	1.000	2.45E+00	Regresson	1.36E+00	Measured	1.04E+00	1.30E-03	3.34E-02	0.20	0.26	0.33	1.67E-01	1.30E-01	1.01E-01
Silver	1.68E-01	0.180	3.02E-02	0.014	2.35E-03	Measured	4.47E-02	4.18E-05	5.77E-04	12.0	26.9	60.2	4.79E-05	2.14E-05	9.58E-06
Zinc	1.63E+02	Regression	1.47E+02	Regresson	8.15E+01	Measured	1.12E+02	6.77E-03	2.08E+00	75.4	169	377	2.76E-02	1.24E-02	5.53E-03
Polychlorinated Biphenyls															
Aroclor-1016	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.86E-03	1.37	2.17	3.43	1.36E-03	8.60E-04	5.43E-04
Aroclor-1221	6.06E-02	Regression	1.73E-01	0.749	4.54E-02	4.03	2.44E-01	2.50E-04	2.04E-03	0.137	0.306	0.685	1.49E-02	6.67E-03	2.98E-03
Aroclor-1232	6.06E-02	Regression	1.73E-01	0.515	3.12E-02	4.03	2.44E-01	2.50E-04	1.94E-03	0.137	0.306	0.685	1.42E-02	6.35E-03	2.84E-03
Aroclor-1242	6.06E-02	Regression	1.73E-01	0.323	1.96E-02	4.03	2.44E-01	2.50E-04	1.86E-03	0.137	0.306	0.685	1.36E-02	6.08E-03	2.72E-03
Aroclor-1248	6.06E-02	Regression	1.73E-01	0.184	1.12E-02	4.03	2.44E-01	2.50E-04	1.81E-03	0.137	0.306	0.685	1.32E-02	5.89E-03	2.64E-03
Aroclor-1254	6.06E-02	Regression	1.73E-01	0.139	8.45E-03	4.03	2.44E-01	2.50E-04	1.79E-03	0.137	0.306	0.685	1.30E-02	5.83E-03	2.61E-03
Aroclor-1260	7.78E-02	Regression	2.28E-01	0.105	8.19E-03	4.03	3.13E-01	2.50E-04	2.31E-03	0.137	0.306	0.685	1.69E-02	7.55E-03	3.38E-03
PCB (total)	7.78E-02	Regression	2.28E-01	0.139	1.08E-02	Measured	9.47E-01	2.50E-04	3.10E-03	0.137	0.306	0.685	2.26E-02	1.01E-02	4.53E-03
Pesticides															
4,4'-DDD	3.40E-02	1.46	4.98E-02	Regresson	6.37E-03	1.61	5.47E-02	2.50E-05	5.45E-04	0.147	0.329	0.735	3.71E-03	1.66E-03	7.41E-04
4,4'-DDE	2.65E-02	1.46	3.89E-02	Regresson	5.29E-03	2.65	7.03E-02	2.50E-05	4.61E-04	0.147	0.329	0.735	3.14E-03	1.40E-03	6.28E-04
4,4'-DDT	3.19E-01	0.193	6.15E-02	Regresson	3.43E-02	1.73	5.53E-01	2.50E-05	1.90E-03	0.147	0.329	0.735	1.29E-02	5.77E-03	2.58E-03
Aldrin	2.04E-02	0.403	8.20E-03	0.139	2.84E-03	3.92	7.98E-02	2.50E-05	2.14E-04	0.20	0.45	1.00	1.07E-03	4.78E-04	2.14E-04
alpha-BHC	2.04E-02	0.710	1.44E-02	1.735	3.53E-02	3.92	7.98E-02	2.50E-05	4.87E-04	1.60	2.26	3.20	3.04E-04	2.15E-04	1.52E-04
alpha-Chlordane	2.04E-02	1.46	2.98E-02	0.165	3.36E-03	2.21	4.51E-02	2.50E-05	3.39E-04	4.58	6.48	9.16	7.40E-05	5.23E-05	3.70E-05
beta-BHC	2.04E-02	0.710	1.44E-02	1.719	3.50E-02	3.92	7.98E-02	2.50E-05	4.85E-04	1.60	2.26	3.20	3.03E-04	2.14E-04	1.51E-04
delta-BHC	2.04E-02	0.710	1.44E-02	1.311	2.67E-02	3.92	7.98E-02	2.50E-05	4.27E-04	1.60	2.26	3.20	2.67E-04	1.89E-04	1.33E-04
Dieldrin	2.04E-02	4.920	1.00E-01	0.410	8.35E-03	1.67	3.40E-02	2.50E-05	8.93E-04	0.015	0.021	0.030	5.95E-02	4.21E-02	2.98E-02
Endosulfan I	2.04E-02	0.057	1.15E-03	1.687	3.44E-02	3.92	7.98E-02	2.50E-05	3.79E-04	0.15	0.34	0.75	2.53E-03	1.13E-03	5.06E-04
Endosulfan II	2.04E-02	0.057	1.15E-03	0.886	1.80E-02	3.92	7.98E-02	2.50E-05	2.66E-04	0.15	0.34	0.75	1.77E-03	7.93E-04	3.55E-04
Endrin	2.04E-02	0.467	9.51E-03	0.535	1.09E-02	3.92	7.98E-02	2.50E-05	2.80E-04	0.184	0.411	0.920	1.52E-03	6.80E-04	3.04E-04
gamma-BHC (Lindane)	2.04E-02	0.334	6.81E-03	1.852	3.77E-02	3.92	7.98E-02	2.50E-05	4.46E-04	8.00	17.9	40.0	5.57E-05	2.49E-05	1.11E-05
gamma-Chlordane	2.04E-02	2.06	4.20E-02	0.165	3.36E-03	2.48	5.05E-02	2.50E-05	4.38E-04	4.58	6.48	9.16	9.56E-05	6.76E-05	4.78E-05
Heptachlor	2.04E-02	0.044	9.02E-04	0.174	3.55E-03	3.92	7.98E-02	2.50E-05	1.64E-04	0.20	0.45	1.00	8.18E-04	3.66E-04	1.64E-04
Heptachlor epoxide	2.04E-02	0.290	5.90E-03	0.566	1.15E-02	3.92	7.98E-02	2.50E-05	2.57E-04	0.20	0.45	1.00	1.28E-03	5.74E-04	2.57E-04
Methoxychlor	2.04E-02	1.000	2.04E-02	0.525	1.07E-02	3.92	7.98E-02	2.50E-05	3.60E-04	4.00	5.66	8.00	9.01E-05	6.37E-05	4.51E-05
Toxaphene	4.07E-01	1.000	4.07E-01	0.355	1.44E-01	3.92	1.59E+00	3.20E-04	6.71E-03	8.00	17.9	40.0	8.38E-04	3.75E-04	1.68E-04
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	1.000	1.98E-03	5.00E-04	7.58E-05	76.0	170	380	9.97E-07	4.46E-07	1.99E-07
1,2,4,5-Tetrachlorobenzene	3.15E-01	0.397	1.25E-01	0.792	2.50E-01	0.078	2.47E-02	3.00E-03	3.47E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.98E-03	0.257	5.09E-04	1.426	2.82E-03	0.287	5.69E-04	5.00E-04	6.88E-05	53.0	75.0	106	1.30E-06	9.18E-07	6.49E-07
1,2-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.452	4.85E-03	0.244	4.83E-04	5.00E-04	9.39E-05	85.7	192	429	1.10E-06	4.90E-07	2.19E-07
1,3-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.296	4.54E-03	0.044	8.62E-05	5.00E-04	9.13E-05	85.7	192	429	1.07E-06	4.76E-07	2.13E-07
1,4-Dichlorobenzene	1.98E-03	1.000	1.98E-03	2.475	4.90E-03	0.030	6.03E-05	5.00E-04	9.37E-05	30.0	52.0	90.0	3.12E-06	1.80E-06	1.04E-06
4-Bromophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.566	1.78E-01	1.000	3.15E-01	3.00E-03	4.77E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.15E-01	1.000	3.15E-01	0.593	1.87E-01	1.000	3.15E-01	3.00E-03	4.83E-03	NA	NA	NA	NA	NA	NA
Acenaphthene	4.19E-02	0.050	2.10E-03	Regresson	5.80E-02	0.076	3.20E-03	4.00E-05	4.94E-04	65.6	147	328	7.53E-06	3.37E-06	1.51E-06
Acenaphthylene	4.19E-02	0.122	5.12E-03	Regresson	2.59E-02	0.030	1.26E-03	4.00E-05	2.92E-04	65.6	147	328	4.45E-06	1.99E-06	8.89E-07
Anthracene	4.30E-02	0.544	2.34E-02	Regresson	3.22E-02	0.018	7.82E-04	4.00E-05	4.75E-04	65.6	147	328	7.24E-06	3.24E-06	1.45E-06
Benzo(a)anthracene	8.62E-02	0.154	1.33E-02	Regresson	1.55E-02	0.005	4.44E-04	4.00E-05	3.53E-04	0.62	1.37	3.07	5.74E-04	2.57E-04	1.15E-04

ATTACHMENT TABLE L-4-24

Summary of Raccoon Exposure Doses - Baseline (Step 7) - Mean - Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

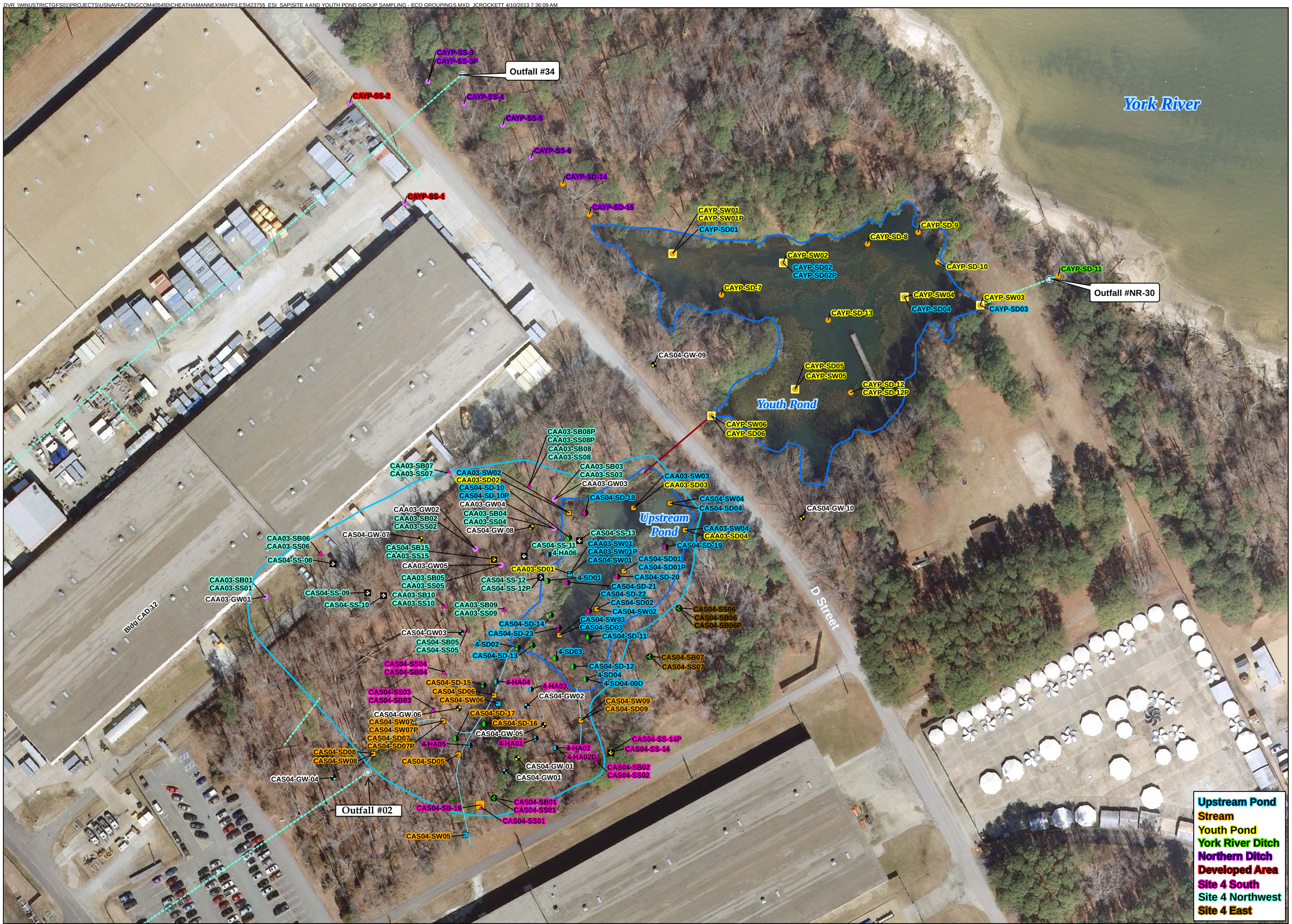
Chemical	Mean Sediment Concentration (mg/kg)	Sediment-Invertebrate BAF	Aquatic Invertebrate Concentration (mg/kg dw)	Sediment-Plant BAF	Aquatic Plant Concentration (mg/kg dw)	Sediment-Fish BAF	Fish/Frog Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Benzo(a)pyrene	7.57E-02	0.059	4.43E-03	Regresson	1.03E-02	0.004	3.40E-04	4.00E-05	2.32E-04	0.62	1.37	3.07	3.77E-04	1.69E-04	7.56E-05
Benzo(b)fluoranthene	1.38E-01	0.004	5.32E-04	0.310	4.27E-02	0.005	7.54E-04	4.00E-05	5.29E-04	0.62	1.37	3.07	8.60E-04	3.85E-04	1.72E-04
Benzo(g,h,i)perylene	5.57E-02	0.003	1.56E-04	Regresson	1.29E-02	0.009	4.90E-04	4.00E-05	1.86E-04	0.62	1.37	3.07	3.02E-04	1.35E-04	6.05E-05
Benzo(k)fluoranthene	5.74E-02	0.236	1.36E-02	Regresson	9.91E-03	0.005	3.02E-04	4.00E-05	2.69E-04	0.62	1.37	3.07	4.37E-04	1.96E-04	8.75E-05
Chrysene	9.78E-02	0.178	1.74E-02	Regresson	1.67E-02	0.006	5.66E-04	4.00E-05	4.11E-04	0.62	1.37	3.07	6.69E-04	2.99E-04	1.34E-04
Dibenz(a,h)anthracene	4.19E-02	0.032	1.34E-03	0.130	5.44E-03	0.005	1.97E-04	4.00E-05	1.20E-04	0.62	1.37	3.07	1.95E-04	8.72E-05	3.90E-05
Fluoranthene	1.71E-01	0.149	2.55E-02	0.500	8.57E-02	0.006	1.08E-03	4.00E-05	1.07E-03	65.6	147	328	1.63E-05	7.31E-06	3.27E-06
Fluorene	4.19E-02	0.500	2.09E-02	Regresson	5.80E-02	0.052	2.16E-03	4.00E-05	6.35E-04	65.6	147	328	9.68E-06	4.33E-06	1.94E-06
Hexachlorobenzene	3.15E-01	0.512	1.61E-01	0.246	7.77E-02	0.196	6.18E-02	1.50E-03	2.47E-03	2.00	2.83	4.00	1.24E-03	8.75E-04	6.19E-04
Hexachlorobutadiene	3.15E-01	0.385	1.21E-01	0.675	2.13E-01	0.078	2.47E-02	3.00E-03	3.19E-03	2.00	6.32	20.0	1.60E-03	5.05E-04	1.60E-04
Hexachlorocyclopentadiene	3.15E-01	1.000	3.15E-01	0.393	1.24E-01	1.000	3.15E-01	3.00E-03	4.39E-03	75.0	168	375	5.86E-05	2.62E-05	1.17E-05
Hexachloroethane	3.15E-01	1.000	3.15E-01	1.439	4.54E-01	1.000	3.15E-01	1.50E-03	6.56E-03	100	224	500	6.56E-05	2.93E-05	1.31E-05
Indeno(1,2,3-cd)pyrene	5.10E-02	0.003	1.52E-04	0.110	5.61E-03	0.005	2.74E-04	4.00E-05	1.27E-04	0.62	1.37	3.07	2.06E-04	9.23E-05	4.13E-05
Pentachlorophenol	9.39E-01	1.000	9.39E-01	5.930	5.57E+00	0.893	8.38E-01	4.50E-03	4.87E-02	8.42	18.8	42.1	5.78E-03	2.59E-03	1.16E-03
Phenanthrene	9.28E-02	0.412	3.83E-02	Regresson	1.94E-01	0.018	1.68E-03	4.00E-05	1.79E-03	65.6	147	328	2.73E-05	1.22E-05	5.46E-06
Pyrene	1.50E-01	0.485	7.28E-02	0.720	1.08E-01	0.007	1.12E-03	4.00E-05	1.55E-03	0.62	1.37	3.07	2.52E-03	1.13E-03	5.05E-04
Dioxin-Like PCB Congeners															
2,3,7,8 TCDD (TEQ)	0.00E+00	1.000	0.00E+00	0.135	0.00E+00	Measured	2.72E-05	0.00E+00	3.31E-08	0.000001	0.000003	0.00001	3.31E-02	1.05E-02	3.31E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

	Invertebrates	Bivalves	Fish
Lipids (%):	2.58	1.48	4.00
TOC (%):	7.35	7.35	7.35
Percent soilds:	0.21	0.21	0.25

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.1031 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic invertebrates, dry weight basis)
PDFi = 0.436 = Proportion of diet composed of food item (aquatic invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (aquatic plants, dry weight basis)
PDFi = 0.400 = Proportion of diet composed of food item (aquatic plants)
FCxi = Chemical-specific = Concentration of chemical in food item (fish, dry weight basis)
PDFi = 0.070 = Proportion of diet composed of food item (fish)
SCx = Chemical-specific = Concentration of chemical in sediment (mg/kg, dry weight)
PDS = 0.094 = Proportion of diet composed of sediment
WIR = 0.4921 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 5.940 = Body weight (kg)

DVR: \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\423755_ESI_SAP\SITE 4 AND YOUTH POND GROUP SAMPLING - ECO GROUPINGS.MXD, JCROCKETT 4/10/2013 7:36:09 AM



Legend

- Groundwater Sample Location
- Surface Sediment Samples
- Sediment/Toxicity Samples
- Surface Soil Samples
- Surface/Subsurface Soil Samples
- Surface Soil Samples for Hexavalent/Total Chromium
- Subsurface Soil Samples for Total and Hexavalent Chromium Analysis

- Outfall
- 2009 SI Soil Sample Location
- 2009 SI Surface Water Sample Location
- 2009 SI Surface Water/Sediment Sample Location
- 2009 SI Well Point Groundwater Sample Location
- 2009 SI DPT Soil Sample/Well Point Groundwater Sample Location

Youth Pond Samples:

- Sediment Sample Location
- Sediment/Surface Water Sample Location
- Surface Soil Sample Location

- Storm Water Line
- Culvert
- Drainage Channels
- Water Body
- Site 4 Boundary

N W E S

0 80 Feet

Figure L-1
Site Features and Sample Locations
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex, Williamsburg, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\388429_SITE4_YOUTH_POND_RI\FIGURE 4-1 - EXTENT OF BURIED DEBRIS.MXD JCROCKETT 9/10/2013 2:29:13 PM

Legend

- Outfall
- Test Pit Location
- Culvert
- Drainage Channels
- Storm Water Line
- Surface Debris Pile
- Extent of Buried Debris
- Water Body
- Site 4 Boundary

N
W E
S

0 60
Feet

Figure L-2
Site 4, Extent of Buried Debris
Site 4 and Youth Pond Remedial Investigation
Cheatham Annex
Williamsburg, Virginia

CH2MHILL

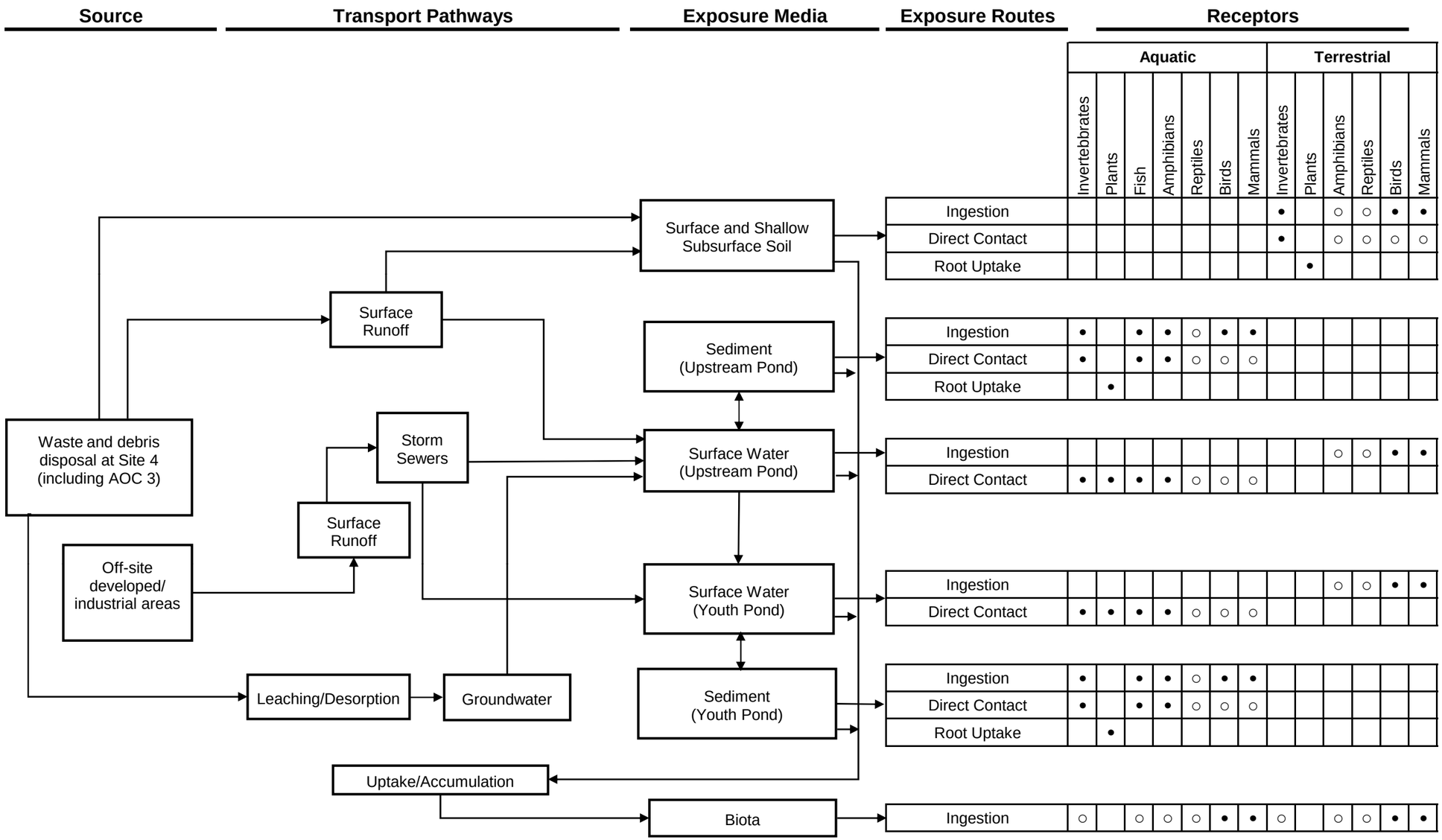


Figure L-3

Ecological Conceptual Site Model
Site 4/Youth Pond Remedial Investigation
Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Appendix M
Results of Reference Pond Sampling

APPENDIX M

Surface Water and Sediment Background UTLs

This appendix contains an evaluation of background (reference) surface water, surface sediment, and subsurface sediment samples collected from portions of Cheatham Pond in 2012 and 2000. These data were used to calculate background 95% Upper Tolerance Limits (UTLs), which were used in the BERA (**Appendix L**) to represent background concentrations for these media.

M.1 Background Data Sets

Surface water, surface sediment (0-4 inches), and subsurface sediment (4-8 inches) samples were collected from portions of Cheatham Pond in October 2012 to develop a reference data set for use in the Remedial Investigations of Site 4, Youth Pond, and Penniman Lake (**Table M-1**). Based on a reconnaissance survey conducted in Cheatham Pond, five locations were selected to match habitat conditions at Site 4 (Upstream Pond), five locations were selected to match habitat conditions at Penniman Lake, and three locations were selected to match habitat conditions at Youth Pond (**Figure M-1**). Based on a review of the preliminary (unvalidated) data, the CAX Partnering Team agreed not to use the three reference samples for Youth Pond due to elevated concentrations of PCBs and metals in sediment. Thus, only the ten samples collected for Penniman Lake and Site 4 were used to develop background UTLs (**Table M-1**).

Surface water and surface sediment data were also collected from eight locations in Cheatham Pond during the 2000 Pond Study (CH2M HILL and Baker, 2001; **Figure M-2**). The surface water samples were not used due to their age. The surface sediment samples were used because sediment concentrations tend to be much more temporally stable than surface water concentrations. However, only the inorganic data were used because of elevated detection limits for most of the organic analytes.

M.2 Background Data Evaluation

The methodology used followed that used previously to derive 95% UTL values for soil and groundwater (CH2M HILL, 2011).

M.2.1 Summary of the Data

Tables M-2 through M-4 summarize the detected concentrations in surface water, surface sediment, and subsurface sediment, respectively, by sampling event/area. The raw analytical data for the samples used for UTL development are included in **Attachment M-1**.

M.2.2 Statistical Analysis

Duplicate results were reconciled to a single value in the same manner that site data was treated, that is, choosing the maximum detect, the higher of the two detection limits (when both the parent and duplicate were non-detect), or the detect (when one of the pair was non-detect). When sufficient data were available, UTLs were calculated for metals (except for the essential nutrients calcium, magnesium, potassium, and sodium), widely distributed anthropogenic compounds (pesticides and PAHs), naturally occurring organic compounds (carbon disulfide), and common laboratory contaminants (e.g., 2-butanone and acetone). UTLs were not calculated for PCBs or explosives.

M.2.2.1 Grouping of Data

To determine which groups (by medium) should be combined when calculating background UTLs, pair-wise Wilcoxon Rank Sum (WRS) comparisons and box and whisker plots were used to determine if significant differences exist between groups. The chemicals included in the comparisons were those with at least 50 percent detections. Non-detects were assigned a value equal to one-half of the reporting limit. The results of the statistical tests are summarized in **Tables M-5 through M-7**.

Based on this analysis, the data for both surface water groups were combined, and the data for all three surface sediment groups were combined, when deriving the UTLs. For subsurface sediments, the two groups were not combined because they were significantly different from each other for most of the metals. Because the uncombined sample sizes for the two subsurface sediment groups were low (five in each group), the UTL was set at the maximum detected concentration for each group.

M.2.2.2 Evaluation of Outliers

Outliers were evaluated with Dixon's outlier test on the combined data sets (surface water and surface sediment). A list of mathematical outliers is provided, by medium, in **Table M-8**. The data included in the evaluation of outliers are plotted as normal probability plots in **Figure M-3**. An "X" symbol is used for the mathematical outliers. Normal probability plots graph actual concentrations against theoretical quantiles if the true distribution of the data were normal. Thus, if the data set has strong adherence to a normal distribution, the plot resembles a straight line (with limited curvature).

An inspection of the plots in **Figure M-3** reveals that many of the constituents contain data that are positively skewed as indicated by upward curvature. This is true even for the portion of the curve below the suspected outliers. Dixon's test assumes that the data values (aside from those being tested as potential outliers) are normally distributed. When upward curvature is present, as is the case for many constituents, the data are positively skewed which leads to more elevated results being identified as mathematical outliers than if an appropriate transformation of the data could be determined to render the data more normally distributed. For conservatism, this potential effect was not considered and all of the calculated mathematical outliers were removed from the recommended background data set prior to calculating the UTLs.

M.2.2.3 Background Threshold Value Calculations

Background threshold values were calculated as 95 percent upper confidence limits of the 95th percentile (upper tolerance limits or UTLs). These 95/95 UTLs were calculated from the recommended background data set (values excluding mathematical outliers) using either a distributional assumption (when deemed appropriate for the background data) or using a nonparametric (no distributional assumption) approach when evidence for a particular distribution was not available. The distribution possibilities included those discussed by USEPA's ProUCL software: the normal, lognormal, and gamma distributions (USEPA, 2009).

When at least 60 percent of the results were detected, the distributions appearing most appropriate via ProUCL's distributional checks were typically used to calculate the UTL. For such cases, when data includes non-detects (NDs), ProUCL algorithms seek to apply maximum likelihood estimate (MLE) or regression on order (ROS) statistical techniques to provide proxy values for the NDs used in the calculation of the UTLs. When a UTL estimated using MLE or ROS techniques was possible within ProUCL's algorithms, that approach was preferred over one using alternate proxy values (e.g., one-half the reporting limit). An exception to using the distributional assumption was encountered for beryllium in surface sediment where a lognormal distribution was identified, but only with 10 samples which did not merit the assumption of that strongly skewed a distribution (ProUCL algorithms do not take this into account, but recommendations for interpreting the ProUCL output in the technical guide do).

When fewer than 60 percent detections were available (or at least 60 percent of the results were detected, but no discernible distribution was available), a nonparametric approach was used to calculate the UTL. When all results were detected, a nonparametric UTL, based on ranks of the data, was applied. The Kaplan Meier approach was applied as the nonparametric method when at least one of the results was non-detect.

When fewer than two detections were available for an analyte, no UTL value was calculated; the UTL was the maximum detected concentration. A summary of surface water, surface sediment, and subsurface sediment central tendency statistics and background UTLs is provided in **Tables M-9 through M-12**.

M.3 References

CH2M HILL, Inc. 2011. Background Study Report. Naval Weapons Station Yorktown, Yorktown, Virginia and Cheatham Annex, Williamsburg, Virginia. May.

CH2M HILL, Inc. and Baker Environmental, Inc. 2001. Final Pond Study Report. Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site. August.

U.S. Environmental Protection Agency (USEPA). 2009. *ProUCL Version 4.00.04 Technical Guide (Draft),* Office of Research and Development.

TABLE M-1

Samples Used in the Surface Water/Sediment Background UTL Derivation

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Station ID	Sample ID	Date	Depth (inches)	Area	Spatial Group	Comment
Surface Water						
CAREFS04-SWSD01	CAREFS04-SW01-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SW02-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SW02P-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD03	CAREFS04-SW03-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SW04-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFS04-SWSD05	CAREFS04-SW05-1012	10/3/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SW01-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SW02-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SW03-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SW03P-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SW04-1012	10/4/2012	Surface	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SW05-1012	10/4/2012	Surface	Cheatham Pond	Reference	
Surface Sediment						
CAREFS04-SWSD01	CAREFS04-SD01-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD01	CAREFS04-SD01P-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SD02-1012	10/9/2012	0-4	Cheatham Pond	Reference	Toxicity test sample
CAREFS04-SWSD03	CAREFS04-SD03-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SD04-1012	10/9/2012	0-4	Cheatham Pond	Reference	Toxicity test sample
CAREFS04-SWSD05	CAREFS04-SD05-1012	10/9/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SD01-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SD02-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SD02P-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SD03-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SD04-1012	10/10/2012	0-4	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SD05-1012	10/10/2012	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD02	CP-00-POND-SD02-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD02	CP-00-POND-SD02D-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD03	CP-00-POND-SD03-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD04	CP-00-POND-SD04-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD05	CP-00-POND-SD05-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD06	CP-00-POND-SD06-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD07	CP-00-POND-SD07-0300	3/31/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD18	CP-00-POND-SD18-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Cheatham Pond-SD19	CP-00-POND-SD19-0300	3/30/2000	0-4	Cheatham Pond	Reference	
Subsurface Sediment						
CAREFS04-SWSD01	CAREFS04-SSD01-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD01	CAREFS04-SSD01P-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD02	CAREFS04-SSD02-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD03	CAREFS04-SSD03-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD04	CAREFS04-SSD04-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFS04-SWSD05	CAREFS04-SSD05-1012	10/9/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD01	CAREFPL-SSD01-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD02	CAREFPL-SSD02-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD03	CAREFPL-SSD03-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD04	CAREFPL-SSD04-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SSD05-1012	10/10/2012	4-8	Cheatham Pond	Reference	
CAREFPL-SWSD05	CAREFPL-SSD05P-1012	10/10/2012	4-8	Cheatham Pond	Reference	

Shaded cells indicate field duplicates

TABLE M-2

Summary Statistics for Detected Constituents in Surface Water Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	2012 Samples (Penniman Lake)					2012 Samples (Site 4)				
	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean
Inorganics (UG/L)										
Aluminum	5 / 5	52.1	61.3	57.0	3.99	5 / 5	77.9	286	149	82.6
Arsenic	5 / 5	5.20	6.19	5.61	0.48	5 / 5	6.30	7.90	6.90	0.68
Barium	5 / 5	18.7	20.7	19.5	0.83	5 / 5	19.5	24.6	22.2	1.92
Cadmium	0 / 5	--	--	0.25	0.0	1 / 5	0.080	0.080	1.22	0.64
Calcium	5 / 5	32,300	36,000	33,760	1,753	5 / 5	31,900	57,700	43,300	9,397
Chromium	0 / 5	--	--	0.50	0.0	5 / 5	0.37	0.96	0.58	0.23
Iron	5 / 5	996	1,260	1,096	132	5 / 5	1,410	2,050	1,766	273
Magnesium	5 / 5	1,920	2,000	1,954	34.4	5 / 5	2,160	2,330	2,224	70.2
Manganese	5 / 5	99.2	142	115	20.6	5 / 5	86.3	120	107	13.9
Potassium	5 / 5	2,590	2,700	2,646	50.3	5 / 5	2,480	2,990	2,762	217
Selenium	0 / 5	--	--	0.63	0.0	1 / 5	2.50	2.50	3.30	0.45
Sodium	5 / 5	13,200	14,000	13,500	346	5 / 5	12,300	14,100	13,280	795
Vanadium	0 / 5	--	--	1.25	0.0	5 / 5	0.40	1.10	0.68	0.30
Zinc	4 / 5	1.29	1.64	1.37	0.16	0 / 5	--	--	3.00	2.66
Dissolved Metals (UG/L)										
Aluminum, Dissolved	0 / 5	--	--	22.7	6.07	5 / 5	69.1	295	155	85.2
Arsenic, Dissolved	0 / 5	--	--	2.29	0.33	5 / 5	5.00	6.10	5.56	0.46
Barium, Dissolved	0 / 5	--	--	8.98	0.66	5 / 5	16.8	24.5	20.9	3.53
Cadmium, Dissolved	0 / 5	--	--	0.25	0.0	1 / 5	0.050	0.050	1.21	0.65
Calcium, Dissolved	0 / 5	--	--	16,920	1,117	5 / 5	32,500	58,100	43,920	10,724
Chromium, Dissolved	0 / 5	--	--	0.50	0.0	1 / 5	0.65	0.65	0.44	0.18
Iron, Dissolved	5 / 5	364	1,030	680	239	5 / 5	544	1,800	1,272	523
Lead, Dissolved	1 / 5	0.52	0.52	0.40	0.066	0 / 5	--	--	2.00	0.0
Magnesium, Dissolved	0 / 5	--	--	982	9.08	5 / 5	2,090	2,280	2,186	69.1
Manganese, Dissolved	4 / 5	67.6	116	68.8	34.8	5 / 5	34.8	107	78.5	29.8
Mercury, Dissolved	0 / 5	--	--	0.080	0.0	5 / 5	0.010	0.040	0.030	0.014
Potassium, Dissolved	0 / 5	--	--	1,307	22.5	5 / 5	2,540	3,200	2,740	264
Selenium, Dissolved	0 / 5	--	--	0.63	0.0	1 / 5	2.80	2.80	3.36	0.31
Sodium, Dissolved	0 / 5	--	--	6,820	97.5	5 / 5	12,600	13,500	13,220	356
Thallium, Dissolved	0 / 5	--	--	0.50	0.0	2 / 5	1.20	1.40	2.02	0.66
Vanadium, Dissolved	0 / 5	--	--	1.25	0.0	5 / 5	0.51	0.96	0.78	0.19
Pesticides (UG/L)										
alpha-BHC	2 / 5	0.0043	0.040	0.012	0.016	0 / 5	--	--	0.012	0.0003
alpha-Chlordane	2 / 5	0.0082	0.017	0.0079	0.0054	0 / 5	--	--	0.012	0.0003

TABLE M-2

Summary Statistics for Detected Constituents in Surface Water Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	2012 Samples (Penniman Lake)					2012 Samples (Site 4)				
	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean
gamma-BHC (Lindane)	2 / 5	0.0040	0.012	0.0061	0.0035	0 / 5	--	--	0.012	0.0003
gamma-Chlordane	1 / 5	0.021	0.021	0.0091	0.0069	0 / 5	--	--	0.012	0.0003
Heptachlor epoxide	1 / 5	0.0075	0.0075	0.0047	0.0020	0 / 5	--	--	0.012	0.0003
Semivolatile Organic Compounds (UG/L)										
Benzo(a)anthracene	2 / 5	0.052	0.067	0.052	0.0083	0 / 5	--	--	0.048	0.0011
Benzo(b)fluoranthene	2 / 5	0.063	0.063	0.054	0.0084	0 / 5	--	--	0.048	0.0011
Benzo(k)fluoranthene	2 / 5	0.058	0.063	0.053	0.0072	0 / 5	--	--	0.048	0.0011
Chrysene	2 / 5	0.054	0.080	0.055	0.014	0 / 5	--	--	0.048	0.0011
Fluoranthene	3 / 5	0.086	0.18	0.090	0.053	0 / 5	--	--	0.048	0.0011
Phenanthrene	2 / 5	0.099	0.12	0.10	0.012	1 / 5	0.065	0.065	0.052	0.0076
Pyrene	3 / 5	0.059	0.13	0.071	0.032	0 / 5	--	--	0.048	0.0011
Volatile Organic Compounds (UG/L)										
Acetone	5 / 5	49.5	76.8	64.1	10.1	0 / 5	--	--	2.28	0.60
Explosives (UG/L)										
2-Nitrotoluene	1 / 5	0.81	0.81	0.22	0.33	0 / 5	--	--	0.06	0.0
Other Parameters										
Hardness (MG/L)	5 / 5	85.5	107	96.8	7.64	5 / 5	76.0	160	110	32.2

TABLE M-3

Summary Statistics for Detected Constituents in Surface Sediment Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	2012 Samples (Penniman Lake)					2012 Samples (Site 4)					2000 Samples (Pond Study)				
	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean
Inorganics (MG/KG)															
Aluminum	5 / 5	1,730	24,200	8,116	9,185	5 / 5	7,480	17,700	11,780	4,743	8 / 8	4,880	12,400	9,771	2,441
Antimony	1 / 5	0.73	0.73	2.40	1.86	1 / 5	1.70	1.70	0.58	0.63	0 / 8	--	--	1.74	0.37
Arsenic	5 / 5	11.1	147	52.1	55.1	5 / 5	38.9	106	66.5	26.3	8 / 8	36.5	75.2	55.5	12.2
Barium	5 / 5	9.62	75.0	34.8	24.4	5 / 5	20.7	72.2	54.1	20.2	8 / 8	46.2	69.9	60.6	7.59
Beryllium	3 / 5	0.45	1.39	0.68	0.46	5 / 5	0.37	1.10	0.70	0.37	7 / 8	0.29	1.20	0.71	0.39
Cadmium	0 / 5	--	--	0.59	0.47	4 / 5	0.090	0.45	0.31	0.19	0 / 8	--	--	1.08	0.99
Calcium	5 / 5	2,960	23,000	8,754	8,246	5 / 5	7,710	215,000	86,922	88,271	8 / 8	65,700	189,000	129,500	52,472
Chromium	5 / 5	5.67	46.2	18.3	16.5	5 / 5	13.1	40.2	23.8	12.7	8 / 8	9.00	38.0	24.8	8.94
Cobalt	1 / 5	1.50	1.50	3.05	2.27	5 / 5	1.80	5.40	3.66	1.65	8 / 8	2.70	12.7	6.03	3.41
Copper	5 / 5	2.18	10.0	5.37	3.70	5 / 5	4.60	16.7	10.8	4.53	8 / 8	10.0	20.8	15.4	4.23
Iron	5 / 5	5,420	38,900	15,930	13,675	5 / 5	12,300	27,800	23,560	6,548	8 / 8	11,000	35,800	23,938	8,296
Lead	5 / 5	4.46	22.2	12.0	8.04	5 / 5	6.80	24.0	15.7	7.17	8 / 8	13.8	31.3	26.3	5.57
Magnesium	5 / 5	255	3,470	1,205	1,304	5 / 5	955	2,540	1,591	752	8 / 8	1,450	2,650	2,039	388
Manganese	5 / 5	21.9	74.6	49.7	23.8	5 / 5	30.6	254	119	88.0	8 / 8	129	300	212	64.3
Mercury	3 / 5	0.031	0.081	0.058	0.037	5 / 5	0.030	0.12	0.084	0.035	8 / 8	0.080	0.24	0.16	0.048
Nickel	5 / 5	1.30	13.4	5.33	4.74	5 / 5	4.60	12.6	7.94	3.84	4 / 8	7.10	13.2	9.42	2.46
Potassium	4 / 5	248	3,740	1,344	1,391	5 / 5	870	2,860	1,664	919	8 / 8	1,020	2,440	1,771	443
Selenium	0 / 5	--	--	1.48	1.18	3 / 5	0.78	2.20	1.31	0.76	0 / 8	--	--	2.23	0.48
Sodium	0 / 5	--	--	885	707	0 / 5	--	--	58.9	18.8	8 / 8	212	519	348	83.0
Thallium	0 / 5	--	--	1.18	0.95	0 / 5	--	--	0.65	0.53	1 / 8	6.50	6.50	2.96	1.52
Vanadium	5 / 5	7.47	58.3	21.8	20.9	5 / 5	22.1	48.0	31.6	11.8	8 / 8	17.5	41.1	32.7	7.46
Zinc	5 / 5	14.0	60.1	33.3	23.8	5 / 5	23.3	81.4	48.2	25.6	8 / 8	30.4	91.1	61.8	19.9
Pesticides (UG/KG)															
4,4'-DDD	5 / 5	0.57	154	33.9	67.2	4 / 5	1.50	3.70	3.10	1.34					
4,4'-DDE	5 / 5	0.95	26.2	8.34	10.5	5 / 5	7.00	28.0	18.2	8.96					
4,4'-DDT	1 / 5	1.45	1.45	0.75	0.51	0 / 5	--	--	4.03	1.38					
alpha-BHC	1 / 5	0.81	0.81	0.69	0.33	0 / 5	--	--	2.10	0.72					
Dieldrin	1 / 5	0.95	0.95	0.65	0.36	0 / 5	--	--	4.03	1.38					
Endrin	2 / 5	2.27	7.36	2.16	3.02	0 / 5	--	--	4.03	1.38					
gamma-BHC (Lindane)	3 / 5	0.30	2.22	0.88	0.82	0 / 5	--	--	2.10	0.72					
gamma-Chlordane	1 / 5	1.10	1.10	0.64	0.29	0 / 5	--	--	2.10	0.72					
Semivolatile Organic Compounds (UG/KG)															
Benzo(a)anthracene	0 / 5	--	--	6.20	3.39	2 / 5	9.90	16.0	19.7	9.58					
Benzo(b)fluoranthene	0 / 5	--	--	6.20	3.39	4 / 5	15.0	28.0	19.6	5.94					
Benzo(g,h,i)perylene	0 / 5	--	--	6.20	3.39	1 / 5	25.0	25.0	23.9	7.11					
Chrysene	2 / 5	8.69	17.3	9.13	5.48	0 / 5	--	--	26.4	9.42					
Fluoranthene	4 / 5	8.77	31.4	15.0	10.7	4 / 5	12.0	17.0	13.8	1.92					
PAH (HMW)	4 / 5	38.8	115	63.3	40.8	4 / 5	174	294	208	95.6					
PAH (LMW)	4 / 5	193	600	333	204	4 / 5	706	1,080	788	354					
PAH (total)	4 / 5	232	769	408	263	4 / 5	880	1,374	995	450					
Phenanthrene	1 / 5	27.5	27.5	9.46	10.3	1 / 5	11.0	11.0	24.2	11.7					
Pyrene	4 / 5	7.57	27.4	14.6	9.86	1 / 5	12.0	12.0	24.4	11.4					
Volatile Organic Compounds (UG/KG)															
1,2,3-Trichlorobenzene	0 / 5	--	--	4.52	2.54	1 / 5	14.0	14.0	9.30	3.95					
2-Butanone	5 / 5	31.0	169	76.7	60.8	5 / 5	76.0	430	275	132					
Acetone	5 / 5	99.8	629	311	262	5 / 5	370	1,700	1,194	507					
Carbon disulfide	1 / 5	7.06	7.06	4.43	2.42	5 / 5	7.20	18.0	13.4	4.32					
Methylene chloride	3 / 5	5.21	17.1	9.71	5.56	0 / 5	--	--	40.0	15.7					
Explosives (UG/KG)															
1,3-Dinitrobenzene	1 / 5	279	279	121	88.2	0 / 5	--	--	123	42.8					
2,4,6-Trinitrotoluene	2 / 5	141	436	164	154	0 / 5	--	--	123	42.8					
2-Nitrotoluene	1 / 5	101	101	85.6	8.78	0 / 5	--	--	123	42.8					
4-Nitrotoluene	1 / 5	348	348	135	119	0 / 5	--	--	123	42.8					
HMX	1 / 5	174	174	101	40.9	0 / 5	--	--	123	42.8					
Nitroglycerin	1 / 5	384	384	240	80.5	0 / 5	--	--	994	342					
Nitroguanidine	0 / 5	--	--	50.6	3.07	3 / 5	360	1,200	500	532					
RDX	1 / 5	297	297	125	96.3	0 / 5	--	--	123	42.8					
Tetryl	1 / 5	106	106	86.6	11.0	0 / 4	--	--	123	49.4					
Other Parameters															
pH	5 / 5	6.54	6.91	6.76	0.14	5 / 5	6.60	6.90	6.84	0.13	8 / 8	7.30	8.00	7.74	0.21
Total organic carbon (MG/KG)	5 / 5	37,600	97,200	59,940	22,238	5 / 5	57,000	170,000	117,400	44,258	8 / 8	12,700	108,000	62,625	32,367

TABLE M-4

Summary Statistics for Detected Constituents in Subsurface Sediment Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	2012 Samples (Penniman Lake)					2012 Samples (Site 4)				
	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean
Inorganics (MG/KG)										
Aluminum	5 / 5	1,510	10,200	4,178	3,449	5 / 5	9,540	19,400	13,788	4,961
Antimony	0 / 5	--	--	1.55	1.11	2 / 5	0.32	26.7	5.60	11.8
Arsenic	5 / 5	3.39	57.2	18.6	22.1	5 / 5	12.6	51.1	34.2	17.0
Barium	5 / 5	10.5	36.5	21.1	10.9	5 / 5	30.7	98.1	59.3	28.0
Beryllium	3 / 5	0.45	0.60	0.51	0.23	5 / 5	0.63	0.96	0.82	0.17
Cadmium	0 / 5	--	--	0.39	0.28	5 / 5	0.030	0.18	0.11	0.053
Calcium	5 / 5	1,120	7,430	4,000	2,369	5 / 5	6,620	89,600	31,924	34,822
Chromium	5 / 5	4.00	15.9	8.46	4.52	5 / 5	21.3	25.8	23.7	1.83
Cobalt	2 / 5	1.69	2.47	2.20	1.20	5 / 5	2.30	5.30	3.66	1.36
Copper	4 / 5	2.09	3.67	2.52	0.84	5 / 5	5.20	8.90	6.48	1.57
Iron	5 / 5	2,840	11,300	6,938	3,274	5 / 5	10,800	43,800	22,760	13,078
Lead	5 / 5	3.58	12.1	6.50	3.86	5 / 5	9.20	17.2	12.8	3.84
Magnesium	4 / 5	197	1,130	769	436	5 / 5	1,340	1,590	1,478	106
Manganese	5 / 5	13.6	28.9	21.8	5.90	5 / 5	24.7	310	103	118
Mercury	3 / 5	0.026	0.052	0.035	0.014	5 / 5	0.040	0.090	0.066	0.019
Nickel	4 / 5	1.24	5.63	2.91	1.63	5 / 5	5.80	9.10	7.40	1.51
Potassium	3 / 5	558	1,120	842	402	5 / 5	1,440	1,610	1,536	67.3
Selenium	0 / 5	--	--	0.97	0.70	3 / 5	0.42	2.50	0.98	0.86
Vanadium	5 / 5	5.09	20.4	10.4	5.90	5 / 5	24.2	40.8	31.8	7.41
Zinc	5 / 5	8.81	22.6	15.6	6.49	5 / 5	28.6	52.8	40.1	9.68
Pesticides (UG/KG)										
4,4'-DDD	4 / 5	1.13	18.4	6.93	8.38	5 / 5	0.66	4.20	1.75	1.40
4,4'-DDE	5 / 5	0.35	8.98	3.77	4.14	5 / 5	3.80	14.0	8.56	4.68
Aldrin	1 / 5	0.91	0.91	0.43	0.27	0 / 5	--	--	1.35	0.25
alpha-BHC	1 / 5	0.32	0.32	0.36	0.10	0 / 5	--	--	1.35	0.25
beta-BHC	2 / 5	0.47	2.21	0.72	0.83	0 / 5	--	--	1.35	0.25
delta-BHC	1 / 5	0.29	0.29	0.35	0.11	0 / 5	--	--	1.35	0.25
Endosulfan I	1 / 5	0.81	0.81	0.41	0.23	0 / 5	--	--	1.35	0.25
Endrin	1 / 5	0.64	0.64	0.42	0.16	0 / 4	--	--	2.46	0.41
gamma-BHC (Lindane)	2 / 5	0.22	0.48	0.38	0.12	0 / 5	--	--	1.35	0.25
Polychlorinated Biphenyls (UG/KG)										
Aroclor-1254	1 / 5	14.5	14.5	9.77	3.66	0 / 5	--	--	13.5	2.47
Semivolatile Organic Compounds (UG/KG)										
Anthracene	0 / 5	--	--	3.45	1.10	1 / 5	4.60	4.60	12.7	4.86
Benzo(a)anthracene	0 / 5	--	--	3.45	1.10	2 / 5	9.20	14.0	13.1	2.63
Benzo(a)pyrene	1 / 5	14.5	14.5	5.76	5.00	1 / 5	15.0	15.0	14.8	1.75
Benzo(b)fluoranthene	1 / 5	17.7	17.7	6.40	6.41	3 / 5	9.20	25.0	14.7	6.41
Benzo(g,h,i)perylene	0 / 5	--	--	3.45	1.10	2 / 5	8.20	12.0	12.5	2.97
Benzo(k)fluoranthene	1 / 5	12.6	12.6	5.38	4.17	1 / 5	16.0	16.0	15.0	1.84
Chrysene	1 / 5	19.6	19.6	6.78	7.25	0 / 5	--	--	15.6	2.58
Dibenz(a,h)anthracene	0 / 5	--	--	3.45	1.10	1 / 5	8.60	8.60	13.5	3.26
Fluoranthene	4 / 5	8.10	21.2	10.8	6.86	2 / 5	15.0	16.0	14.7	1.64
Indeno(1,2,3-cd)pyrene	0 / 5	--	--	3.45	1.10	1 / 5	8.40	8.40	13.5	3.34
PAH (HMW)	4 / 5	35.9	95.9	46.6	31.5	4 / 5	113	142	116	33.6

TABLE M-4

Summary Statistics for Detected Constituents in Subsurface Sediment Samples

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical	2012 Samples (Penniman Lake)					2012 Samples (Site 4)				
	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean
PAH (LMW)	4 / 5	201	316	200	88.6	2 / 5	532	601	366	186
PAH (total)	4 / 5	237	369	244	107	4 / 5	537	735	578	185
Phenanthrene	4 / 5	7.31	16.7	9.05	5.24	2 / 5	7.50	10.0	12.0	3.41
Pyrene	4 / 5	9.75	21.5	10.9	6.87	2 / 5	14.0	16.0	14.5	1.66
Volatile Organic Compounds (UG/KG)										
2-Butanone	5 / 5	11.8	43.9	26.6	14.7	5 / 5	85.0	340	191	92.9
Acetone	5 / 5	43.4	157	97.1	47.9	5 / 5	500	1,400	822	344
Carbon disulfide	0 / 5	--	--	2.21	0.75	5 / 5	4.40	11.0	7.12	2.87
Methylene chloride	2 / 5	7.11	8.03	4.69	2.70	0 / 5	--	--	21.8	4.93
Explosives (UG/KG)										
1,3-Dinitrobenzene	1 / 5	217	217	115	57.5	0 / 5	--	--	77.0	17.2
HMX	1 / 5	812	812	236	322	0 / 5	--	--	77.0	17.2
Nitroguanidine	1 / 5	110	110	60.6	27.7	1 / 5	180	180	51.9	71.6
Other Parameters										
pH	5 / 5	6.77	6.94	6.85	0.071	5 / 5	6.80	7.20	6.92	0.16
Total organic carbon (MG/KG)	5 / 5	19,600	67,800	39,960	18,635	5 / 5	72,000	130,000	95,400	21,973

TABLE M-5

Two-Tailed Wilcoxon Rank Sum Comparisons for Cases with at Least 50 Percent Detects - Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Comparison	Chemical Group	Parameter	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision (α = 0.05)	Mean of Group 1 Detects	Mean of Group 2 Detects	Median of Group 1 Detects	Median of Group 2 Detects	Frequency of Detection (Group 1)	Frequency of Detection (Group 2)
Site 4 (2) vs Penniman Lake (1)	Dissolved Metals	Iron	0.144	Not Significant	680	1,270	688	1,420	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Dissolved Metals	Manganese	0.917	Not Significant	81.5	78.5	71.2	81.4	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Aluminum	0.012	2 > 1	57.0	149	55.6	141	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Arsenic	0.012	2 > 1	5.61	6.90	5.30	6.60	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Barium	0.037	2 > 1	19.5	22.2	19.1	22.3	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Calcium	0.144	Not Significant	33,800	43,300	32,800	43,400	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Iron	0.012	2 > 1	1,100	1,770	1,010	1,710	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Magnesium	0.012	2 > 1	1,950	2,220	1,940	2,190	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Manganese	0.531	Not Significant	115	107	102	114	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Potassium	0.403	Not Significant	2,650	2,760	2,650	2,750	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Sodium	1.000	Not Significant	13,500	13,300	13,400	13,500	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Wet Chemistry	Hardness	0.753	Not Significant	96.8	110	97.3	98.0	5 / 5	5 / 5

TABLE M-6

Two-Tailed Wilcoxon Rank Sum Comparisons for Cases with at Least 50 Percent Detects - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Comparison	Chemical Group	Parameter	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision (α = 0.05)	Mean of Group 1 Detects	Mean of Group 2 Detects	Median of Group 1 Detects	Median of Group 2 Detects	Frequency of Detection (Group 1)	Frequency of Detection (Group 2)
Site 4 (2) vs Penniman Lake (1)	Pesticides	4,4'-DDE	1.000	Not Significant	8.34	18.2	3.75	18.0	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Aluminum	0.144	Not Significant	8,120	11,800	5,320	9,060	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Arsenic	0.296	Not Significant	52.1	66.5	43.0	69.3	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Barium	0.403	Not Significant	34.8	54.1	31.7	62.0	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Beryllium	0.424	Not Significant	0.86	0.70	0.74	0.47	3 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Calcium	0.037	2 > 1	8,750	86,900	5,490	40,100	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Chromium	0.531	Not Significant	18.3	23.8	13.7	17.0	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Cobalt	1.000	Not Significant	1.50	3.66	1.50	3.00	1 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Copper	0.060	Not Significant	5.37	10.8	3.38	10.1	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Iron	0.296	Not Significant	15,900	23,600	13,500	26,900	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Lead	0.403	Not Significant	12.0	15.7	8.33	13.3	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Magnesium	0.296	Not Significant	1,200	1,590	716	1,130	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Manganese	0.144	Not Significant	49.7	119	54.9	95.8	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Mercury	1.000	Not Significant	0.048	0.084	0.033	0.080	3 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Nickel	1.000	Not Significant	5.33	7.94	4.48	5.80	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Potassium	0.797	Not Significant	1,420	1,660	855	1,280	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Vanadium	0.144	Not Significant	21.8	31.6	16.3	24.9	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Zinc	0.210	Not Significant	33.3	48.2	19.9	37.1	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Volatiles	2-Butanone	0.045	2 > 1	76.7	275	42.4	290	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Volatiles	Acetone	0.066	Not Significant	311	1,190	148	1,200	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Wet Chemistry	Total organic carbon	0.037	2 > 1	59,900	117,000	56,100	110,000	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Wet Chemistry	pH	0.389	Not Significant	6.76	6.84	6.75	6.90	5 / 5	5 / 5
Penniman Lake (1) vs Pond Study (2)	Total Metals	Aluminum	0.164	Not Significant	8,120	9,770	5,320	10,200	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Arsenic	0.164	Not Significant	52.1	55.5	43.0	54.8	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Barium	0.092	Not Significant	34.8	60.6	31.7	60.4	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Beryllium	0.268	Not Significant	0.86	0.75	0.74	0.54	3 / 5	7 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Calcium	0.004	2 > 1	8,750	130,000	5,490	139,000	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Chromium	0.213	Not Significant	18.3	24.8	13.7	26.1	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Cobalt	1.000	Not Significant	1.50	6.03	1.50	4.95	1 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Copper	0.005	2 > 1	5.37	15.4	3.38	14.5	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Iron	0.164	Not Significant	15,900	23,900	13,500	23,400	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Lead	0.010	2 > 1	12.0	26.3	8.33	28.3	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Magnesium	0.092	Not Significant	1,200	2,040	716	2,030	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Manganese	0.004	2 > 1	49.7	212	54.9	204	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Mercury	0.527	Not Significant	0.048	0.156	0.033	0.160	3 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Nickel	1.000	Not Significant	5.33	10.0	4.48	9.90	5 / 5	4 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Potassium	0.789	Not Significant	1,420	1,770	855	1,770	4 / 5	8 / 8

TABLE M-6

Two-Tailed Wilcoxon Rank Sum Comparisons for Cases with at Least 50 Percent Detects - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Comparison	Chemical Group	Parameter	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision (α = 0.05)	Mean of Group 1 Detects	Mean of Group 2 Detects	Median of Group 1 Detects	Median of Group 2 Detects	Frequency of Detection (Group 1)	Frequency of Detection (Group 2)
Penniman Lake (1) vs Pond Study (2)	Total Metals	Vanadium	0.124	Not Significant	21.8	32.7	16.3	34.1	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Total Metals	Zinc	0.092	Not Significant	33.3	61.8	19.9	59.7	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Volatiles	Acetone	0.929	Not Significant	311	1,140	148	1,140	5 / 5	2 / 8
Penniman Lake (1) vs Pond Study (2)	Wet Chemistry	Total organic carbon	0.826	Not Significant	59,900	62,600	56,100	64,700	5 / 5	8 / 8
Penniman Lake (1) vs Pond Study (2)	Wet Chemistry	pH	0.004	2 > 1	6.76	7.74	6.75	7.75	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Aluminum	0.942	Not Significant	11,800	9,770	9,060	10,200	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Arsenic	0.510	Not Significant	66.5	55.5	69.3	54.8	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Barium	0.942	Not Significant	54.1	60.6	62.0	60.4	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Beryllium	1.000	Not Significant	0.70	0.75	0.47	0.54	5 / 5	7 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Calcium	0.272	Not Significant	86,900	130,000	40,100	139,000	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Chromium	0.826	Not Significant	23.8	24.8	17.0	26.1	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Cobalt	1.000	Not Significant	3.66	6.03	3.00	4.95	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Copper	0.143	Not Significant	10.8	15.4	10.1	14.5	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Iron	1.000	Not Significant	23,600	23,900	26,900	23,400	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Lead	0.016	2 > 1	15.7	26.3	13.3	28.3	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Magnesium	0.272	Not Significant	1,590	2,040	1,130	2,030	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Manganese	0.092	Not Significant	119	212	95.8	204	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Mercury	0.527	Not Significant	0.084	0.156	0.080	0.160	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Nickel	1.000	Not Significant	7.94	10.0	5.80	9.90	5 / 5	4 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Potassium	0.739	Not Significant	1,660	1,770	1,280	1,770	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Vanadium	0.826	Not Significant	31.6	32.7	24.9	34.1	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Total Metals	Zinc	0.341	Not Significant	48.2	61.8	37.1	59.7	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Volatiles	Acetone	0.055	Not Significant	1,190	1,140	1,200	1,140	5 / 5	2 / 8
Site 4 (1) vs Pond Study (2)	Wet Chemistry	Total organic carbon	0.048	1 > 2	117,000	62,600	110,000	64,700	5 / 5	8 / 8
Site 4 (1) vs Pond Study (2)	Wet Chemistry	pH	0.004	2 > 1	6.84	7.74	6.90	7.75	5 / 5	8 / 8

TABLE M-7

Two-Tailed Wilcoxon Rank Sum Comparisons for Cases with at Least 50 Percent Detects - Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Comparison	Chemical Group	Parameter	Probability that the Observed Differences Would Occur Purely by Chance	Statistical Decision (α = 0.05)	Mean of Group 1 Detects	Mean of Group 2 Detects	Median of Group 1 Detects	Median of Group 2 Detects	Frequency of Detection (Group 1)	Frequency of Detection (Group 2)
Site 4 (2) vs Penniman Lake (1)	Pesticides	4,4'-DDD	0.753	Not Significant	8.58	1.75	7.39	1.30	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Pesticides	4,4'-DDE	0.210	Not Significant	3.77	8.56	1.30	7.10	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	Fluoranthene	1.000	Not Significant	12.9	15.5	11.2	15.5	4 / 5	2 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	PAH (HMW)	0.072	Not Significant	55.7	130	45.5	132	4 / 5	4 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	PAH (LMW)	0.424	Not Significant	233	567	208	567	4 / 5	2 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	PAH (total)	0.072	Not Significant	286	655	269	673	4 / 5	4 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	Phenanthrene	1.000	Not Significant	10.7	8.75	9.46	8.75	4 / 5	2 / 5
Site 4 (2) vs Penniman Lake (1)	Semivolatiles	Pyrene	1.000	Not Significant	13.1	15.0	10.5	15.0	4 / 5	2 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Aluminum	0.037	2 > 1	4,180	13,800	3,110	11,500	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Arsenic	0.210	Not Significant	18.6	34.2	8.08	38.1	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Barium	0.037	2 > 1	21.1	59.3	17.6	61.5	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Beryllium	1.000	Not Significant	0.513	0.820	0.492	0.930	3 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Calcium	0.022	2 > 1	4,000	31,900	3,240	12,100	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Chromium	0.012	2 > 1	8.46	23.7	7.29	23.1	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Cobalt	1.000	Not Significant	2.08	3.66	2.08	3.50	2 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Copper	0.010	2 > 1	2.80	6.48	2.71	5.80	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Iron	0.022	2 > 1	6,940	22,800	6,300	16,600	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Lead	0.060	Not Significant	6.50	12.8	4.05	11.2	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Magnesium	1.000	Not Significant	652	1,480	641	1,440	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Manganese	0.037	2 > 1	21.8	103	22.6	56.5	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Mercury	0.025	2 > 1	0.043	0.066	0.050	0.060	3 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Nickel	0.010	2 > 1	3.03	7.40	2.62	7.20	4 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Potassium	1.000	Not Significant	896	1,540	1,010	1,550	3 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Vanadium	0.012	2 > 1	10.4	31.8	8.57	27.8	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Total Metals	Zinc	0.012	2 > 1	15.6	40.1	13.3	41.0	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Volatiles	2-Butanone	0.012	2 > 1	26.6	191	19.0	180	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Volatiles	Acetone	0.012	2 > 1	97.1	822	77.4	730	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Wet Chemistry	Total organic carbon	0.012	2 > 1	40,000	95,400	42,500	92,000	5 / 5	5 / 5
Site 4 (2) vs Penniman Lake (1)	Wet Chemistry	pH	0.401	Not Significant	6.85	6.92	6.87	6.90	5 / 5	5 / 5

TABLe M-8

Mathematical Outliers Identified Using Dixon's Test

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Sample ID	Parameter	Units	Result in Question	Qualifier	Dixon Test Outlier Using Untransformed Data?	Dixon Test Outlier Incorporating Transformed Data?	Transformation Used to Optimize Adherence to Normality	Percent Difference Between Result in Question and Next Highest Result	Percent Detects
Surface Sediment									
CAREFPL-SD05-1012	4,4'-DDD	ug/kg	154	L	X	X	Square Root	1832%	90%
CAREFPL-SD02-1012	Arsenic	mg/kg	147		X	X	None	39%	100%
CP-00-POND-SD02-0300	Cobalt	mg/kg	12.7		X		--	35%	78%
CAREFPL-SD02-1012	Fluoranthene	ug/kg	31.4	J	X	X	None	65%	80%
Surface Water									
CAREFPL-SW03-1012	alpha-BHC	ug/L	0.0404	J	X	X	Logarithm	223%	20%
CAREFS04-SW01-1012	Aluminum	ug/L	286	J	X		--	92%	100%
CAREFS04-SW02-1012	Aluminum, dissolved	ug/L	295	J	X		--	87%	50%
CAREFPL-SW05-1012	Benzo(a)anthracene	ug/L	0.0666	J	X	X	Logarithm	29%	20%
CAREFPL-SW02-1012	Benzo(b)fluoranthene	ug/L	0.0627	J	X	X	Logarithm	25%	20%
CAREFPL-SW05-1012	Benzo(b)fluoranthene	ug/L	0.0629	J	X	X	Logarithm	0%	20%
CAREFPL-SW02-1012	Benzo(k)fluoranthene	ug/L	0.0575	J	X	X	Logarithm	15%	20%
CAREFPL-SW05-1012	Benzo(k)fluoranthene	ug/L	0.0627	J	X	X	Logarithm	9%	20%
CAREFS04-SW01-1012	Chromium	ug/L	0.96	J	X	X	None	68%	50%
CAREFPL-SW02-1012	Chrysene	ug/L	0.0542	J	X	X	Logarithm	8%	20%
CAREFPL-SW05-1012	Chrysene	ug/L	0.0799	J	X	X	Logarithm	47%	20%
CAREFPL-SW05-1012	Fluoranthene	ug/L	0.177	J	X	X	Logarithm	96%	30%
CAREFPL-SW02-1012	Pyrene	ug/L	0.0742	J	X	X	Logarithm	26%	30%
CAREFPL-SW05-1012	Pyrene	ug/L	0.125	J	X	X	Logarithm	68%	30%

TABLE M-9

Background Values for Surface Water (Following Removal of Outliers)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical Group	Chemical	Number of Detects	Number of Samples	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Recommended UTL	Recommended UTL Basis
FMETAL	Aluminum, Dissolved	4	9	44	ug/L	69.1	158	28.4	61.8	193	Kaplan Meier UTL
FMETAL	Arsenic, Dissolved	5	10	50	ug/L	5.00	6.10	3.81	5.62	6.47	Kaplan Meier UTL
FMETAL	Barium, Dissolved	5	10	50	ug/L	16.8	24.5	16.3	19.8	27.7	Kaplan Meier UTL
FMETAL	Cadmium, Dissolved	1	10	10	ug/L	0.05	0.05	0.50	3.00	0.05	Maximum Detect
FMETAL	Chromium, Dissolved	1	10	10	ug/L	0.65	0.65	0.53	1.20	0.65	Maximum Detect
FMETAL	Iron, Dissolved	10	10	100	ug/L	364	1,800	--	--	2,410	Normal UTL
FMETAL	Lead, Dissolved	1	10	10	ug/L	0.52	0.52	0.75	4.00	0.52	Maximum Detect
FMETAL	Manganese, Dissolved	9	10	90	ug/L	34.8	116	35.7	35.7	165	Normal UTL
FMETAL	Mercury, Dissolved	5	10	50	ug/L	0.010	0.040	0.160	0.160	0.067	Kaplan Meier UTL
FMETAL	Selenium, Dissolved	1	10	10	ug/L	2.80	2.80	1.25	7.00	2.80	Maximum Detect
FMETAL	Thallium, Dissolved	2	10	20	ug/L	1.20	1.40	1.00	5.00	1.43	Kaplan Meier UTL
FMETAL	Vanadium, Dissolved	5	10	50	ug/L	0.51	0.96	2.50	2.50	1.27	Kaplan Meier UTL
METAL	Aluminum	9	9	100	ug/L	52.1	149	--	--	228	Gamma UTL
METAL	Arsenic	10	10	100	ug/L	5.20	7.90	--	--	8.81	Normal UTL
METAL	Barium	10	10	100	ug/L	18.7	24.6	--	--	26.6	Normal UTL
METAL	Cadmium	1	10	10	ug/L	0.08	0.08	0.50	3.00	0.08	Maximum Detect
METAL	Chromium	4	9	44	ug/L	0.37	0.57	1.00	1.00	0.71	Kaplan Meier UTL
METAL	Iron	10	10	100	ug/L	996	2,050	--	--	2,620	Normal UTL
METAL	Manganese	10	10	100	ug/L	86.3	142	--	--	161	Normal UTL
METAL	Selenium	1	10	10	ug/L	2.50	2.50	1.25	7.00	2.50	Maximum Detect
METAL	Vanadium	5	10	50	ug/L	0.40	1.10	2.50	2.50	1.46	Kaplan Meier UTL
METAL	Zinc	4	10	40	ug/L	1.29	1.64	2.50	15.5	1.81	Kaplan Meier UTL
PEST	alpha-BHC	1	9	11	ug/L	0.00432	0.00432	0.00943	0.02500	0.00432	Single Detect
PEST	alpha-Chlordane	2	10	20	ug/L	0.00820	0.01720	0.00943	0.02500	0.02050	Kaplan Meier UTL
PEST	gamma-BHC (Lindane)	2	10	20	ug/L	0.00401	0.01240	0.00943	0.02500	0.01550	Kaplan Meier UTL
PEST	gamma-Chlordane	1	10	10	ug/L	0.02130	0.02130	0.00943	0.02500	0.02130	Maximum Detect
PEST	Heptachlor epoxide	1	10	10	ug/L	0.00746	0.00746	0.00383	0.02500	0.00746	Maximum Detect
SVOA	Benzo(a)anthracene	1	9	11	ug/L	0.0515	0.0515	0.0943	0.1000	0.0515	Single Detect
SVOA	Fluoranthene	2	9	22	ug/L	0.0855	0.0901	0.0943	0.1000	0.0948	Kaplan Meier UTL
SVOA	Phenanthrene	3	10	30	ug/L	0.0650	0.1240	0.0950	0.1920	0.1440	Kaplan Meier UTL
SVOA	Pyrene	1	8	13	ug/L	0.0591	0.0591	0.0943	0.1000	0.0591	Single Detect

TABLE M-10

Background Values for Surface Sediment (Following Removal of Outliers)

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical Group	Chemical	Number of Detects	Number of Samples	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Recommended UTL	Recommended UTL Basis
METAL	Aluminum	18	18	100	mg/kg	1,730	24,200	--	--	23,200	Normal UTL
METAL	Antimony	2	18	11	mg/kg	0.73	1.70	0.51	10.6	1.70	Maximum Detect
METAL	Arsenic	17	17	100	mg/kg	11.1	106	--	--	108	Normal UTL
METAL	Barium	18	18	100	mg/kg	9.62	75.0	--	--	75.0	Nonparametric UTL
METAL	Beryllium	15	18	83	mg/kg	0.29	1.39	0.29	1.36	1.39	Nonparametric UTL
METAL	Cadmium	4	18	22	mg/kg	0.09	0.45	0.29	5.35	0.57	Kaplan Meier UTL
METAL	Chromium	18	18	100	mg/kg	5.67	46.2	--	--	52.0	Normal UTL
METAL	Cobalt	13	17	76	mg/kg	1.50	9.40	1.44	13.2	9.45	Normal UTL
METAL	Copper	18	18	100	mg/kg	2.18	20.8	--	--	25.6	Normal UTL
METAL	Iron	18	18	100	mg/kg	5,420	38,900	--	--	45,600	Normal UTL
METAL	Lead	18	18	100	mg/kg	4.46	31.3	--	--	41.6	Normal UTL
METAL	Manganese	18	18	100	mg/kg	21.9	300	--	--	368	Normal UTL
METAL	Mercury	16	18	89	mg/kg	0.030	0.240	0.067	0.224	0.255	Normal UTL
METAL	Nickel	14	18	78	mg/kg	1.30	13.4	11.7	24.4	17.1	Normal UTL
METAL	Selenium	3	18	17	mg/kg	0.78	2.20	0.72	6.61	2.69	Kaplan Meier UTL
METAL	Thallium	1	18	6	mg/kg	6.50	6.50	0.44	6.72	6.50	Maximum Detect
METAL	Vanadium	18	18	100	mg/kg	7.47	58.3	--	--	62.5	Normal UTL
METAL	Zinc	18	18	100	mg/kg	14.0	91.1	--	--	110	Normal UTL
PEST	4,4'-DDD	8	9	89	ug/kg	0.571	7.97	10.0	10.0	10.1	Normal UTL
PEST	4,4'-DDE	10	10	100	ug/kg	0.945	28.0	--	--	44.1	Normal UTL
PEST	4,4'-DDT	1	10	10	ug/kg	1.45	1.45	0.663	10.0	1.45	Maximum Detect
PEST	alpha-BHC	1	10	10	ug/kg	0.813	0.813	0.663	5.40	0.813	Maximum Detect
PEST	Dieldrin	1	10	10	ug/kg	0.948	0.948	0.663	10.0	0.948	Maximum Detect
PEST	Endrin	2	10	20	ug/kg	2.27	7.36	0.663	10.0	8.64	Kaplan Meier UTL
PEST	gamma-BHC (Lindane)	3	10	30	ug/kg	0.30	2.22	0.933	5.40	2.92	Kaplan Meier UTL
PEST	gamma-Chlordane	1	10	10	ug/kg	1.10	1.10	0.663	5.40	1.10	Maximum Detect
SVOA	Benzo(a)anthracene	2	10	20	ug/kg	9.90	16.0	6.45	64.0	18.2	Kaplan Meier UTL
SVOA	Benzo(b)fluoranthene	4	10	40	ug/kg	15.0	28.0	6.45	26.0	30.3	Kaplan Meier UTL
SVOA	Benzo(g,h,i)perylene	1	10	10	ug/kg	25.0	25.0	6.45	64.0	25.0	Maximum Detect
SVOA	Chrysene	2	10	20	ug/kg	8.69	17.3	7.33	75.0	21.7	Kaplan Meier UTL
SVOA	Fluoranthene	7	9	78	ug/kg	8.77	19.0	7.33	26.0	26.0	Normal UTL
SVOA	PAH (HMW)	8	10	80	ug/kg	38.8	294	33.0	117	381	Normal UTL
SVOA	PAH (LMW)	8	10	80	ug/kg	193	1,080	213	419	1,670	Normal UTL
SVOA	PAH (total)	8	10	80	ug/kg	232	1,374	246	536	2,110	Normal UTL
SVOA	Phenanthrene	2	10	20	ug/kg	11.0	27.5	6.45	75.0	30.2	Kaplan Meier UTL
SVOA	Pyrene	5	10	50	ug/kg	7.57	27.4	7.33	75.0	35.3	Kaplan Meier UTL
VOA	2-Butanone	10	10	100	ug/kg	31.0	430	--	--	591	Normal UTL
VOA	Acetone	10	10	100	ug/kg	99.8	1,700	--	--	2,500	Normal UTL
VOA	Carbon disulfide	6	10	60	ug/kg	7.06	18.0	4.26	13.8	25.8	Normal UTL

TABLE M-11

Background Values for Subsurface Sediment - Site 4/Youth Pond

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical Group	Chemical	Number of Detects	Number of Samples	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Recommended UTL	Recommended UTL Basis
METAL	Aluminum	5	5	100	mg/kg	9,540	19,400	--	--	19,400	Maximum Detect
METAL	Antimony	2	5	40	mg/kg	0.32	26.7	0.18	0.92	26.7	Maximum Detect
METAL	Arsenic	5	5	100	mg/kg	12.6	51.1	--	--	51.1	Maximum Detect
METAL	Barium	5	5	100	mg/kg	30.7	98.1	--	--	98.1	Maximum Detect
METAL	Beryllium	5	5	100	mg/kg	0.63	0.96	--	--	0.96	Maximum Detect
METAL	Cadmium	5	5	100	mg/kg	0.03	0.18	--	--	0.18	Maximum Detect
METAL	Chromium	5	5	100	mg/kg	21.3	25.8	--	--	25.8	Maximum Detect
METAL	Cobalt	5	5	100	mg/kg	2.30	5.30	--	--	5.30	Maximum Detect
METAL	Copper	5	5	100	mg/kg	5.20	8.90	--	--	8.90	Maximum Detect
METAL	Iron	5	5	100	mg/kg	10,800	43,800	--	--	43,800	Maximum Detect
METAL	Lead	5	5	100	mg/kg	9.20	17.2	--	--	17.2	Maximum Detect
METAL	Manganese	5	5	100	mg/kg	24.7	310	--	--	310	Maximum Detect
METAL	Mercury	5	5	100	mg/kg	0.04	0.09	--	--	0.09	Maximum Detect
METAL	Nickel	5	5	100	mg/kg	5.80	9.10	--	--	9.10	Maximum Detect
METAL	Selenium	3	5	60	mg/kg	0.42	2.50	1.30	1.50	2.50	Maximum Detect
METAL	Vanadium	5	5	100	mg/kg	24.2	40.8	--	--	40.8	Maximum Detect
METAL	Zinc	5	5	100	mg/kg	28.6	52.8	--	--	52.8	Maximum Detect
PEST	4,4'-DDD	5	5	100	ug/kg	0.66	4.20	--	--	4.20	Maximum Detect
PEST	4,4'-DDE	5	5	100	ug/kg	3.80	14.0	--	--	14.0	Maximum Detect
SVOA	Anthracene	1	5	20	ug/kg	4.60	4.60	26.0	33.0	4.60	Maximum Detect
SVOA	Benzo(a)anthracene	2	5	40	ug/kg	9.20	14.0	26.0	33.0	14.0	Maximum Detect
SVOA	Benzo(a)pyrene	1	5	20	ug/kg	15.0	15.0	26.0	33.0	15.0	Maximum Detect
SVOA	Benzo(b)fluoranthene	3	5	60	ug/kg	9.20	25.0	26.0	33.0	25.0	Maximum Detect
SVOA	Benzo(g,h,i)perylene	2	5	40	ug/kg	8.20	12.0	26.0	33.0	12.0	Maximum Detect
SVOA	Benzo(k)fluoranthene	1	5	20	ug/kg	16.0	16.0	26.0	33.0	16.0	Maximum Detect
SVOA	Dibenz(a,h)anthracene	1	5	20	ug/kg	8.60	8.60	26.0	33.0	8.60	Maximum Detect
SVOA	Fluoranthene	2	5	40	ug/kg	15.0	16.0	26.0	33.0	16.0	Maximum Detect
SVOA	Indeno(1,2,3-cd)pyrene	1	5	20	ug/kg	8.40	8.40	26.0	33.0	8.40	Maximum Detect
SVOA	PAH (HMW)	4	5	80	ug/kg	113	142	117	117	142	Maximum Detect
SVOA	PAH (LMW)	2	5	40	ug/kg	532	601	424	542	601	Maximum Detect
SVOA	PAH (total)	4	5	80	ug/kg	537	735	546	546	735	Maximum Detect
SVOA	Phenanthrene	2	5	40	ug/kg	7.50	10.0	26.0	33.0	10.0	Maximum Detect
SVOA	Pyrene	2	5	40	ug/kg	14.0	16.0	26.0	33.0	16.0	Maximum Detect
VOA	2-Butanone	5	5	100	ug/kg	85.0	340	--	--	340	Maximum Detect
VOA	Acetone	5	5	100	ug/kg	500	1,400	--	--	1,400	Maximum Detect
VOA	Carbon disulfide	5	5	100	ug/kg	4.40	11.0	--	--	11.0	Maximum Detect

TABLE M-12

Background Values for Subsurface Sediment - Penniman Lake

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

Chemical Group	Chemical	Number of Detects	Number of Samples	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Minimum DL for Non-detects	Maximum DL for Non-detects	Recommended UTL	Recommended UTL Basis
METAL	Aluminum	5	5	100	mg/kg	1,510	10,200	--	--	10,200	Maximum Detect
METAL	Arsenic	5	5	100	mg/kg	3.39	57.2	--	--	57.2	Maximum Detect
METAL	Barium	5	5	100	mg/kg	10.5	36.5	--	--	36.5	Maximum Detect
METAL	Beryllium	3	5	60	mg/kg	0.45	0.60	0.39	1.65	0.60	Maximum Detect
METAL	Chromium	5	5	100	mg/kg	4.00	15.9	--	--	15.9	Maximum Detect
METAL	Cobalt	2	5	40	mg/kg	1.69	2.47	1.93	8.23	2.47	Maximum Detect
METAL	Copper	4	5	80	mg/kg	2.09	3.67	2.83	2.83	3.67	Maximum Detect
METAL	Iron	5	5	100	mg/kg	2,840	11,300	--	--	11,300	Maximum Detect
METAL	Lead	5	5	100	mg/kg	3.58	12.1	--	--	12.1	Maximum Detect
METAL	Manganese	5	5	100	mg/kg	13.6	28.9	--	--	28.9	Maximum Detect
METAL	Mercury	3	5	60	mg/kg	0.026	0.052	0.043	0.054	0.052	Maximum Detect
METAL	Nickel	4	5	80	mg/kg	1.24	5.63	4.94	4.94	5.63	Maximum Detect
METAL	Vanadium	5	5	100	mg/kg	5.09	20.4	--	--	20.4	Maximum Detect
METAL	Zinc	5	5	100	mg/kg	8.81	22.6	--	--	22.6	Maximum Detect
PEST	4,4'-DDD	4	5	80	ug/kg	1.13	18.4	0.739	0.739	18.4	Maximum Detect
PEST	4,4'-DDE	5	5	100	ug/kg	0.345	8.98	--	--	8.98	Maximum Detect
PEST	Aldrin	1	5	20	ug/kg	0.910	0.910	0.478	0.739	0.91	Maximum Detect
PEST	alpha-BHC	1	5	20	ug/kg	0.322	0.322	0.478	1.040	0.322	Maximum Detect
PEST	beta-BHC	2	5	40	ug/kg	0.465	2.21	0.478	0.739	2.21	Maximum Detect
PEST	delta-BHC	1	5	20	ug/kg	0.294	0.294	0.478	1.040	0.294	Maximum Detect
PEST	Endosulfan I	1	5	20	ug/kg	0.805	0.805	0.478	0.739	0.805	Maximum Detect
PEST	Endrin	1	5	20	ug/kg	0.640	0.640	0.478	1.040	0.64	Maximum Detect
PEST	gamma-BHC (Lindane)	2	5	40	ug/kg	0.218	0.480	0.668	1.040	0.48	Maximum Detect
SVOA	Benzo(a)pyrene	1	5	20	ug/kg	14.5	14.5	4.59	10.5	14.5	Maximum Detect
SVOA	Benzo(b)fluoranthene	1	5	20	ug/kg	17.7	17.7	4.59	10.5	17.7	Maximum Detect
SVOA	Benzo(k)fluoranthene	1	5	20	ug/kg	12.6	12.6	4.59	10.5	12.6	Maximum Detect
SVOA	Chrysene	1	5	20	ug/kg	19.6	19.6	4.59	10.5	19.6	Maximum Detect
SVOA	Fluoranthene	4	5	80	ug/kg	8.10	21.2	4.59	4.59	21.2	Maximum Detect
SVOA	PAH (HMW)	4	5	80	ug/kg	35.9	95.9	20.7	20.7	95.9	Maximum Detect
SVOA	PAH (LMW)	4	5	80	ug/kg	201	316	133	133	316	Maximum Detect
SVOA	PAH (total)	4	5	80	ug/kg	237	369	154	154	369	Maximum Detect
SVOA	Phenanthrene	4	5	80	ug/kg	7.31	16.7	4.59	4.59	16.7	Maximum Detect
SVOA	Pyrene	4	5	80	ug/kg	9.75	21.5	4.59	4.59	21.5	Maximum Detect
VOA	2-Butanone	5	5	100	ug/kg	11.8	43.9	--	--	43.9	Maximum Detect
VOA	Acetone	5	5	100	ug/kg	43.4	157	--	--	157	Maximum Detect

ATTACHMENT TABLE M-1-1

Analytical Data - Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Chemical	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**
Volatile Organic Compounds (UG/L)												
1,1,1-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	2.5 UJ	2.5 UJ	0.5 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	5 U	5 U	1 U	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	25 U	25 U	5 U	10 U	10 U	10 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	12.5 U	12.5 U	2.5 U	5 U	5 U	5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	49.5 J	68.4	5 U	65.3	60.5	76.8	4.3 B	4.3 B	4.6 B	2.7 B	5.4 B	5.8 B
Benzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA
Bromodichloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (Freon-12)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m- and p-Xylene	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U
Methyl acetate	5 U	5 U	1 U	2 U	2 U	2 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methylcyclohexane	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	5 U	5 U	1 U	2 U	2 U	2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Methyl-tert-butyl ether (MTBE)	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane (Freon-11)	5 U	5 U	1 U	2 U	2 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	2.5 U	2.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	7.5 U	7.5 U	1.5 U	3 U	3 U	3 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Semivolatile Organic Compounds (UG/L)												
1,1-Biphenyl	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
1,2,4,5-Tetrachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U

ATTACHMENT TABLE M-1-1

Analytical Data - Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Chemical	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**
2,2'-Oxybis(1-chloropropane)	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
2,3,4,6-Tetrachlorophenol	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	7.4 U	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4,5-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	18 U	19 U	19 U	18 U	19 U	18 U
2,4,6-Trichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 UL	7.4 U	7.2 U
2,4-Dichlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dimethylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2,4-Dinitrophenol	23.6 U	24 U	23.1 UL	23.6 U	24 U	24 U	18 U	19 U	19 U	18 UL	19 U	18 U
2,4-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,6-Dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Chloronaphthalene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Chlorophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Methylnaphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
2-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
2-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 U	19 U	18 U
2-Nitrophenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3,3'-Dichlorobenzidine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
3-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 U	19 U	18 U
4,6-Dinitro-2-methylphenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 UL	19 U	18 U
4-Bromophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloro-3-methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chloroaniline	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Chlorophenyl-phenylether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
4-Methylphenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	NA	NA	NA	NA	NA	NA
4-Nitroaniline	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 U	19 U	18 U
4-Nitrophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 U	19 U	18 U
Acenaphthene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Acenaphthylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Acetophenone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Atrazine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzaldehyde	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Benzo(a)anthracene	0.0943 U	0.0515 L	0.0926 UL	0.0943 U	0.0962 U	0.0666 J	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(a)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(b)fluoranthene	0.0943 U	0.0627 J	0.0926 UL	0.0943 U	0.0962 U	0.0629 J	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Benzo(g,h,i)perylene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Benzo(k)fluoranthene	0.0943 U	0.0575 J	0.0926 UL	0.0943 U	0.0962 U	0.0627 J	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
bis(2-Chloroethoxy)methane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Chloroethyl)ether	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
bis(2-Ethylhexyl)phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	3 B	7.5 U	9.7 B	7.3 U	7.4 U	7.2 U
Butylbenzylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Caprolactam	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Carbazole	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Chrysene	0.0943 U	0.0542 J	0.0926 UL	0.0943 U	0.0962 U	0.0799 J	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Dibenz(a,h)anthracene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Dibenzofuran	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Diethylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Dimethyl phthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-butylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Di-n-octylphthalate	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Fluoranthene	0.0943 U	0.0901 J	0.0622 L	0.0855 J	0.0962 U	0.177 J	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Fluorene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Hexachlorobenzene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorobutadiene	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Hexachlorocyclopentadiene	4.72 U	4.81 U	4.63 UL	4.72 U	4.81 U	4.81 U	7.4 UJ	7.5 UJ	7.5 UJ	7.3 UJ	7.4 UJ	7.2 UJ
Hexachloroethane	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U

ATTACHMENT TABLE M-1-1

Analytical Data - Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Chemical	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**
Indeno(1,2,3-cd)pyrene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Isophorone	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Naphthalene	0.0943 U	0.0962 U	0.0926 UL	0.0943 U	0.0962 U	0.0962 U	0.095 U	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
n-Nitroso-di-n-propylamine	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
n-Nitrosodiphenylamine	2.36 U	2.4 UL	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Nitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Pentachlorophenol	9.43 U	9.62 U	9.26 UL	9.43 U	9.62 U	9.62 U	18 U	19 U	19 U	18 UL	19 U	18 U
Phenanthrene	0.189 U	0.192 U	0.185 UL	0.0988 J	0.192 U	0.124 J	0.065 J	0.1 U	0.096 U	0.095 U	0.095 U	0.095 U
Phenol	2.36 U	2.4 U	2.31 UL	2.36 U	2.4 U	2.4 U	7.4 U	7.5 U	7.5 U	7.3 U	7.4 U	7.2 U
Pyrene	0.0943 U	0.0742 J	0.0926 UL	0.0591 J	0.0962 U	0.125 J	0.095 U	0.1 U	0.096 U	0.095 UL	0.095 U	0.095 U
Pesticide/Polychlorinated Biphenyls (UG/L)												
4,4'-DDD	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDE	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
4,4'-DDT	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Aldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
alpha-BHC	0.00432 J	0.00943 UL	0.00943 UL	0.0404 J	0.00943 U	0.00943 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
alpha-Chlordane	0.00943 UL	0.00943 UL	0.00943 UL	0.0172 J	0.00943 U	0.0082 J	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Aroclor-1016	0.236 UL	0.236 UJ	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1221	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1232	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1242	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1248	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
Aroclor-1254	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 UL
Aroclor-1260	0.236 UL	0.236 UL	0.236 UL	0.236 UL	0.236 U	0.236 U	0.24 UL	0.25 U	0.25 U	0.25 UL	0.24 U	0.24 U
beta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
delta-BHC	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
Dieldrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endosulfan I	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Endosulfan II	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endosulfan sulfate	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 U	0.047 U	0.048 U
Endrin	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin aldehyde	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 UL	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
Endrin ketone	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.048 U	0.05 U	0.05 U	0.05 UL	0.047 U	0.048 U
gamma-BHC (Lindane)	0.00401 J	0.00943 UL	0.00943 UL	0.0124 J	0.00943 U	0.00943 U	0.024 U	0.025 U	0.025 U	0.025 U	0.024 U	0.024 U
gamma-Chlordane	0.0119 B	0.0109 B	0.00612 B	0.0159 B	0.0213	0.00943 UL	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Heptachlor epoxide	0.00383 B	0.00943 UL	0.00943 UL	0.0055 B	0.00943 UL	0.00746 J	0.024 U	0.025 U	0.025 U	0.025 UL	0.024 U	0.024 U
Methoxychlor	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 UL	0.00943 U	0.00943 U	0.24 U	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U
Toxaphene	0.629 UL	0.629 UL	0.629 UL	0.629 UL	0.629 U	0.629 U	0.48 U	0.5 U	0.5 U	0.5 UL	0.47 U	0.48 U
Explosives (UG/L)												
1,3,5-Trinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL	0.12 UL
1,3-Dinitrobenzene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2,4,6-Trinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Amino-4,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
2-Nitrotoluene	0.15 U	0.148 U	0.154 UJ	0.814 J	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3,5-Dinitroaniline	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
3-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Amino-2,6-dinitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
4-Nitrotoluene	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
HMX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Nitroglycerin	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	2 UL	2 UL	2 UL	2 U	2 UL	2 UL
Nitroguanidine	10 U	10 U	10 U	10 U	10 U	10 U	6 U	6 U	6 U	6 U	6 U	6 U
PETN	0.374 U	0.37 U	0.385 U	0.374 U	0.381 U	0.37 U	2 UL	2 UL	2 UL	2 U	2 UL	2 UL
RDX	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Tetryl	0.15 U	0.148 U	0.154 U	0.15 U	0.152 U	0.148 U	0.12 UL	0.12 UL	0.12 UL	0.12 U	0.12 UL	0.12 UL
Inorganics (UG/L)												

ATTACHMENT TABLE M-1-1

Analytical Data - Surface Water

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03		CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01	CAREFS04-SWSD02		CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SW01-1012	CAREFPL-SW02-1012	CAREFPL-SW03-1012	CAREFPL-SW03P-1012	CAREFPL-SW04-1012	CAREFPL-SW05-1012	CAREFS04-SW01-1012	CAREFS04-SW02-1012	CAREFS04-SW02P-1012	CAREFS04-SW03-1012	CAREFS04-SW04-1012	CAREFS04-SW05-1012
Chemical	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/04/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**	**10/03/12**
Aluminum	61	61.3	52.1	49.8 J	55.6	55.2	286 J	97.5 J	141 J	77.9 J	149 J	90.8 J
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	6.07	6.19	5.28	5.13	5.2	5.3	7.9 J	5.3 J	7.3 J	6.6 J	6.3 J	6.4 J
Barium	20.7	20	18.6	18.7	19	19.1	23.1	20 J	21.3	19.5	24.6	22.3
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3 U	3 U	3 U	3 U	3 U	0.08 J
Calcium	35,300	36,000	32,300	31,800	32,800	32,400	39,400	40,700 J	43,400	31,900	57,700	44,100
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	0.96 J	4 U	0.57 J	0.37 J	0.53 J	0.47 J
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	4 U	4 U	4 U	4 U	4 U	4 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	1.7 B	1.3 B	1.2 B	1.3 B	1.7 B	2.1 B
Cyanide	10 U	10 U	10 U	10 U	10 U	10 U	8 U	8 U	8 U	8 U	8 U	8 U
Iron	1,260	1,220	994	1,010	996	996	2,030	1,080 J	1,630 J	1,410	2,050	1,710
Lead	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	1,920	1,940	1,910	1,930	1,980	2,000	2,330	2,180	2,260	2,190	2,180	2,160
Manganese	142	133	98.5	99.2	102	100	120	79.2 J	98.8 J	86.3	114	115
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.1 U	0.04 B	0.02 B	0.02 B	0.1 U	0.02 B
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.55 B	4 U	0.63 B	0.7 B	0.57 B	0.57 B
Potassium	2,600	2,690	2,580	2,590	2,650	2,700	2,960	2,860 J	2,990	2,750	2,480	2,630
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	2.5 J	7 U	7 U	7 U	7 U	7 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	4 U	4 U	4 U	4 U
Sodium	13,200	13,200	13,300	13,400	13,700	14,000	13,900	13,200	13,500	14,100	12,300	12,600
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	5 U	5 U	5 U	5 U	5 U	5 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1.1 J	0.44 J	0.88 J	0.47 J	0.57 J	0.4 J
Zinc	1.38 J	1.31 J	2.5 U	2.5 U	1.64 J	1.29 J	4.3 B	3.1 B	3.4 B	15.5 B	3.4 B	3.4 B
Dissolved Metals (UG/L)												
Aluminum	49.3 B	61.8 B	38.8 B	41.5 B	28.4 B	46.4 B	158 J	295 J	106 J	69.1 J	113 J	138 J
Antimony	2 U	2 U	2 U	2 U	2 U	2 U	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic	4.33 B	5.62 B	4.08 B	4.59 B	3.81 B	4.52 B	5 J	6.1 J	4.2 J	5.2 J	5.9 J	5.6 J
Barium	18.6 B	19.8 B	17.5 B	17.7 B	16.3 B	17.4 B	16.8	23 J	20.1	17.5	24.5	22.9
Beryllium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3 U	3 U	0.05 J	3 U	3 U	3 U
Calcium	36,200 B	36,100 B	32,800 B	32,200 B	33,000 B	31,100 B	33,900	46,600 J	41,000	32,500	58,100	48,500
Chromium	1 U	1 U	1 U	1 U	1 U	1 U	0.65 J	1.2 B	0.7 B	0.74 B	0.58 B	0.53 B
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	4 U	4 U	4 U	4 U	4 U	4 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	1.2 B	2 B	1.3 B	0.83 B	1.1 B	1.1 B
Iron	613	1,030	634	688	364	707	544	1,660 J	954 J	934 K	1,800	1,420
Lead	0.75 U	0.75 U	0.523 J	0.75 U	0.75 U	0.75 U	4 U	4 U	4 U	4 U	4 U	4 U
Magnesium	1,940 B	1,970 B	1,960 B	1,960 B	1,990 B	1,960 B	2,090	2,280	2,170	2,160	2,200	2,200
Manganese	70.9	116	64.2	67.6	35.7 B	71.5	34.8	81.4	72.8	65.4	104	107
Mercury	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.04 J	0.04 J	0.1 U	0.02 J	0.04 J	0.01 J
Nickel	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.37 B	0.52 B	4 U	4 U	0.37 B	4 U
Potassium	2,580 B	2,690 B	2,620 B	2,590 B	2,590 B	2,590 B	2,630	3,200 J	2,810	2,620	2,540	2,710
Selenium	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	7 U	7 U	2.8 J	7 U	7 U	7 U
Silver	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4 U	4 U	4 U	4 U	4 U	4 U
Sodium	13,400 B	13,500 B	13,700 B	13,700 B	13,900 B	13,700 B	13,300	13,200	13,300	13,500	12,600	13,400
Thallium	1 U	1 U	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1.4 J	1.2 J	5 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.75 J	0.96 J	0.43 J	0.51 J	0.72 J	0.96 J
Zinc	1.48 B	2.09 B	2.5 U	2.5 U	2.5 U	2.5 U	2.9 B	5.5 B	3.4 B	3 B	3.2 B	3.3 B
Other Parameters												
Hardness (MG/L)	107 N	98 N	85.5 N	NA	96.3	97.3	94	98	NA	76	160	120

Notes:

Shading indicates detections

NA - Not analyzed

ATTACHMENT TABLE M-1-2

Analytical Data - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05	Cheatham Pond-SD02		Cheatham Pond-SD03	Cheatham Pond-SD04	Cheatham Pond-SD05	Cheatham Pond-SD06	Cheatham Pond-SD07	Cheatham Pond-SD18	Cheatham Pond-SD19
	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012	CAREFS04-SD01-1012	CAREFS04-SD01P-1012	CAREFS04-SD02-1012	CAREFS04-SD03-1012	CAREFS04-SD04-1012	CAREFS04-SD05-1012	CP-00-POND-SD02-0300	CP-00-POND-SD02D-0300	CP-00-POND-SD03-0300	CP-00-POND-SD04-0300	CP-00-POND-SD05-0300	CP-00-POND-SD06-0300	CP-00-POND-SD07-0300	CP-00-POND-SD18-0300	CP-00-POND-SD19-0300
Chemical	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12	03/30/00	03/30/00	03/30/00	03/30/00	03/31/00	03/31/00	03/31/00	03/30/00	03/30/00
Volatile Organic Compounds (UG/KG)																					
1,1,1-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,1,2,2-Tetrachloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,1,2-Trichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,1-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,1-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,2,3-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL	23 UJ	20 UL	19 UJ	7 U	14 J	16 UJ									
1,2,4-Trichlorobenzene	4.54 UL	15 UL	14.1 UL	4.26 UL	7.55 UL	13.8 UL	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
1,2-Dibromo-3-chloropropane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
1,2-Dibromoethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,2-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
1,2-Dichloroethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA									
1,2-Dichloropropane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
1,3-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
1,4-Dichlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
2-Butanone	32.2	169	129	31	42.4	109	290 J	190 J	240 J	76 K	340 J	430 J									
2-Hexanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	120 UL	98 UL	95 UL	35 U	71 UL	79 UL									
4-Methyl-2-pentanone	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	120 UL	98 UL	95 UL	35 U	71 UL	79 UL									
Acetone	114 J	563 J	424 J	99.8 J	148 J	629 J	1,200 J	1,000 J	1,200 J	370 K	1,500 J	1,700 J									
Benzene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Bromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	NA	NA	NA	NA	NA	NA									
Bromodichloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Bromoform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Bromomethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL									
Carbon disulfide	4.54 UJ	15 UJ	7.06 J	4.26 UJ	7.55 UJ	13.8 UJ	18 L	13 L	16 L	7.2 K	11 L	15 L									
Carbon tetrachloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Chlorobenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Chloroethane	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL									
Chloroform	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Chloromethane	9.07 UJ	30 UJ	28.2 UJ	8.51 UJ	15.1 UJ	27.6 UJ	46 UL	39 UL	38 UL	14 U	28 UL	32 UL									
cis-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
cis-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Cyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Dibromochloromethane	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Dichlorodifluoromethane (Freon-12)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	46 UL	39 UL	38 UL	14 UJ	28 UL	32 UL									
Ethylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Isopropylbenzene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UJ	20 UL	19 UJ	7 U	14 UJ	16 UJ									
m- and p-Xylene	NA	NA	NA	NA	NA	NA	46 UL	39 UL	38 UL	14 UJ	28 UL	32 UL									
Methyl acetate	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	28 UJ	23 UJ	23 UJ	8.4 U	17 UJ	19 UJ									
Methylcyclohexane	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Methylene chloride	5.21 J	16.9 J	17.1 J	8.51 U	8.18 J	27.6 U	120 UL	98 UL	95 UL	35 U	71 UL	79 UL									
Methyl-tert-butyl ether (MTBE)	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
o-Xylene	NA	NA	NA	NA	NA	NA	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Styrene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Tetrachloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Toluene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
trans-1,2-Dichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
trans-1,3-Dichloropropene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Trichloroethene	4.54 U	15 U	14.1 U	4.26 U	7.55 UL	13.8 U	23 UL	20 UL	19 UL	7 U	14 UL	16 UL									
Trichlorofluoromethane (Freon-11)	9.07 U	30 U	28.2 U	8.51 U	15.1 U	27.6 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL									
Vinyl chloride	4.54 U	15 U	14.1 U	4.26 U	7.55 U	13.8 U	46 UL	39 UL	38 UL	14 U	28 UL	32 UL									
Xylene, total	13.6 U	45 U	42.3 U	12.8 U	22.6 UL	41.4 U	69 UL	58 UL	57 UL	21 U	43 UL	47 UL									
Semivolatile Organic Compounds (UG/KG)																					
1,1-Biphenyl	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
1,2,4,5-Tetrachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2,2'-Oxybis(1-chloropropane)	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ									
2,3,4,6-Tetrachlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2,4,5-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
2,4,6-Trichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2,4-Dichlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2,4-Dimethylphenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2,4-Dinitrophenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 R	8,120 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
2,4-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
2,6-Dinitrotoluene	324 U	1,130 U	966 U	367 U	480 U	812 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
2-Chloronaphthalene	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
2-Chlorophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2-Methylnaphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
2-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
2-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
2-Nitrophenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
3,3'-Dichlorobenzidine	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
3-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
4,6-Dinitro-2-methylphenol	3,240 U	11,300 U	9,660 U	3,670 U	4,800 U	8,120 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
4-Bromophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
4-Chloro-3-methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
4-Chloroaniline	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
4-Chlorophenyl-phenylether	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
4-Methylphenol	324 U	1,130 U	966 U	367 U	480 U	812 U	NA	NA	NA	NA	NA	NA									
4-Nitroaniline	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
4-Nitrophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
Acenaphthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
Acenaphthylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
Acetophenone	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
Atrazine	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ									
Benzaldehyde	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 UJ	1,400 UJ									
Benzo(a)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	16 J	12 J	64 U	26 U	9.9 L	55 U									
Benzo(a)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 UL	60 UL	64 UL	26 U	44 UL	55 UL									
Benzo(b)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	28 J	20 J	22 J	26 U	20 L	15 J									
Benzo(g,h,i)perylene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	25 J	60 U	64 U	26 UL	44 UL	55 U									
Benzo(k)fluoranthene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 UL	55 U									
bis(2-Chloroethoxy)methane	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
bis(2-Chloroethyl)ether	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
bis(2-Chloroisopropyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA									
bis(2-Ethylhexyl)phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	860 B	1,300 U	1,600 U	320 B	640 B	1,400 U									
Butylbenzylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
Caprolactam	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Carbazole	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Chrysene	8.69 J	22.4 U	19.3 U	7.33 U	9.57 U	17.3 J	75 U	60 U	64 U	26 U	44 U	55 U									
Dibenz(a,h)anthracene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 UL	55 U									
Dibenzofuran	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Diethylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Dimethyl phthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Di-n-butylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
Di-n-octylphthalate	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Fluoranthene	8.77 J	22.4 U	31.4 J	7.33 U	12.3 J	19 J	17 J	17 J	14 J	26 U	13 J	12 J									
Fluorene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
Hexachlorobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									

ATTACHMENT TABLE M-1-2

Analytical Data - Surface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02		CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05	CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05	Cheatham Pond-SD02		Cheatham Pond-SD03	Cheatham Pond-SD04	Cheatham Pond-SD05	Cheatham Pond-SD06	Cheatham Pond-SD07	Cheatham Pond-SD18	Cheatham Pond-SD19
	CAREFPL-SD01-1012	CAREFPL-SD02-1012	CAREFPL-SD02P-1012	CAREFPL-SD03-1012	CAREFPL-SD04-1012	CAREFPL-SD05-1012	CAREFS04-SD01-1012	CAREFS04-SD01P-1012	CAREFS04-SD02-1012	CAREFS04-SD03-1012	CAREFS04-SD04-1012	CAREFS04-SD05-1012	CP-00-POND-SD02-0300	CP-00-POND-SD02D-0300	CP-00-POND-SD03-0300	CP-00-POND-SD04-0300	CP-00-POND-SD05-0300	CP-00-POND-SD06-0300	CP-00-POND-SD07-0300	CP-00-POND-SD18-0300	CP-00-POND-SD19-0300
Chemical	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12	03/30/00	03/30/00	03/30/00	03/30/00	03/31/00	03/31/00	03/31/00	03/30/00	03/30/00
Hexachlorobutadiene	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
Hexachlorocyclopentadiene	324 U	1,130 U	966 U	367 U	480 R	812 U	1,600 UJ	1,300 UJ	1,600 UJ	630 UJ	1,100 R	1,400 UJ									
Hexachloroethane	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
Indeno(1,2,3-cd)pyrene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
Isophorone	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Naphthalene	6.45 U	22.4 U	19.3 U	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	44 U	55 U									
n-Nitroso-di-n-propylamine	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
n-Nitrosodiphenylamine	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 UL	1,400 U									
Nitrobenzene	324 U	1,130 U	966 U	367 U	480 U	812 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
PAH (HMW)	38.8	115	105	33.0 U	50.8	95.8	294	242	278	117 U	174	235									
PAH (LMW)	193	655 U	600	213 U	286	482	1,080	877	1,038	419 U	706	905									
PAH (total)	232	769	704	246 U	337	578	1,374	1,119	1,316	536 U	880	1,140									
Pentachlorophenol	1,290 U	4,490 U	3,860 U	1,470 U	1,920 U	3,240 U	4,000 U	3,200 U	4,000 U	1,600 U	2,700 U	3,400 U									
Phenanthrene	6.45 U	22.4 U	27.5 J	7.33 U	9.57 U	16.2 U	75 U	60 U	64 U	26 U	11 J	55 U									
Phenol	324 U	1,130 U	966 U	367 U	480 U	812 U	1,600 U	1,300 U	1,600 U	630 U	1,100 U	1,400 U									
Pyrene	7.57 J	25.1 J	27.4 J	7.33 U	12.5 J	21.8 J	75 U	60 U	64 U	26 U	12 J	55 U									
Pesticide/Polychlorinated Biphenyls (UG/KG)																					
4,4'-DDD	0.571 J	2.32 L	7.97 L	4.51 L	2.3 L	154 L	3.7 J	10 UL	10 UL	1.5 L	2.3 J	3 L									
4,4'-DDE	0.945 L	3.27 L	9.3 J	3.75 J	1.5 L	26.2 J	26 J	16 J	12 L	7 L	28	18 L									
4,4'-DDT	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.45 L	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL									
Aldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
alpha-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.813 L	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
alpha-Chlordane	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL									
Aroclor-1016	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
Aroclor-1221	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
Aroclor-1232	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	64 U	62 U	60 U	21 U	47 U	55 U									
Aroclor-1242	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
Aroclor-1248	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
Aroclor-1254	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
Aroclor-1260	16.2 UL	55.1 UL	49.7 UL	18.7 UL	22.9 UL	39.7 UL	54 U	53 U	51 U	18 U	40 U	47 U									
beta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
delta-BHC	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UJ	4 U	4.7 UL									
Dieldrin	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	0.948 J	10 U	10 UL	10 UL	3.4 UL	7.8 UL	9.1 UL									
Endosulfan I	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
Endosulfan II	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL									
Endosulfan sulfate	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL									
Endrin	0.663 UL	2.25 UL	2.27 J	0.763 UL	0.933 UL	7.36 J	10 U	10 UL	10 UL	3.4 UL	7.8 UL	9.1 UL									
Endrin aldehyde	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL									
Endrin ketone	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	10 U	10 UL	10 UL	3.4 UL	7.8 U	9.1 UL									
gamma-BHC (Lindane)	0.295 J	2.25 UL	2.03 UL	0.316 J	0.933 UL	2.22 J	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
gamma-Chlordane	0.663 UL	1.1 L	2.56 B	1.27 B	0.933 UL	1.32 B	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL									
Heptachlor	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 U	4.7 UL									
Heptachlor epoxide	0.663 UL	2.25 UL	2.03 UL	0.763 UL	0.933 UL	1.62 UL	5.4 U	5.3 UL	5.1 UL	1.8 UL	4 UL	4.7 UL									
Methoxychlor	0.663 UJ	2.25 UJ	2.03 UJ	0.763 UJ	0.933 UJ	1.62 UJ	54 U	53 UL	51 UL	18 UL	40 U	47 UL									
Toxaphene	42.9 UL	145 UL	131 UL	49.3 UL	60.4 UL	105 UL	100 U	100 UL	100 UL	34 UL	78 U	91 UL									
Explosives (UG/KG)																					
1,3,5-Trinitrobenzene	160 U	160 U	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
1,3-Dinitrobenzene	160 U	278 J	279 J	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
2,4,6-Trinitrotoluene	160 U	160 U	436 J	160 U	141 J	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
2-Amino-4,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
2-Nitrotoluene	160 U	101 J	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
3,5-Dinitroaniline	160 U	160 U	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
3-Nitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
4-Amino-2,6-dinitrotoluene	160 U	160 U	167 U	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
4-Nitrotoluene	160 U	160 U	167 U	160 U	348	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
HMX	160 U	160 U	167 U	174 J	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
Nitroglycerin	400 U	384 J	417 U	400 U	417 U	417 U	2,600 UL	2,100 UL	2,400 UL	840 UL	2,000 UL	2,100 UL									
Nitroguanidine	105 U	95.2 U	105 U	90.9 U	105 U	100 U	1,200	1,200	40 U	40 U	360	900									
PETN	400 U	400 U	417 U	400 U	417 U	417 U	2,600 UL	2,100 UL	2,400 UL	840 UL	2,000 UL	2,100 UL									
RDX	160 U	160 U	297 J	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 UL	270 UL									
Tetryl	160 U	160 U	106 J	160 U	167 U	167 U	320 UL	270 UL	290 UL	100 UL	250 R	270 UL									
Inorganics (MG/KG)																					
Aluminum	2,880	5,320	4,460	6,450	1,730	24,200	17,700 J	12,200 J	16,100	7,480	8,560	9,060	8,710	9,400	10,100	12,400	10,900	12,200	7,990	10,300	4,880
Antimony	1.63 UL	5.45 U	4.98 U	4.82 U	0.726 J	10.6 U	0.53 B	0.41 B	0.74 B	0.51 B	1.7 L	0.58 B	4.18 U	4.76 U	3.97 U	3.53 U	2.84 U	3.50 U	3.77 U	3.19 U	2.29 U
Arsenic	11.1	147	140	16.3	43.1	43	106	85.8	46.1	38.9	72	69.3	63.6	65.3	75.2	58.5	50.3	45.4	51.1	61.6	36.5
Barium	23.5	31.7	25.7	34.3	9.62	75	64.7 J	44.2 J	72.2	20.7	62	50.7	59	56.9	69.9	61.8	67.8	66	57.6	56.7	46.2
Beryllium	0.45 J	1.36 U	1.24 U	0.74 J	0.287 U	1.39 J	1.1 J	0.75 J	1.1 J	0.46 J	0.37 J	0.47 J	1.2	1.15 U	0.53	0.851 U	0.4	0.54	0.29	1.2	1.1
Cadmium	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U	0.45 J	0.4 J	0.4 J	0.11 J	0.95 U	0.09 J	4.87 U	5.35 U	0.513 U	3.97 U	0.367 U	0.452 U	0.488 U	3.59 U	2.57 U
Calcium	2,960	23,000	20,800	3,780	5,490	8,540	40,100	29,900	29,800	7,710	215,000	142,000	177,000	172,000	65,700	79,600	180,000	66,700	150,000	128,000	189,000
Chromium	7.19	18.9	16.8	13.7	5.67	46.2	40.2 J	26.6 J	34.7	17	13.1	14.1	22.9	31.3	25.7	38	21.2	26.5	17.2	29.1	9
Cobalt	1.5 J	6.82 U	6.22 U	6.02 U	1.44 U	13.2 U	5.4 J	3.6 J	5.4	1.8	2.7 J	3 J	8	12.7	4.5	9.4	2.7	3.8	3.4	6.3	5.4
Copper	2.18	10	9.16	2.57 J	3.38	8.72 J	16.7	12.5	13.3	4.6	10.1	9.3	19.5	19.1	15.6	20.2	11.6	13.3	12.5	20.8	10
Cyanide	0.502 U	1.71 U	1.52 U	0.555 U	0.718 U	1.21 U	2.7 U	1.8 U	2.4 U	0.92 U	2 U	2.1 U	8 U	6 U	7 U	8 U	6 U	7 U	8 U	7 U	3 U
Iron	5,420	13,500	11,400	16,100	5,730	38,900	26,900 J	19,800 J	27,800	12,300	27,500	23,300	24,100	23,800	35,800	32,800	20,300	28,500	16,300	22,600	11,000
Lead	4.46	19	16.6	8.33	6.09	22.2	24 J	16.6 J	22	6.8	12.2	13.3	27	27.4	31.3	29.6	23.6	29.1	26.2	29.2	13.8
Magnesium	482 J	716 J	1,870 U	1,100 J	255 J	3,470 J	2,540 J	1,720 J	2,270	1,130	1,060	955	1,660	1,780	2,300	2,650	2,340	1,950	1,730	2,110	1,450
Manganese	28	69	56.3	54.9	21.9	74.6	62.8 J	44.6 J	95.8	30.6	254 L	154	221	222	300	292	186	179	129	244	141
Mercury	0.0307 J	0.224 U	0.16 U	0.0327 J	0.0665 U	0.0811 J	0.12 J	0.1 J	0.11 J	0.03 J	0.08 J	0.08 J	0.15	0.13	0.18	0.18	0.12	0.17	0.13	0.24	0.08
Nickel	2.57	4.91 J	4.04 J	4.48 J	1.3 J	13.4	12.6 J	8.7 J	11.6	4.6	5.1	5.8	22.2 U	24.4 U	13.2	18.1 U	9.5	10.3	7.1	16.3 U	11.7 U
Potassium	530 J	2,040 U	1,870 U	1,180 J	248 J	3,740 J	2,860 J	1,900 J	2,420	1,280	892	870	1,600	2,090	2,080	2,440	1,510	1,870	1,490	1,670	1,020
Selenium	1.02 U	3.41 U	3.11 U	3.01 U	0.718 U	6.61 U	2.2 J	1 J	2 J	0.93 U	2.2 U	0.78 J	5.36 U	6.11 U	5.1 U	4.53 U	3.65 U	4.49 U	4.85 U	4.09 U	2.94 U
Silver	0.408 U	1.36 U	1.24 U	1.2 U	0.287 U	2.64 U	0.81 B	0.58 B	0.83 B	0.28 B	0.28 B	0.48 B	5.11 U	5.62 U	1.78 U	4.16 U	1.27 U	4.57 U	1.69 U	3.76 U	2.70 U
Sodium	612 U	2,040 U	1,870 U	1,810 U	431 U	3,960 U	146 B	100 B	124 B	52.9 B	141 B	125 B	308	329	343	349	344	344	341	519	212
Thallium	0.816 U	2.73 U	2.49 U	2.41 U	0.575 U	5.29 U	2.6 U	1.6 U	2.3 U	0.66 U	0.44 B	0.54 B	5.90 U	6.72 U	5.61 U	6.5	4.02 U	4.95 U	5.34 U	4.51 U	3.23 U
Vanadium	7.47	18.4	16.8	16.3	8.64	58.3	48 J	32.8 J	40.1	22.1	22.7	24.9	27	33	36.9	41.1	30.9	39.1	28.2	35.2	17.5
Zinc	14	60.1	50.8	19.9	14.2	58.5	81.4 J	53 J	69.2	23.3	29.9	37.1	76.9	79.2	77.1	91.1	51.4	58.3	45.6	61.1	30.4
Other Parameters																					
pH	6.86 H3	6.54 H3	NA	6.91 H3	6.75 H3	6.72 H3	6.9	NA	6.6	6.9	6.9	6.9	7.6	7.7	8	7.8	7.7	7.9	7.3	7.7	7.8
Total organic carbon (MG/KG)	56,100 N	97,200 N	NA	37,600 N	51,700 N	57,100 N	170,000	NA	150,000	57,000	100,000	110,000	43,200	60,800	108,000	29,500	46,700	78,300	12,700	96,500	68,500

Notes:

Shading indicates detections

NA - Not analyzed

ATTACHMENT TABLE M-1-3

Analytical Data - Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Chemical	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
Volatile Organic Compounds (UG/KG)												
1,1,1-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1,2,2-Tetrachloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	8 UL	9 UL	6.5 U	8 U	8.5 UL	12 UL
1,1,2-Trichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1-Dichloroethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,1-Dichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2,3-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2,4-Trichlorobenzene	4.56 UL	4.21 UL	2.26 UL	6.46 UL	3.47 UL	4.57 UL	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dibromo-3-chloropropane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dibromoethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,2-Dichloroethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,2-Dichloropropane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
1,3-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
1,4-Dichlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
2-Butanone	19	40.9	11.8	43.9	13.3 J	17.5 J	85 J	72 J	180 J	160	190 J	340 J
2-Hexanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
4-Methyl-2-pentanone	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
Acetone	70.5 J	137 J	43.4 J	157 J	57.6 J	77.4 J	460 J	500 J	660 J	730	820 J	1,400 J
Benzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	NA	NA	NA	NA	NA	NA
Bromodichloromethane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromoform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Bromomethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Carbon disulfide	4.56 UJ	4.21 UJ	2.26 UJ	6.46 UJ	3.47 UJ	4.57 UJ	5.5 L	6.7 L	4.4 L	11 J	4.5 L	9 L
Carbon tetrachloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chlorobenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chloroethane	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Chloroform	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Chloromethane	9.13 UJ	8.42 UJ	4.53 UJ	12.9 UJ	6.94 UJ	9.15 UJ	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
cis-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
cis-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Cyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Dibromochloromethane	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Dichlorodifluoromethane (Freon-12)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	16 UL	18 UL	13 UL	16 UJ	17 UL	24 UL
Ethylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Isopropylbenzene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UJ	9 UJ	6.5 UJ	8 U	8.5 UL	12 UJ
m- and p-Xylene	NA	NA	NA	NA	NA	NA	16 UL	18 UL	13 UL	16 UJ	17 UL	24 UL
Methyl acetate	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	9.6 UJ	11 UJ	7.8 UJ	9.6 U	10 UJ	14 UJ
Methylcyclohexane	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Methylene chloride	8.03 J	6.33 B	3.93 B	7.11 J	4.33 B	6.31 B	40 UL	45 UL	32 UL	40 U	42 UL	59 UL
Methyl-tert-butyl ether (MTBE)	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
o-Xylene	NA	NA	NA	NA	NA	NA	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Styrene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Tetrachloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Toluene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
trans-1,2-Dichloroethene	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
trans-1,3-Dichloropropene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Trichloroethene	4.56 UL	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	8 UL	9 UL	6.5 UL	8 U	8.5 UL	12 UL
Trichlorofluoromethane (Freon-11)	9.13 U	8.42 U	4.53 U	12.9 U	6.94 U	9.15 U	16 UL	18 UL	13 U	16 U	17 UL	24 UL
Vinyl chloride	4.56 U	4.21 U	2.26 U	6.46 U	3.47 U	4.57 U	16 UL	18 UL	13 UL	16 U	17 UL	24 UL
Xylene, total	13.7 UL	12.6 U	6.79 U	19.4 U	10.4 U	13.7 U	24 UL	27 UL	20 UL	24 U	26 UL	35 UL
Semivolatile Organic Compounds (UG/KG)												
1,1-Biphenyl	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
1,2,4,5-Tetrachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2,2'-Oxybis(1-chloropropane)	352 U	326 U	230 U	526 U	274 U	296 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
2,3,4,6-Tetrachlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4,5-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2,4,6-Trichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dichlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dimethylphenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	820 U	620 U	640 U	650 U	950 U	820 U
2,4-Dinitrophenol	3,520 R	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2,4-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2,6-Dinitrotoluene	352 U	326 U	230 U	526 U	274 U	296 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
2-Chloronaphthalene	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Chlorophenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Methylnaphthalene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
2-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
2-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
2-Nitrophenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	820 U	620 U	640 U	650 U	950 U	820 U
3,3'-Dichlorobenzidine	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
3-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U

ATTACHMENT TABLE M-1-3

Analytical Data - Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Chemical	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/10/12	10/09/12	10/09/12	10/09/12	10/10/12	10/09/12	10/09/12
4,6-Dinitro-2-methylphenol	3,520 U	3,260 U	2,300 U	5,260 U	2,740 U	2,960 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
4-Bromophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chloro-3-methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chloroaniline	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Chlorophenyl-phenylether	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
4-Methylphenol	352 U	326 U	230 U	526 U	274 U	296 U	NA	NA	NA	NA	NA	NA
4-Nitroaniline	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
4-Nitrophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
Acenaphthene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
Acenaphthylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
Acetophenone	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	4.6 J	33 U
Atrazine	352 U	326 U	230 U	526 U	274 U	296 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
Benzaldehyde	352 U	326 U	230 U	526 U	274 U	296 U	820 UJ	620 UJ	640 UJ	650 UJ	950 UJ	820 UJ
Benzo(a)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	14 J	9.2 J
Benzo(a)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	13.6	14.5	33 UL	25 UL	26 UL	26 U	15 L	33 UL
Benzo(b)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	17.7	16.3	10 J	8.7 J	9.2 J	26 U	25 J	33 U
Benzo(g,h,i)perylene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 UL	12 L	8.2 J
Benzo(k)fluoranthene	7.01 U	6.5 U	4.59 U	10.5 U	12.6	8.37 J	33 U	25 U	26 U	26 U	16 J	33 U
bis(2-Chloroethoxy)methane	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
bis(2-Chloroethyl)ether	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
bis(2-Ethylhexyl)phthalate	352 U	326 U	230 U	526 U	274 U	296 U	330 B	620 U	640 U	350 B	950 U	820 U
Butylbenzylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Caprolactam	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Carbazole	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Chrysene	7.01 U	6.5 U	4.59 U	10.5 U	19.6	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
Dibenz(a,h)anthracene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	8.6 L	33 U
Dibenzofuran	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Diethylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Dimethyl phthalate	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Di-n-butylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Di-n-octylphthalate	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Fluoranthene	8.1 J	11.4 J	4.59 U	11 J	21.2	20	33 U	25 U	26 U	26 U	16 J	15 J
Fluorene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
Hexachlorobenzene	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Hexachlorobutadiene	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Hexachlorocyclopentadiene	352 R	326 U	230 U	526 U	274 U	296 U	820 UJ	620 UJ	640 UJ	650 UJ	950 R	820 UJ
Hexachloroethane	352 UL	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Indeno(1,2,3-cd)pyrene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	8.4 J	33 U
Isophorone	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Naphthalene	7.01 U	6.5 U	4.59 U	10.5 U	5.45 U	5.91 U	33 U	25 U	26 U	26 U	38 U	33 U
n-Nitroso-di-n-propylamine	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
n-Nitrosodiphenylamine	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Nitrobenzene	352 U	326 U	230 U	526 U	274 U	296 U	160 U	150 U	120 U	120 U	200 UL	170 UL
PAH (HMW)	37.8	35.9	20.7 U	53.1	95.9	74.6	142	109	113	117 U	134	130
PAH (LMW)	214	201	133 U	316	191	201	542 U	410 U	424 U	429 U	601	532
PAH (total)	251	237	154 U	369	287	276	684	519	537	546 U	735	662
Pentachlorophenol	1,400 U	1,300 U	920 U	2,100 U	1,090 U	1,180 U	2,000 U	1,500 U	1,600 U	1,600 U	2,300 U	2,000 U
Phenanthrene	8.42 J	7.31 J	4.59 U	10.5 J	16.7	15.4	33 U	25 U	26 U	26 U	10 J	7.5 J
Phenol	352 U	326 U	230 U	526 U	274 U	296 U	820 U	620 U	640 U	650 U	950 U	820 U
Pyrene	9.75 J	9.86 J	4.59 U	11.1 J	21.5	20.7	33 U	25 U	26 U	26 U	16 J	14 J
Pesticide/Polychlorinated Biphenyls (UG/KG)												
4,4'-DDD	0.739 UL	1.13 J	1.37 L	18.4 J	13.4 L	11.6 L	0.66 L	5.2 U	1.3 J	4.2 J	1.4 L	1.2 L
4,4'-DDE	0.683 J	1.3 L	0.345 L	8.98 J	7.53 J	6.82 J	4.9 L	3.6 J	7.1 J	13	14 L	3.8 L
4,4'-DDT	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 R	5.8 UL
Aldrin	0.739 UL	0.668 UL	0.478 UL	0.91 J	0.568 UL	0.619 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
alpha-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.322 J	0.318 L	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
alpha-Chlordane	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Aroclor-1016	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1221	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1232	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	32 U	32 U	27 U	24 U	39 U	35 U
Aroclor-1242	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1248	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1254	14.5 L	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
Aroclor-1260	18.1 UL	16.4 UL	11.7 UL	25.4 U	13.9 UL	15.2 UL	28 U	27 U	23 U	21 U	33 U	30 U
beta-BHC	0.739 UL	0.668 UL	0.478 UL	2.21 J	0.465 J	0.364 L	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
delta-BHC	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.294 J	0.264 J	2.8 UL	2.7 U	2.3 U	2.1 UJ	3.3 U	3 UL
Dieldrin	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endosulfan I	0.739 UL	0.668 UL	0.478 UL	0.805 J	0.568 UL	0.619 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
Endosulfan II	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 U	5.8 UL
Endosulfan sulfate	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endrin	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.64 J	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 R	5.8 UL
Endrin aldehyde	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL
Endrin ketone	0.739 UL	0.668 UL	0.478 UL	1.04 U	0.568 UL	0.619 UL	5.4 UL	5.2 U	4.5 U	4 U	6.4 UL	5.8 UL

ATTACHMENT TABLE M-1-3

Analytical Data - Subsurface Sediment

Site 4/Youth Pond Remedial Investigation

Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia

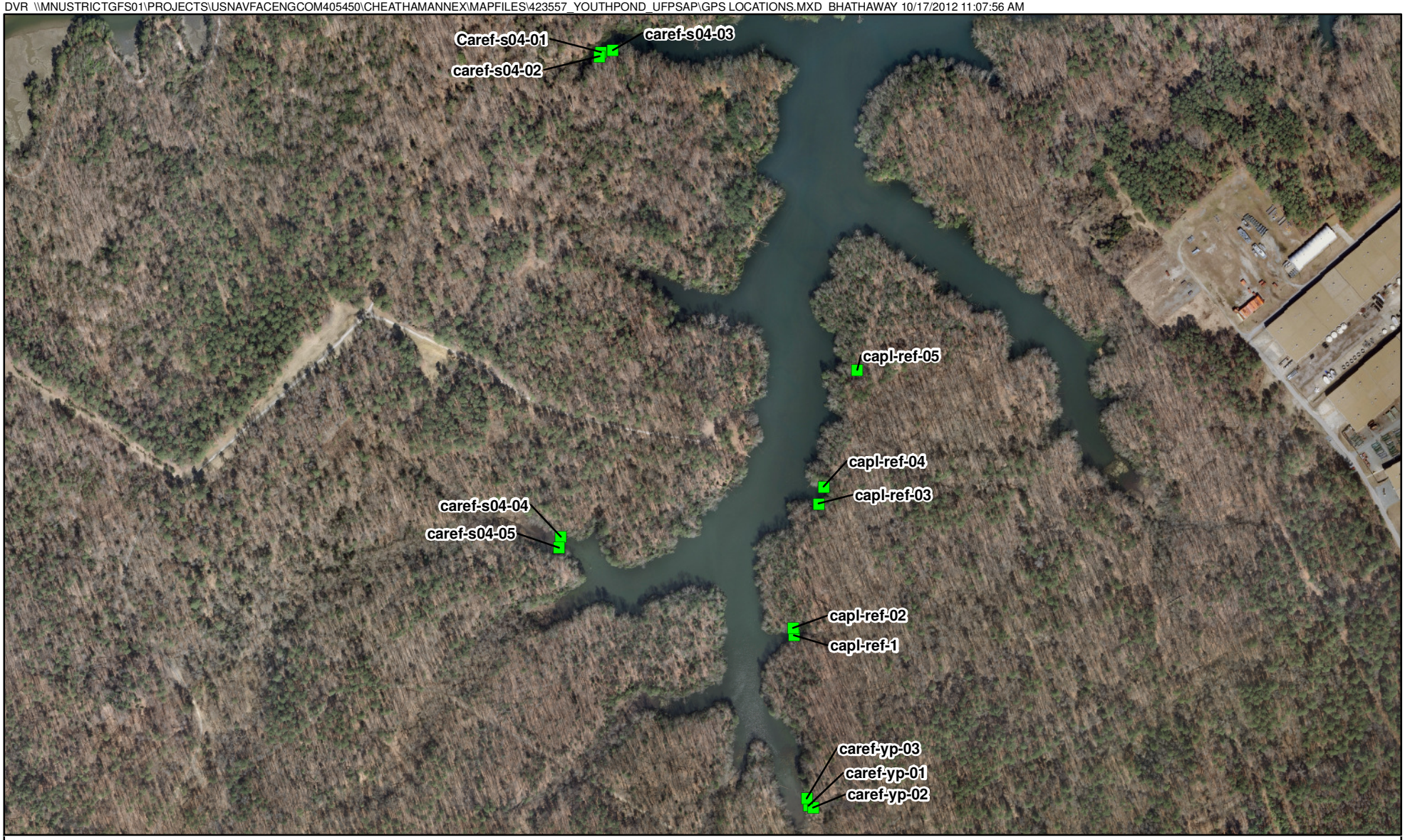
	CAREFPL-SWSD01	CAREFPL-SWSD02	CAREFPL-SWSD03	CAREFPL-SWSD04	CAREFPL-SWSD05		CAREFS04-SWSD01		CAREFS04-SWSD02	CAREFS04-SWSD03	CAREFS04-SWSD04	CAREFS04-SWSD05
	CAREFPL-SSD01-1012	CAREFPL-SSD02-1012	CAREFPL-SSD03-1012	CAREFPL-SSD04-1012	CAREFPL-SSD05-1012	CAREFPL-SSD05P-1012	CAREFS04-SSD01-1012	CAREFS04-SSD01P-1012	CAREFS04-SSD02-1012	CAREFS04-SSD03-1012	CAREFS04-SSD04-1012	CAREFS04-SSD05-1012
Chemical	**10/10/12**	**10/10/12**	**10/10/12**	**10/10/12**	**10/10/12**	**10/10/12**	**10/09/12**	**10/09/12**	**10/09/12**	**10/10/12**	**10/09/12**	**10/09/12**
gamma-BHC (Lindane)	0.739 UL	0.668 UL	0.218 J	1.04 U	0.285 J	0.48 J	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 U	3 UL
gamma-Chlordane	0.739 UL	0.668 UL	0.226 B	0.896 B	0.304 B	0.453 B	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Heptachlor	0.739 UL	0.668 UL	0.478 UL	1.35 B	0.316 B	0.619 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 R	3 UL
Heptachlor epoxide	0.739 UL	0.668 UL	0.478 UL	1.04 UL	0.568 UL	0.619 UL	2.8 UL	2.7 U	2.3 U	2.1 U	3.3 UL	3 UL
Methoxychlor	0.739 UJ	0.668 UJ	0.478 UJ	1.04 UL	0.568 UJ	0.619 UJ	28 UL	27 U	23 U	21 U	33 U	30 UL
Toxaphene	47.8 UL	43.2 UL	30.9 UL	67.1 U	36.7 UL	40.1 UL	54 UL	52 U	45 U	40 U	64 U	58 UL
Explosives (UG/KG)												
1,3,5-Trinitrobenzene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
1,3-Dinitrobenzene	190 U	160 U	190 U	174 U	182 U	217 J	160 U	150 U	120 U	120 U	200 UL	170 UL
2,4,6-Trinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2-Amino-4,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
2-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
3,5-Dinitroaniline	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
3-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
4-Amino-2,6-dinitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
4-Nitrotoluene	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
HMX	190 U	160 U	190 U	812 J	182 U	200 U	160 UL	150 UL	120 UL	120 UL	200 UL	170 UL
Nitroglycerin	476 U	400 U	476 U	435 U	455 U	500 U	1,200 U	1,200 U	990 U	930 U	1,600 UL	1,400 UL
Nitroguanidine	90.9 U	105 U	95.2 U	95.2 U	110 J	105 J	40 U	39 U	40 U	39 U	180 J	40 U
PETN	476 U	400 U	476 U	435 U	455 U	500 U	1,200 U	1,200 U	990 U	930 U	1,600 UL	1,400 UL
RDX	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
Tetryl	190 U	160 U	190 U	174 U	182 U	200 U	160 U	150 U	120 U	120 U	200 UL	170 UL
Inorganics (MG/KG)												
Aluminum	3,110	1,510	3,500	2,570	7,950 J	10,200 J	9,600	8,180	11,500	9,540	19,400	18,900
Antimony	0.888 U	1.54 U	2.83 U	6.58 U	3.65 U	3.56 U	0.17 B	0.81 UJ	0.92 UJ	26.7	0.32 L	0.18 B
Arsenic	8.08	16.5	3.39 J	57.2	7.85	6.96	19	20.7	12.6	51.1	48.6	38.1
Barium	27.7	10.5	17.6	13 J	28.2	36.5	34	29.4	61.5	30.7	98.1	72.3
Beryllium	0.492 J	0.386 U	0.448 J	1.65 U	0.914 U	0.599 J	0.64 J	0.56 J	0.94	0.63 J	0.96 J	0.93 J
Cadmium	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U	0.18 J	0.18 J	0.11 J	0.11 J	0.03 J	0.12 J
Calcium	3,240	5,050	1,120 J	7,430	2,800	3,160	11,300	10,800	6,620	12,100	89,600	40,000
Chromium	7.29	4	8.9	6.22 J	11.9	15.9	23.1	19.4	23.1	21.3	25.8	25.3
Cobalt	1.69	1.93 U	3.53 U	8.23 U	4.57 U	2.47 J	2.4	2.2	3.5	2.3	5.3	4.8
Copper	2.64	2.09	2.83 U	3.67 J	2.31 J	2.78 J	5.8	5.3	5.3	5.2	8.9	7.2
Cyanide	0.558 U	0.477 U	0.355 U	0.783 U	0.421 U	0.437 U	1.2 U	1.2 U	1 U	0.88 U	1.8 U	1.2 U
Iron	5,310	2,840	8,940	6,300	8,740 J	11,300 J	10,800	10,400	16,600	16,000	43,800	26,600
Lead	4.05	3.77	3.58	8.98	9.5	12.1	9.7	8.6	11.2	9.2	17.2	16.6
Magnesium	479 J	197 J	802 J	2,470 U	861 J	1,130 J	1,340	1,160	1,590	1,440	1,580 J	1,440
Manganese	28.9	18.6	13.6	22.6	21.6	25.1	24.7	23.4	56.5	39.7	310 L	84.2
Mercury	0.0258 J	0.0541 U	0.043 U	0.0499 J	0.047 J	0.0519 J	0.05 J	0.06 J	0.06 J	0.04 J	0.09 J	0.08 J
Nickel	2.75	1.24 J	2.48 J	4.94 U	4.39 J	5.63	6.1	5.4	7.2	5.8	9.1	8.8
Potassium	558	578 U	1,120 J	2,470 U	777 J	1,010 J	1,500	1,300	1,580	1,610	1,550 K	1,440
Selenium	0.555 U	0.964 U	1.77 U	4.12 U	2.28 U	2.23 U	2.5	2.1	1.3 U	0.42 J	0.6 J	1.5 U
Silver	0.222 U	0.386 U	0.706 U	1.65 U	0.914 U	0.89 U	0.3 B	0.28 B	0.4 B	0.42 B	0.25 B	0.31 B
Sodium	333 U	578 U	1,060 U	2,470 U	1,370 U	1,340 U	56.5 B	53.3 B	54.5 B	52.2 B	111 B	94.5 B
Thallium	0.444 U	0.771 U	1.41 U	3.29 U	1.83 U	1.78 U	1 U	0.81 U	0.92 U	0.81 U	0.45 B	1.1 U
Vanadium	7.65	5.09	10.3	8.57 J	15.8	20.4	24.2	21.4	27.5	27.8	40.8	38.6
Zinc	13.3	10.8	8.81	22.3	18.9	22.6	41	35.1	32.8	28.6	45.3	52.8
Other Parameters												
pH	6.87 H3	6.89 H3	6.77 H3	6.79 H3	6.94 H3	NA	7.2	NA	6.8	6.9	6.9	6.8
Total organic carbon (MG/KG)	26,500 N	42,500 N	19,600 N	67,800 N	43,400 N	NA	130,000	NA	83,000	72,000	100,000	92,000

Notes:

Shading indicates detections

NA - Not analyzed

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\CHEATHAMANNEX\MAPFILES\423557_YOUTHPOND_UFPSAP\GPS LOCATIONS.MXD BHATHAWAY 10/17/2012 11:07:56 AM



Legend

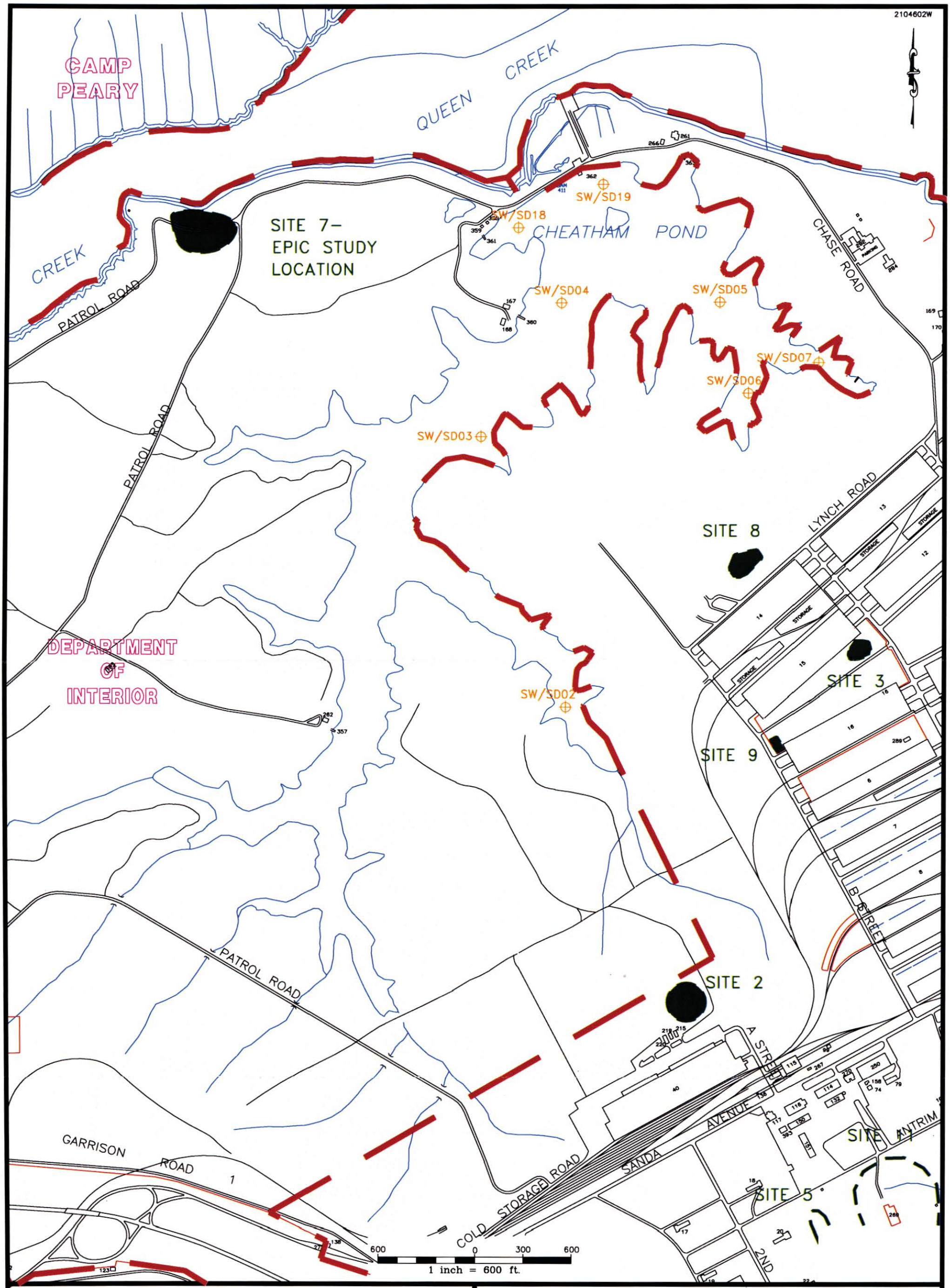
- 2012 Surface Water/Sediment Reference Locations

N
W E
S

0 300 600
Feet

Figure M-1
2012 Locations
Cheatham Pond

CH2MHILL



LEGEND

- APPROXIMATE SITE/AOC BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- LAKE/POND
- STREAM
- TIDAL SHORE LINE
- STRUCTURE
- STORAGE TANK
- ROAD
- RAILROAD TRACKS
- FENCE
- SURFACE WATER/SEDIMENT SAMPLING LOCATION

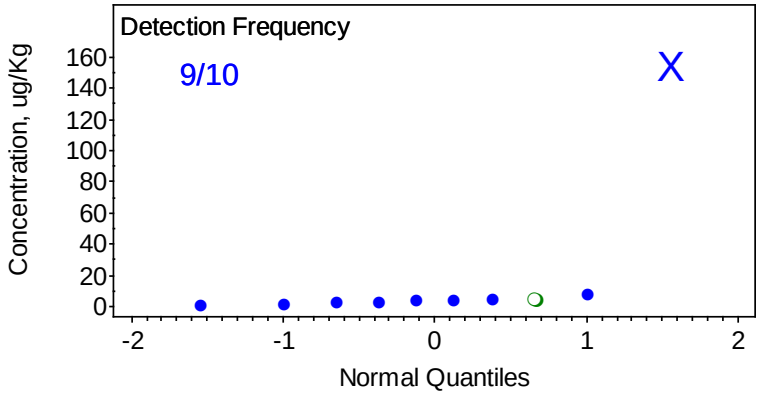
SOURCE: LANTDIV, 1992.

Figure M-2
2000 Pond Study Locations
Cheatham Pond

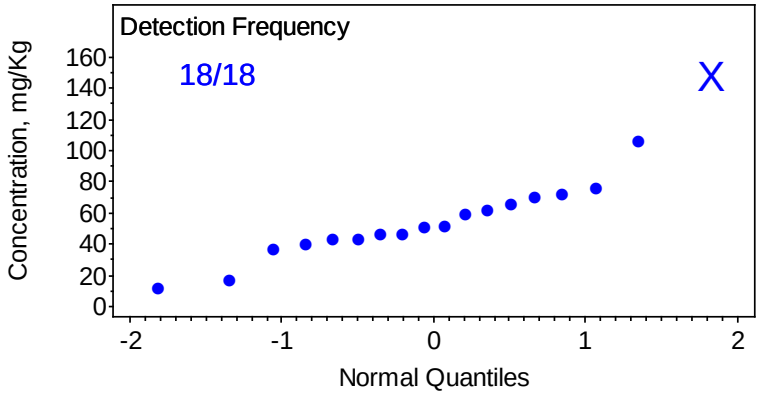
(from CH2M HILL and Baker, 2001)

Probability Plots for Sediment Cases with Statistical Outliers

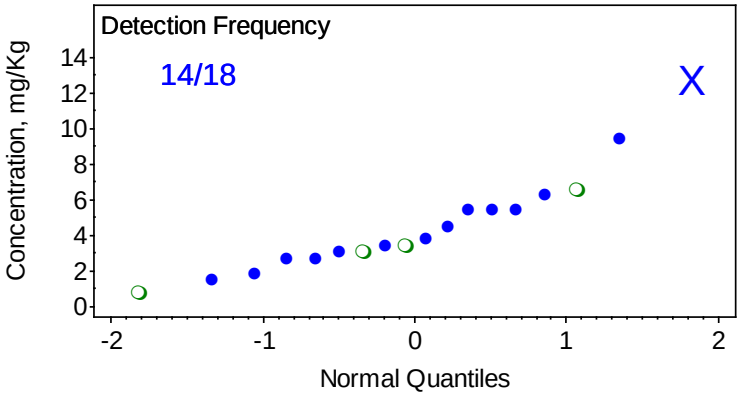
4,4'-DDD



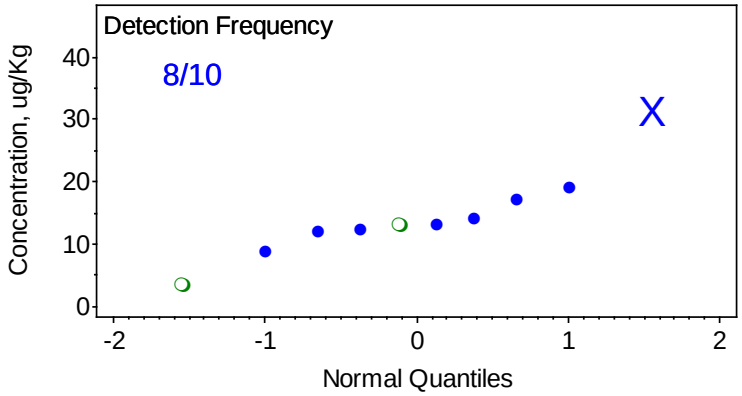
Arsenic



Cobalt



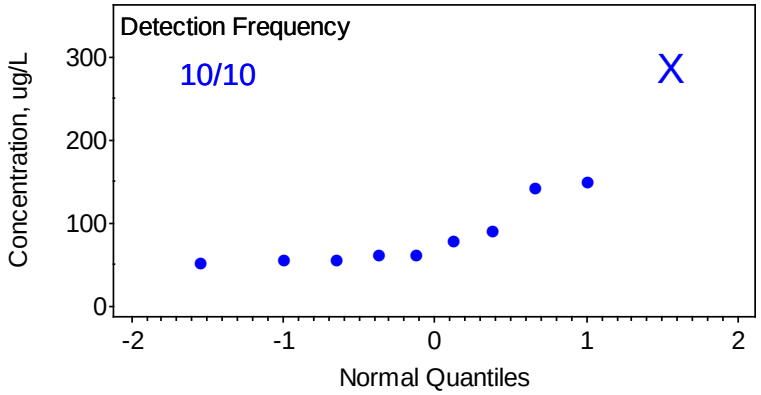
Fluoranthene



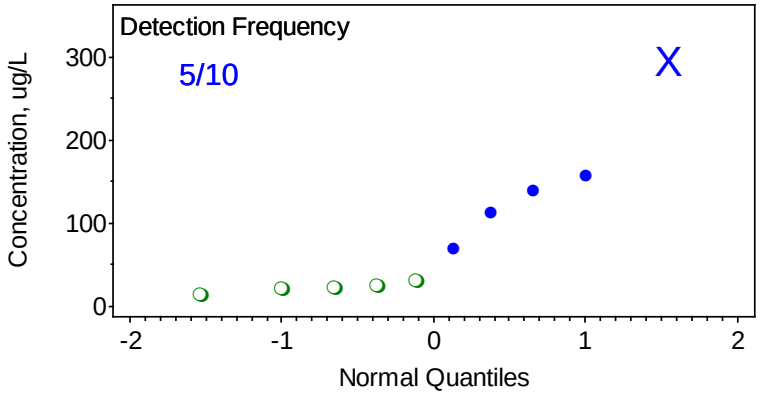
Green Open Circle Represents 1/2 DL Proxy for Nondetects; Closed Blue Symbol Represents Detects
X Represents Dixon Outlier

Probability Plots for Surface Water Cases with Statistical Outliers

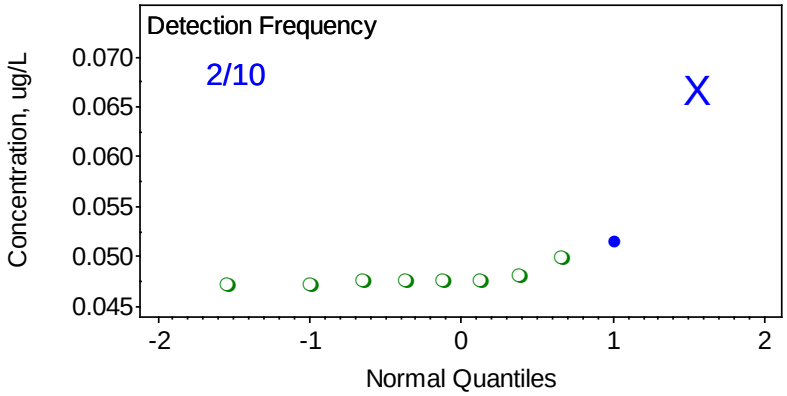
Aluminum



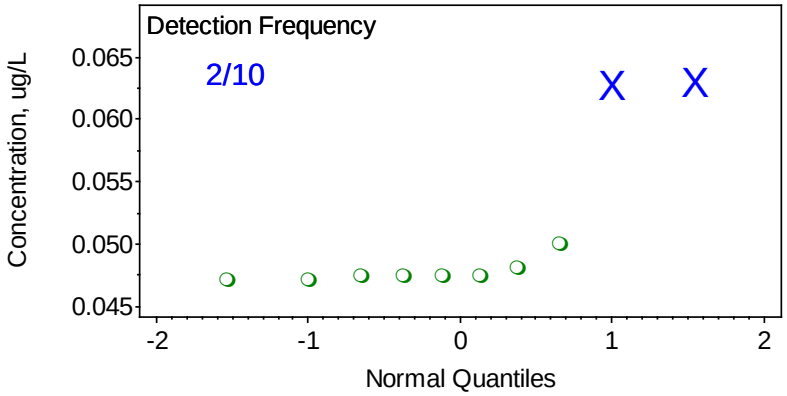
Aluminum, Dissolved



Benzo(a)anthracene



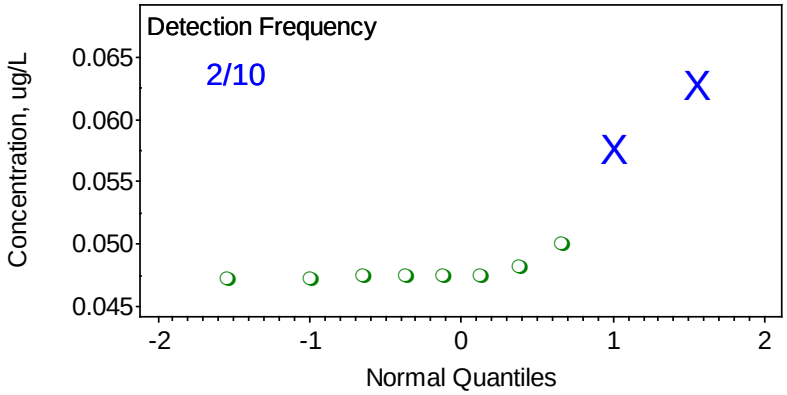
Benzo(b)fluoranthene



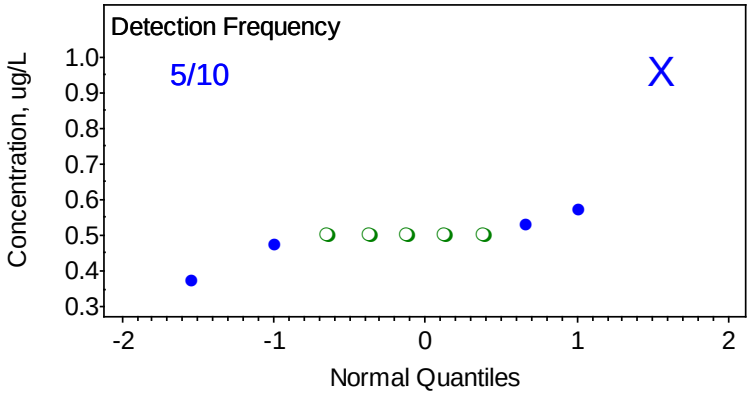
Green Open Circle Represents 1/2 DL Proxy for Nondetects; Closed Blue Symbol Represents Detects
X Represents Dixon Outlier

Probability Plots for Surface Water Cases with Statistical Outliers

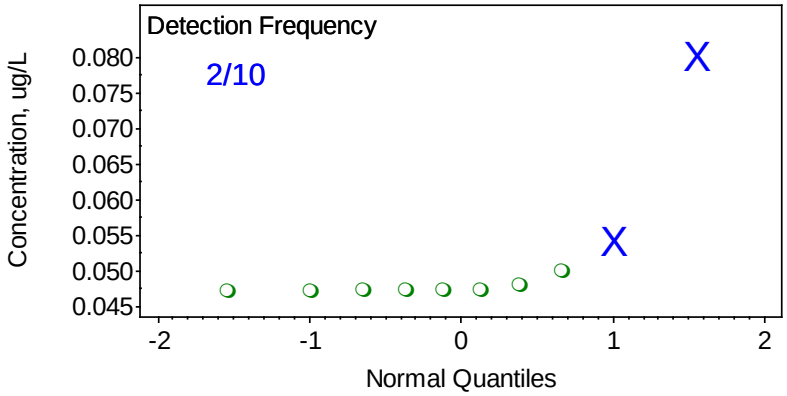
Benzo(k)fluoranthene



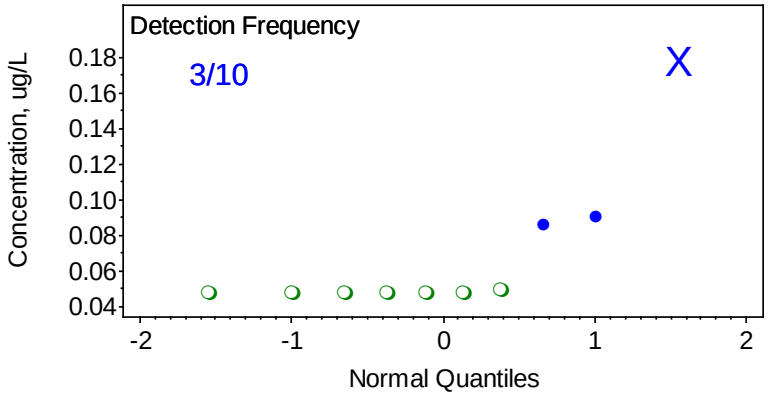
Chromium



Chrysene



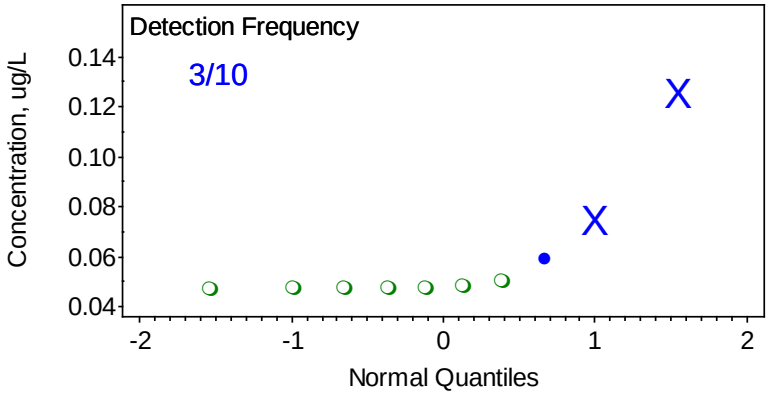
Fluoranthene



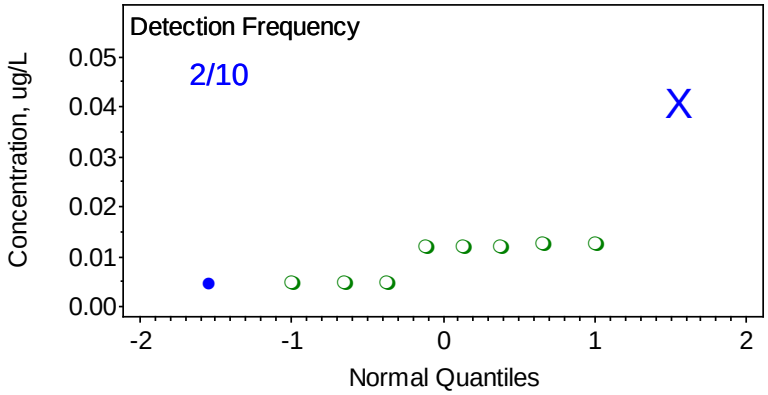
Green Open Circle Represents 1/2 DL Proxy for Nondetects; Closed Blue Symbol Represents Detects
X Represents Dixon Outlier

Probability Plots for Surface Water Cases with Statistical Outliers

Pyrene



alpha-BHC



Green Open Circle Represents 1/2 DL Proxy for Nondetects; Closed Blue Symbol Represents Detects
X Represents Dixon Outlier

Appendix N
Toxicity Test Reports

TOXICOLOGICAL EVALUATION
OF FRESHWATER SEDIMENT SAMPLES

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233
Prime Contract #N62470-11-D-8012

Hyalella azteca 42 Day
Survival, Growth and Reproduction Sediment Toxicity Test

Prepared For:

CH2M Hill, Incorporated
5700 Cleveland Street, Suite 101
Virginia Beach, Virginia 23462

Prepared By:

EnviroSystems, Incorporated
1 Lafayette Road
Hampton, New Hampshire 03842

January 2013
Reference Number 22654Ha

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TOXICOLOGICAL EVALUATION
OF FRESHWATER SEDIMENT SAMPLES
CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233
Prime Contract #N62470-11-D-8012

Hyalella azteca 42 Day
Survival, Growth and Reproduction Sediment Toxicity Test

1.0 INTRODUCTION

This report presents the results of chronic exposure toxicity tests conducted on sediment samples collected for the Cheatham Annex Site 4 Ecological Risk Assessment. Samples were provided by CH2M Hill, Incorporated, Virginia Beach, Virginia. Testing was based on programs and protocols developed by the ASTM (2012) and US EPA (2000). The toxicity of the samples was assessed by conducting survival, growth and reproduction tests using the freshwater amphipod, *Hyalella azteca*. Toxicity tests and supporting analyses were performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire.

Toxicity tests expose groups of organisms to environmental samples, a laboratory control and field reference sites for a specified period to assess potential impacts on a variety of endpoints, such as survival, growth or reproduction. Analysis of variance techniques are used to determine the relative toxicity of the samples as compared to the laboratory control and/or field reference sites. Endpoints for this study included survival (measured on days 28, 35 and 42), growth (measured on days 28 and 42, as mean dry weight and mean dry biomass), and reproduction (measured on days 35 and 42).

2.0 MATERIALS AND METHODS

2.1 General Methods, Biological Evaluations

Toxicological and analytical protocols used in this program follow procedures outlined in *Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates* (ASTM Method E 1706-05, 2012), *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (US EPA 2000) and *Standard Methods for the Examination of Water and Wastewater*, 22nd Edition (APHA 2012). These protocols provide standard approaches for physical and chemical analysis and for the evaluation of toxicological effects of sediments on aquatic invertebrates.

2.2 Test Species

H. azteca were obtained from Aquatic Research Organisms, Hampton, New Hampshire. Organisms used in the 28 day exposure assay were 7-8 days old at the start of the assay.

2.3 Test Samples and Laboratory Control Sediment

Sediment samples collected for the Cheatham Annex Site 4 Ecological Risk Assessment project were received at ESI under chain of custody. Once received, samples were inspected to determine integrity, given unique sample numbers and logged into the laboratory sample management database. Once logged in, the samples were placed in a secure refrigerated, 2 - 4 °C, storage area. A listing of sample sites, sample collection, and receipt information is summarized in Table 1.

The control substrate was an artificial sediment prepared according to guidance presented in the EPA/ASTM method. Organic detritus from chironomid cultures and disintegrated paper pulp were used to provide organic content. Overlying water for the sediment toxicity tests was a 50:50 mixture of natural surface water, collected from the upper portion of the Taylor River watershed in Hampton Falls, New Hampshire, and moderately hard reconstituted water. Use of natural surface water mixed with artificial reconstituted water is recommended by the protocol (US EPA 2000, ASTM 2012).

2.4 *Hyalella azteca* 42-Day Survival, Growth and Reproduction Toxicity Tests

Sediment was homogenized and then placed in test chambers. Overlying water was added immediately and then the chambers were allowed to stabilize. The chambers received two volume additions twice a day until organisms were added.

Test vessels were 400 mL glass beakers containing 100 mL of sediment and approximately 225 mL of overlying water. Test vessels were drilled at a consistent height above their bases and the hole covered with Nytex® screen. The screened hole facilitates water exchange while retaining test organisms. Vessels were maintained in a water bath during the test. Depth of the water in the bath was set below the drain hole in the test vessel to eliminate flow of water from the bath into the test vessel. Test chambers were randomly placed in the water bath after addition of test sediments. Placement locations were generated by the CETIS® software program. The block randomized position assignments are included in the data appendix. The water bath was maintained in a limited access, temperature controlled room. Temperatures in the room and water bath were independently set at a temperature of 23°C. Temperature was recorded on an hourly frequency using a temperature logger placed in a surrogate vessel. The photoperiod in the test chamber was set at 16:8 hour light:dark. Lighting was supplied by cool white fluorescent bulbs.

On day 0, amphipods were randomly selected from the pool of organisms and added to test vessels. Each treatment group included 8 replicates with 10 organisms per replicate and a surrogate test chamber that was used to obtain water qualities during the assay without disturbing the test animals. The surrogate chamber was treated the same as actual test chambers with the addition of animals and food, but was not used to determine endpoint data.

Prior to the daily overlying water renewal, dissolved oxygen, pH, specific conductance and temperature were measured in the surrogate chamber for each treatment. Overlying water in each replicate was then renewed with approximately two volume additions. Water exchanges were facilitated by use of a distribution system designed to provide equal, regulated flow to each chamber. The system was activated manually by the addition of water during the assay. After the overlying water renewal each replicate was fed 1.0 mL of a yeast/trout chow/alfalfa suspension. Alkalinity, ammonia, hardness and sulfide of the overlying water were measured on days 0, 7, 14, 21, 28, 35 and 42. The total organic carbon of the overlying water was measured on days 0 and 28. Overlying water quality records are available in Appendix A.

After 28 days exposure, replicates of each test treatment were terminated to collect data for the survival and growth endpoints. Each test chamber was gently swirled to loosen the sediments and the test material was emptied into a stainless steel sieve. The sediments were washed through the sieve using fresh water and material left on the screen was sorted to recover the organisms. This process was continued until the entire sample was evaluated.

Surviving amphipods from 4 replicates identified for day 28 survival and growth analysis were counted and placed on tared weighing pans. Pans were dried overnight at 104°C to obtain dry weight to the nearest 0.01 mg. The mean dry weight of surviving organisms was determined to assess growth.

Surviving amphipods from the remaining 8 replicates were enumerated and then returned to test chambers, which were filled with a 50:50 mix of natural surface water and moderately hard reconstituted water. The test vessels were returned to the water bath for the additional 14 day exposure. During this period, water quality monitoring, water exchanges and feeding were conducted in the same manner as during the initial 28 day exposure. Survival and juvenile counts were recorded on Days 35 and 42 in the remaining eight replicates of each test treatment. Growth, measured as dry weight and dry biomass, was determined on Day 42.

2.5 Statistical Analysis

Survival, growth and reproduction were analyzed using CETIS® software to determine significant differences between the test sediments and both the laboratory control and reference site sediments. Data sets were evaluated to determine normality of distribution and homogeneity of sample variance. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance

(ANOVA) statistic. Data sets were also analyzed for the presence of outliers using the Grubbs' Outlier Test. In cases where outliers were found, statistical analysis was conducted both with and without the questionable data point and both sets of results are reported. Statistical comparisons were made for the following endpoints; survival on days 28, 35 and 42; dry weight and dry biomass on days 28 and 42; surviving amphipod juvenile production on day 35 and the total for days 35 and 42; surviving female amphipod juvenile production on day 42 and the total for days 35 and 42. Dry weight was calculated by taking the mean dry weight obtained for a replicate and dividing it by the number of surviving organisms. Dry biomass was calculated by taking the mean dry weight obtained for a replicate and dividing it by the number of organisms exposed at the start of the assay. Pair-wise comparisons were made using the appropriate statistical evaluation. Statistical difference was evaluated at $\alpha=0.05$.

2.6 Quality Control

As part of the laboratory quality control program, reference toxicant evaluations are conducted by ESI on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. Results are summarized in Table 2.

3.0 RESULTS AND DISCUSSION

3.1 Laboratory Control and Project Reference Site Performance

At the end of the 28 day exposure period, mean survival in laboratory control sediment was 98.0% with a coefficient of variation (CV) of %. Amphipods recovered from laboratory control sediment had a mean dry weight of 0.753 mg/amphipod, with a CV of 22.42%. The dry weight of a representative group of amphipods at the start of the assay was 0.016 mg/individual. The minimum test acceptability criteria for survival in the laboratory control is ≥80%. The minimum acceptable criteria for growth is a demonstration of increased dry weight after 28 days exposure. At day 42 mean reproduction was 5.7 juveniles per amphipod or 7.5 juveniles per surviving female amphipod. Minimum acceptability for the assay is a production of ≥2 juveniles per amphipod. Table 3 provides a summary of assay acceptability criteria and laboratory control achievement. Table 4 summarizes the reference site performance.

During daily water quality observations the temperature recorded for the assay had a mean value of 22.22°C with a range of 21.21 to 22.85°C. Confirmation temperature data collected in a surrogate replicate documented a mean temperature of 22.3°C with a range of 21.6 to 23.1°C. Test acceptability criteria requires a mean temperature of 23±1°C, with maximum temporary fluctuations of 23±3°C.

3.2 Protocol Deviations

Review of data generated during the 42-day exposure period documented no deviations from the recommended protocol. There were several instances where deviations from ESI's Standard Operating Procedure (SOP) were noted. The instances involved test chambers where more than 1 organisms were recovered at the end of the initial 28-day exposure period. Review of the procedures used to add organisms to the chambers and conduct of the assay during that 28-day period failed to identify a reasonable source for the additional organisms in these chambers. The process of adding organisms to chambers accounted for all organisms prepared for the assay, and at the end of the assay no chambers were encountered where there was 0% survival. As such, these replicates were excluded from subsequent analysis. It is the opinion of ESI's Technical Director that this deviation from the SOP had no impact on the outcome of the assay or invalidated any other data.

3.3 Summary

This program utilized protocols developed by the US EPA and ASTM to assess the potential toxicological impacts that exposure to sediments from Cheatham Annex Site 4 would have on freshwater invertebrates. Table 5 provides a summary of demonstrated effects, based on comparison with both reference site samples. Tables 6 through 16 provide summaries of assay endpoints and detailed statistical results for each sample location. Table 17 summarizes overlying water qualities measured during the test. Laboratory bench sheets, water quality data, detailed summaries of survival, dry weights and reproduction associated statistical support data are included in Appendix A.

4.0 REFERENCES

APHA. 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition. Washington D.C.

ASTM. 2012. Annual Book of ASTM Standards. Volume 11.06. *Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates*. E 1706-05. ASTM, West Conshohocken, PA.

US EPA. 2000. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.* Second Edition. EPA/600-R-99/064.

Table 1. Summary of Sample Collection and Receipt Information. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Field ID	ESI Code	Sample Number	Sample Designation	Sample Collected Date	Sample Collected Time	Sample Received Date	Sample Received Time
CAS04-SD20-1012	22654-001	001	Test	10/02/12	1325	10/03/12	1700
CAS04-SD19-1012	22654-002	002	Test	10/02/12	1250	10/03/12	1700
CAS04-SD18-1012	22654-003	003	Test	10/02/12	0950	10/03/12	1700
CAS04-SD23-1012	22654-004	004	Test	10/02/12	1620	10/03/12	1700
CAS04-SD21-1012	22654-005	005	Test	10/02/12	1420	10/03/12	1700
CAS04-SD22-1012	22654-006	006	Test	10/02/12	1445	10/03/12	1700
CAREFS04-SD05-1012	22654-007	X	Hold	10/09/12	1015	10/10/12	1130
CAREFS04-SD02-1012	22654-008	007	Reference	10/09/12	1450	10/10/12	1130
CAREFS04-SD04-1012	22654-009	008	Reference	10/09/12	1120	10/10/12	1130
CAREFS04-SD01-1012	22654-010	X	Hold	10/09/12	1545	10/10/12	1130

Table 2. Reference Toxicant Evaluation. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Date	Endpoint		Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
Hyalella azteca						
11/16/12	Survival	LC-50	0.008	0.014	0.000 - 0.033	Cadmium (mg/L)

Table 3. Summary of Acceptable Endpoints and Measurements. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Endpoint / Measurement	Protocol Criteria		
Survival	Day 28 Lab Control mean ≥ 80%	Mean Survival %	98.0
		Protocol Met	Yes
Growth	Day 28 Lab Control Positive Growth	start dry wt. (mg)	0.016
		end dry wt. (mg)	0.753
		Protocol Met	Yes
Reproduction	Day 42 Juveniles produced in Lab Control ≥ 2	day 35 j / amphipod	1.4
		day 42 j / amphipod	5.7
		Protocol Met	Yes
Temperature	Mean: 23°±1°C	daily / hourly	22.22 / 22.3
	Minimum: 20°C	daily / hourly	21.21 / 21.6
	Maximum: 26°C	daily / hourly	22.85 / 23.1
		Protocol Met	Yes / Yes

Table 4. Summary of Project Reference Site Performance. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Field ID (ESI Code)	Mean Percent Survival			Mean Dry Weight (mg)		Mean Dry Biomass (mg)		Reproduction ♂♀		Reproduction ♀	
	D 28	D 35	D 42	D 28	D 42	D 28	D 42	D 35	D 35+42	D 42	D 35+42
CAREFS04-SD02-1012 (22654-008)	91.82%	90.00%	85.71%	0.587	0.878	0.531	0.752	1.6	5.8	8.6	11.8
CAREFS04-SD04-1012 (22654-009)	95.83%	92.50%	90.00%	0.554	0.887	0.525	0.804	1.9	6.1	6.6	9.8

Table 5. Summary of Significant Endpoints. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

		Finding of Significant Difference(s) between Project Sites and																						
		CAREFS04-SD02-1012 (22654-008)											CAREFS04-SD04-1012 (22654-009)											
		survival			dry wt		dry bio.		reproduction				survival			dry wt		dry bio.		reproduction				
									♂♀		♀									♂♀		♀		
Field ID	ESI Code	day 28	day 35	day 42	day 28	day 42	day 28	day 42	D 35	D 35+42	D 42	D 35+42	day 28	day 35	day 42	day 28	day 42	day 28	day 42	D 35	D 35+42	D 42	D 35+42
CAS04-SD20-1012	22654-001																						
CAS04-SD19-1012	22654-002																		Y				
CAS04-SD18-1012	22654-003						Y																
CAS04-SD23-1012	22654-004																		Y	Y			
CAS04-SD21-1012	22654-005																						
CAS04-SD22-1012	22654-006												Y						Y	Y			

Table 6. Day 28 *Hyalella azteca* Survival Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 28 Survival Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	10	98.00%	90%	100%	4.30%
CAREFS04-SD02-1012	22654-008	007	11	91.82%	80%	100%	6.57%
CAREFS04-SD04-1012	22654-009	008	12	95.83%	90%	100%	5.37%
CAS04-SD20-1012	22654-001	001	11	94.55%	80%	100%	7.27%
CAS04-SD19-1012	22654-002	002	11	95.45%	90%	100%	5.47%
CAS04-SD18-1012	22654-003	003	12	94.17%	80%	100%	8.42%
CAS04-SD23-1012	22654-004	004	12	94.17%	70%	100%	10.58%
CAS04-SD21-1012	22654-005	005	12	89.17%	70%	100%	12.15%
CAS04-SD22-1012	22654-006	006	12	95.00%	80%	100%	8.40%

Day 28 Survival Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	91.82%	Yes	-	-
CAREFS04-SD04-1012	008	95.83%	No	-	-
CAS04-SD20-1012	001	94.55%	No	No	No
CAS04-SD19-1012	002	95.45%	No	No	No
CAS04-SD18-1012	003	94.17%	No	No	No
CAS04-SD23-1012	004	94.17%	No / No*	No	No
CAS04-SD21-1012	005	89.17%	Yes	No	Yes
CAS04-SD22-1012	006	95.00%	No	No	No

* - No / No - Indicates that an outlier was present, results presented for data with and without outlier.

Table 7. Day 35 *Hyalella azteca* Survival Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 35 Survival Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	92.50%	80%	100%	7.64%
CAREFS04-SD02-1012	22654-008	007	7	90.00%	80%	100%	6.42%
CAREFS04-SD04-1012	22654-009	008	8	92.50%	70%	100%	11.19%
CAS04-SD20-1012	22654-001	001	8	83.75%	30%	100%	27.77%
CAS04-SD19-1012	22654-002	002	8	91.25%	80%	100%	7.02%
CAS04-SD18-1012	22654-003	003	8	90.23%	70%	100%	11.60%
CAS04-SD23-1012	22654-004	004	8	85.00%	60%	100%	17.79%
CAS04-SD21-1012	22654-005	005	8	83.75%	50%	100%	20.12%
CAS04-SD22-1012	22654-006	006	8	93.75%	80%	100%	9.77%

Day 35 Survival Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	90.00%	No	-	-
CAREFS04-SD04-1012	008	92.50%	No	-	-
CAS04-SD20-1012	001	83.75%	No / No*	No / No	No / No
CAS04-SD19-1012	002	91.25%	No	No	No
CAS04-SD18-1012	003	90.23%	No	No	No
CAS04-SD23-1012	004	85.00%	No	No	No
CAS04-SD21-1012	005	83.75%	No	No	No
CAS04-SD22-1012	006	93.75%	No	No	No

* - No / No - Indicates that an outlier was present, results presented for data with and without outlier.

Table 8. Day 42 *Hyalella azteca* Survival Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Survival Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	87.50%	80%	100%	10.13%
CAREFS04-SD02-1012	22654-008	007	7	85.71%	80%	100%	9.18%
CAREFS04-SD04-1012	22654-009	008	8	90.00%	70%	100%	13.28%
CAS04-SD20-1012	22654-001	001	8	80.00%	10%	100%	36.60%
CAS04-SD19-1012	22654-002	002	8	88.75%	70%	100%	11.17%
CAS04-SD18-1012	22654-003	003	8	84.32%	64%	100%	15.77%
CAS04-SD23-1012	22654-004	004	8	81.25%	60%	100%	22.25%
CAS04-SD21-1012	22654-005	005	8	81.25%	50%	100%	21.25%
CAS04-SD22-1012	22654-006	006	8	86.25%	60%	100%	17.46%

Day 42 Survival Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	85.71%	No	-	-
CAREFS04-SD04-1012	008	90.00%	No	-	-
CAS04-SD20-1012	001	80.00%	No / No*	No	No / No
CAS04-SD19-1012	002	88.75%	No	No	No
CAS04-SD18-1012	003	84.32%	No	No	No
CAS04-SD23-1012	004	81.25%	No	No	No
CAS04-SD21-1012	005	81.25%	No	No	No
CAS04-SD22-1012	006	86.25%	No	No	No

* - No / No - Indicates that an outlier was present, results presented for data with and without outlier.

Table 9. Day 28 *Hyalella azteca* Dry Weight Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 28 Dry Weight Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	2	0.753	0.633	0.872	22.42%
CAREFS04-SD02-1012	22654-008	007	4	0.587	0.520	0.671	11.58%
CAREFS04-SD04-1012	22654-009	008	4	0.554	0.490	0.644	11.76%
CAS04-SD20-1012	22654-001	001	3	0.537	0.529	0.553	2.59%
CAS04-SD19-1012	22654-002	002	3	0.756	0.659	0.863	13.55%
CAS04-SD18-1012	22654-003	003	4	0.467	0.376	0.566	17.83%
CAS04-SD23-1012	22654-004	004	4	0.507	0.376	0.667	24.67%
CAS04-SD21-1012	22654-005	005	4	0.712	0.627	0.807	11.09%
CAS04-SD22-1012	22654-006	006	4	0.563	0.444	0.625	14.65%

Day 28 Dry Weight Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	0.587	No	-	-
CAREFS04-SD04-1012	008	0.554	Yes	-	-
CAS04-SD20-1012	001	0.537	Yes	No	No
CAS04-SD19-1012	002	0.756	No	No	No
CAS04-SD18-1012	003	0.467	Yes	Yes	No
CAS04-SD23-1012	004	0.507	No	No	No
CAS04-SD21-1012	005	0.712	No	No	No
CAS04-SD22-1012	006	0.563	No	No	No

Table 10. Day 28 *Hyalella azteca* Dry Biomass Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 28 Dry Biomass Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	2	0.721	0.570	0.872	29.62%
CAREFS04-SD02-1012	22654-008	007	4	0.531	0.436	0.671	19.73%
CAREFS04-SD04-1012	22654-009	008	4	0.525	0.441	0.580	11.31%
CAS04-SD20-1012	22654-001	001	3	0.519	0.476	0.553	7.59%
CAS04-SD19-1012	22654-002	002	3	0.703	0.659	0.777	9.21%
CAS04-SD18-1012	22654-003	003	4	0.436	0.301	0.566	24.94%
CAS04-SD23-1012	22654-004	004	4	0.507	0.376	0.667	24.67%
CAS04-SD21-1012	22654-005	005	4	0.644	0.439	0.741	21.75%
CAS04-SD22-1012	22654-006	006	4	0.533	0.444	0.625	15.27%

Day 28 Dry Biomass Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	0.531	No	-	-
CAREFS04-SD04-1012	008	0.525	No	-	-
CAS04-SD20-1012	001	0.519	No	No	No
CAS04-SD19-1012	002	0.703	No	No	No
CAS04-SD18-1012	003	0.436	Yes	No	No
CAS04-SD23-1012	004	0.507	No	No	No
CAS04-SD21-1012	005	0.644	No	No	No
CAS04-SD22-1012	006	0.533	No	No	No

Table 11. Day 42 *Hyalella azteca* Dry Weight Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Dry Weight Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	0.898	0.653	1.172	23.37%
CAREFS04-SD02-1012	22654-008	007	7	0.878	0.730	0.978	10.32%
CAREFS04-SD04-1012	22654-009	008	8	0.887	0.551	1.065	18.67%
CAS04-SD20-1012	22654-001	001	8	0.942	0.728	1.111	15.29%
CAS04-SD19-1012	22654-002	002	8	0.863	0.740	1.050	11.90%
CAS04-SD18-1012	22654-003	003	8	0.814	0.528	1.242	26.76%
CAS04-SD23-1012	22654-004	004	8	0.854	0.760	0.980	9.73%
CAS04-SD21-1012	22654-005	005	8	1.059	0.810	1.194	11.96%
CAS04-SD22-1012	22654-006	006	8	0.866	0.693	1.024	12.62%

Day 42 Dry Weight Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	0.878	No	-	-
CAREFS04-SD04-1012	008	0.887	No	-	-
CAS04-SD20-1012	001	0.942	No	No	No
CAS04-SD19-1012	002	0.863	No	No	No
CAS04-SD18-1012	003	0.814	No	No / No*	No
CAS04-SD23-1012	004	0.854	No	No	No / No
CAS04-SD21-1012	005	1.059	No	No	No
CAS04-SD22-1012	006	0.866	No	No	No

* - No / No - Indicates that an outlier was present, results presented for data with and without outlier.

Table 12. Day 42 *Hyalella azteca* Dry Biomass Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Dry Biomass Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	0.783	0.588	1.132	24.82%
CAREFS04-SD02-1012	22654-008	007	7	0.752	0.630	0.926	13.16%
CAREFS04-SD04-1012	22654-009	008	8	0.804	0.386	1.039	23.94%
CAS04-SD20-1012	22654-001	001	8	0.744	0.101	1.100	38.89%
CAS04-SD19-1012	22654-002	002	8	0.763	0.637	0.945	13.90%
CAS04-SD18-1012	22654-003	003	8	0.683	0.422	0.994	28.75%
CAS04-SD23-1012	22654-004	004	8	0.682	0.560	0.826	14.46%
CAS04-SD21-1012	22654-005	005	8	0.860	0.567	1.194	24.60%
CAS04-SD22-1012	22654-006	006	8	0.739	0.540	0.954	15.65%

Day 42 Dry Biomass Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	0.752	No	-	-
CAREFS04-SD04-1012	008	0.804	No	-	-
CAS04-SD20-1012	001	0.744	No / No*	No / No	No / No
CAS04-SD19-1012	002	0.763	No	No	Yes / No
CAS04-SD18-1012	003	0.683	No	No	No
CAS04-SD23-1012	004	0.682	No	No	Yes / No*
CAS04-SD21-1012	005	0.860	No	No	No
CAS04-SD22-1012	006	0.739	No	No	Yes / No

* - No / No - Indicates that an outlier was present, results presented for data with and without outlier.

Table 13. Day 35 *Hyalella azteca* Juvenile Production per Amphipod* Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 35 Juvenile Production per Amphipod Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	1.4	0.4	2.8	66.33%
CAREFS04-SD02-1012	22654-008	007	7	1.6	0.2	5.8	122.40%
CAREFS04-SD04-1012	22654-009	008	8	1.9	0.4	2.7	40.59%
CAS04-SD20-1012	22654-001	001	8	2.1	0.8	3.5	51.38%
CAS04-SD19-1012	22654-002	002	8	1.4	0.1	2.6	75.27%
CAS04-SD18-1012	22654-003	003	8	1.3	0.2	3.6	83.81%
CAS04-SD23-1012	22654-004	004	8	0.9	0.0	2.1	103.80%
CAS04-SD21-1012	22654-005	005	8	2.2	0.0	5.0	74.65%
CAS04-SD22-1012	22654-006	006	8	0.7	0.0	1.4	66.18%

Day 35 Juvenile Production per Amphipod Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	1.6	No / No	-	-
CAREFS04-SD04-1012	008	1.9	No	-	-
CAS04-SD20-1012	001	2.1	No	No / No	No
CAS04-SD19-1012	002	1.4	No	No / No	No
CAS04-SD18-1012	003	1.3	No	No / No	No
CAS04-SD23-1012	004	0.9	No	No / No	Yes
CAS04-SD21-1012	005	2.2	No	No	No
CAS04-SD22-1012	006	0.7	Yes	No / No	Yes

*Note: The endpoint described here as “Day 35 *Hyalella azteca* Juvenile Production per Amphipod” is the equivalent to the CETIS endpoint identified as “35d Reproduction”.
It is calculated as: day 35 juveniles / day 35 survivors

Table 14. Total *Hyalella azteca* Juvenile Production per Day 42 Surviving Amphipods* Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Total Juvenile Production per Day 42 Surviving Amphipods Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	5.7	1.3	9.2	46.68%
CAREFS04-SD02-1012	22654-008	007	7	5.8	1.4	12.8	65.26%
CAREFS04-SD04-1012	22654-009	008	8	6.1	2.9	9.6	37.28%
CAS04-SD20-1012	22654-001	001	8	8.5	3.2	12.5	45.30%
CAS04-SD19-1012	22654-002	002	8	6.0	2.7	9.3	38.25%
CAS04-SD18-1012	22654-003	003	8	6.3	2.0	11.3	59.22%
CAS04-SD23-1012	22654-004	004	8	4.6	1.1	9.8	67.86%
CAS04-SD21-1012	22654-005	005	8	8.8	2.3	13.4	45.21%
CAS04-SD22-1012	22654-006	006	8	5.5	1.1	10.3	53.67%

Day 42 Total Juvenile Production per Day 42 Surviving Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	5.8	No	-	-
CAREFS04-SD04-1012	008	6.1	No	-	-
CAS04-SD20-1012	001	8.5	No	No	No
CAS04-SD19-1012	002	6.0	No	No	No
CAS04-SD18-1012	003	6.3	No	No	No
CAS04-SD23-1012	004	4.6	No	No	No
CAS04-SD21-1012	005	8.8	No	No	No
CAS04-SD22-1012	006	5.5	No	No	No

*Note: The endpoint described here as "Total *Hyalella azteca* Juvenile Production per Day 42 Surviving Amphipods" is the equivalent to the CETIS endpoint identified as "42d Reproduction-Overall ".
It is calculated as: day 35 + day 42 juveniles / day 42 survivors

Table 15. Day 42 *Hyalella azteca* Juvenile Production per Female Amphipod* Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Juvenile Production per Female Amphipod Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	7.5	0.7	14.3	52.52%
CAREFS04-SD02-1012	22654-008	007	7	8.6	3.0	11.5	33.52%
CAREFS04-SD04-1012	22654-009	008	8	6.6	2.5	11.0	45.36%
CAS04-SD20-1012	22654-001	001	8	9.8	3.0	15.4	41.32%
CAS04-SD19-1012	22654-002	002	8	9.5	6.1	14.0	27.21%
CAS04-SD18-1012	22654-003	003	8	8.9	1.8	16.8	51.71%
CAS04-SD23-1012	22654-004	004	8	7.3	2.7	10.8	33.54%
CAS04-SD21-1012	22654-005	005	8	11.3	5.8	16.3	33.98%
CAS04-SD22-1012	22654-006	006	8	8.0	3.3	13.0	37.37%

Day 42 Juvenile Production per Female Amphipod Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	8.6	No	-	-
CAREFS04-SD04-1012	008	6.6	No	-	-
CAS04-SD20-1012	001	9.8	No	No	No
CAS04-SD19-1012	002	9.5	No	No	No
CAS04-SD18-1012	003	8.9	No	No	No
CAS04-SD23-1012	004	7.3	No	No	No
CAS04-SD21-1012	005	11.3	No	No	No
CAS04-SD22-1012	006	8.0	No	No	No

*Note: The endpoint described here as “Day 42 *Hyalella azteca* Juvenile Production per Female Amphipod” is the equivalent to the CETIS endpoint identified as “42 d Juveniles per Female”.
It is calculated as: day 42 juveniles / day 42 females

Table 16. Total *Hyalella azteca* Juvenile Production per Female Amphipod* Summary and Statistical Analysis. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

Day 42 Total Juvenile Production per Female Amphipod Summary

Field ID	ESI Code	Sample Number	Reps	Mean	Minimum	Maximum	CV
Laboratory Control	22654-000	000	8	10.0	3.3	17.7	43.75%
CAREFS04-SD02-1012	22654-008	007	7	11.8	3.7	20.4	41.81%
CAREFS04-SD04-1012	22654-009	008	8	9.8	5.0	12.8	28.54%
CAS04-SD20-1012	22654-001	001	8	14.2	7.3	20.0	27.81%
CAS04-SD19-1012	22654-002	002	8	12.5	8.3	21.5	34.70%
CAS04-SD18-1012	22654-003	003	8	11.2	2.7	21.3	52.66%
CAS04-SD23-1012	22654-004	004	8	8.9	2.7	13.2	41.66%
CAS04-SD21-1012	22654-005	005	8	15.1	5.8	19.7	31.46%
CAS04-SD22-1012	22654-006	006	8	9.5	3.3	15.5	38.98%

Day 42 Total Juvenile Production per Female Amphipod Statistical Analysis

			Statistically Significant Difference as Compared to:		
Field ID	Sample Number	Mean	Laboratory Control (000)	CAREFS04-SD02-1012 (007)	CAREFS04-SD04-1012 (008)
CAREFS04-SD02-1012	007	11.8	No	-	-
CAREFS04-SD04-1012	008	9.8	No	-	-
CAS04-SD20-1012	001	14.2	No	No	No
CAS04-SD19-1012	002	12.5	No	No	No
CAS04-SD18-1012	003	11.2	No	No	No
CAS04-SD23-1012	004	8.9	No	No	No
CAS04-SD21-1012	005	15.1	No	No	No
CAS04-SD22-1012	006	9.5	No	No	No

*Note: The endpoint described here as “Total *Hyalella azteca* Juvenile Production per Female Amphipod ” is the equivalent to the CETIS endpoint identified as “42d Reproduction per Female ”.
It is calculated as: day 35 + day 42 juveniles / day 42 females

Table 17. Summary of Overlying Water Qualities. CTO-WE04, Cheatham Annex (CAX), Williamsburg, Virginia. January 2013.

	Field ID	Sample Number	Day	Conductivity (uS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
22654-000	Laboratory Control	000	0	323	68	92	ND
22654-001	CAS04-SD20-1012	001	0	346	78	110	0.29
22654-002	CAS04-SD19-1012	002	0	347	76	100	0.66
22654-003	CAS04-SD18-1012	003	0	349	78	100	0.5
22654-004	CAS04-SD23-1012	004	0	352	79	110	0.67
22654-005	CAS04-SD21-1012	005	0	358	80	110	0.62
22654-006	CAS04-SD22-1012	006	0	339	74	100	0.54
22654-008	CAREFS04-SD02-1012	007	0	343	77	100	0.49
22654-009	CAREFS04-SD04-1012	008	0	363	85	110	0.38
22654-000	Laboratory Control	000	7	339	65	86	ND
22654-001	CAS04-SD20-1012	001	7	356	69	93	ND
22654-002	CAS04-SD19-1012	002	7	348	66	91	ND
22654-003	CAS04-SD18-1012	003	7	360	73	99	ND
22654-004	CAS04-SD23-1012	004	7	355	69	92	ND
22654-005	CAS04-SD21-1012	005	7	374	75	99	ND
22654-006	CAS04-SD22-1012	006	7	364	71	97	ND
22654-008	CAREFS04-SD02-1012	007	7	350	78	100	ND
22654-009	CAREFS04-SD04-1012	008	7	386	92	120	ND
22654-000	Laboratory Control	000	14	371	66	92	ND
22654-001	CAS04-SD20-1012	001	14	396	77	110	ND
22654-002	CAS04-SD19-1012	002	14	399	75	110	ND
22654-003	CAS04-SD18-1012	003	14	448	85	120	ND
22654-004	CAS04-SD23-1012	004	14	394	76	110	ND
22654-005	CAS04-SD21-1012	005	14	439	91	130	ND
22654-006	CAS04-SD22-1012	006	14	403	75	130	ND
22654-008	CAREFS04-SD02-1012	007	14	366	73	100	ND
22654-009	CAREFS04-SD04-1012	008	14	400	85	110	ND
22654-000	Laboratory Control	000	21	345	62	90	ND
22654-001	CAS04-SD20-1012	001	21	353	71	100	ND
22654-002	CAS04-SD19-1012	002	21	351	69	100	ND
22654-003	CAS04-SD18-1012	003	21	364	74	110	ND
22654-004	CAS04-SD23-1012	004	21	392	80	120	ND
22654-005	CAS04-SD21-1012	005	21	397	82	120	ND
22654-006	CAS04-SD22-1012	006	21	400	78	130	ND
22654-008	CAREFS04-SD02-1012	007	21	361	73	110	ND
22654-009	CAREFS04-SD04-1012	008	21	378	81	120	ND
22654-000	Laboratory Control	000	28	312	55	85	ND
22654-001	CAS04-SD20-1012	001	28	324	65	100	ND
22654-002	CAS04-SD19-1012	002	28	321	62	98	ND
22654-003	CAS04-SD18-1012	003	28	324	65	120	ND
22654-004	CAS04-SD23-1012	004	28	349	73	110	ND
22654-005	CAS04-SD21-1012	005	28	353	75	120	ND
22654-006	CAS04-SD22-1012	006	28	360	75	120	ND
22654-008	CAREFS04-SD02-1012	007	28	350	68	110	ND
22654-009	CAREFS04-SD04-1012	008	28	414	85	160	ND
22654-000	Laboratory Control	000	35	326	56	88	0.21

	Field ID	Sample Number	Day	Conductivity (uS/cm)	Alkalinity (mg/L)	Hardness (mg/L)	Ammonia (mg/L)
22654-001	CAS04-SD20-1012	001	35	332	58	90	0.38
22654-002	CAS04-SD19-1012	002	35	331	56	89	0.24
22654-003	CAS04-SD18-1012	003	35	339	58	92	0.21
22654-004	CAS04-SD23-1012	004	35	340	59	91	0.21
22654-005	CAS04-SD21-1012	005	35	335	58	91	0.16
22654-006	CAS04-SD22-1012	006	35	340	58	91	0.23
22654-008	CAREFS04-SD02-1012	007	35	344	60	93	ND
22654-009	CAREFS04-SD04-1012	008	35	373	60	96	0.18
22654-000	Laboratory Control	000	42	320	56	92	ND
22654-001	CAS04-SD20-1012	001	42	324	56	91	ND
22654-002	CAS04-SD19-1012	002	42	323	56	91	ND
22654-003	CAS04-SD18-1012	003	42	318	57	92	ND
22654-004	CAS04-SD23-1012	004	42	323	56	90	ND
22654-005	CAS04-SD21-1012	005	42	325	57	93	ND
22654-006	CAS04-SD22-1012	006	42	328	58	92	ND
22654-008	CAREFS04-SD02-1012	007	42	327	56	90	ND
22654-009	CAREFS04-SD04-1012	008	42	338	57	94	ND

Additional water quality data are provided in Appendix A**.**

APPENDIX A: RAW DATA AND STATISTICAL SUPPORT

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Sample Key

Client: CH2M Hill
Project: CTO-WE04, Cheatham Annex
Study: 22654
Assay: Hyalella azteca 42 Day

Designation	LabID	Field ID	Sample Number	Sampled		Received	
	22654-000	Laboratory Control	000				
Test	22654-001	CAS04-SD20-1012	001	10/02/12	1325	10/03/12	1700
Test	22654-002	CAS04-SD19-1012	002	10/02/12	1250	10/03/12	1700
Test	22654-003	CAS04-SD18-1012	003	10/02/12	950	10/03/12	1700
Test	22654-004	CAS04-SD23-1012	004	10/02/12	1620	10/03/12	1700
Test	22654-005	CAS04-SD21-1012	005	10/02/12	1420	10/03/12	1700
Test	22654-006	CAS04-SD22-1012	006	10/02/12	1445	10/03/12	1700
Hold	22654-007	CAREFS04-SD05-1012	X	10/09/12	1015	10/10/12	1130
Test	22654-008	CAREFS04-SD02-1012	007	10/09/12	1450	10/10/12	1130
Test	22654-009	CAREFS04-SD04-1012	008	10/09/12	1120	10/10/12	1130
Hold	22654-010	CAREFS04-SD01-1012	X	10/09/12	1545	10/10/12	1130
Hold	22654-011	CAREFS04-SD03-1012	X	10/10/12	835	10/11/12	930

YSI 556 MPS Sample Reading Order

Study: 22654

Client: CH2M Hill

Project: CTO-WE04, Cheatham Annex

Reading Number	Field ID	Receipt Number	Sample Number
0	Laboratory Control	22595-000	000
1	CAS04-SD20-1012	22654-001	001
2	CAS04-SD19-1012	22654-002	002
3	CAS04-SD18-1012	22654-003	003
4	CAS04-SD23-1012	22654-004	004
5	CAS04-SD21-1012	22654-005	005
6	CAS04-SD22-1012	22654-006	006
7	CAREFS04-SD02-1012	22654-008	007
8	CAREFS04-SD04-1012	22654-009	008

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Start Date:	06 Nov-12 12:00	**Species:**	Hyalella azteca	**Sample Code:**	000
End Date:	04 Dec-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Sample Source:**	CTO-WE04, Cheatham Annex
Sample Date:	02 Nov-12 12:00	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control; 22654-000

Sample Code	Rep	Pos	# Exposed	28d Survival	35d Survival	42d Survival	28d Total Weight-mg	28d Tare Weight-mg
002	1	1	10	10	9	9		
001	1	2	10	9	8	8		
007	1	3	10	9	9	8		
005	1	4	10	10	10	10		
004	1	5	10	9	8	6		
000	1	6	10	10	9	9		
006	1	7	10	10	10	9		
003	1	8	10	10	9	8		
008	1	9	10	10	10	10		
006	2	10	10	10	10	10		
003	2	11	10	9	9	8		
005	2	12	10	9	10	10		
004	2	13	10	10	10	10		
001	2	14	10	10	10	10		
000	2	15	10	10	10	10		
008	2	16	10	9	9	9		
007	2	17	10	9	9	8		
002	2	18	10	10	10	10		
001	3	19	10	8	8	8		
000	3	20	10	10	9	8		
006	3	21	10	10	10	6		
008	3	22	10	10	9	8		
004	3	23	10	10	10	10		
005	3	24	10	10	9	9		
002	3	25	10	9	9	8		
003	3	26	10	10	10	10		
007	3	27	10	10	10	10		
000	4	28	10	9	8	8		
003	4	29	11	11	9	7		
005	4	30	10	9	8	8		
001	4	31	10	10	3	1		
006	4	32	10	9	8	7		
008	4	33	10	10	10	10		
007	4	34	10	10	9	8		
002	4	35	10	10	9	9		
004	4	36	10	10	9	9		
007	5	37	10	9	9	9		
006	5	38	13	13	13	13		
005	5	39	10	7	7	7		
008	5	40	10	10	10	10		
004	5	41	10	8	8	7		
000	5	42	10	10	10	10		
003	5	43	10	8	7	7		
002	5	44	10	9	9	9		
001	5	45	10	9	9	9		
008	6	46	10	9	7	7		
006	6	47	10	10	10	10		

Sample Code	Rep	Pos	# Exposed	28d Survival	35d Survival	42d Survival	28d Total Weight-mg	28d Tare Weight-mg
004	6	48	10	10	10	10		
001	6	49	10	9	9	9		
002	6	50	10	9	9	9		
000	6	51	10	10	10	8		
007	6	52	10	9	8	8		
003	6	53	10	10	10	10		
005	6	54	10	9	9	7		
007	7	55	10	9	9	9		
002	7	56	10	10	10	10		
008	7	57	10	10	10	10		
004	7	58	10	9	7	7		
006	7	59	10	9	9	9		
000	7	60	10	10	9	8		
001	7	61	10	10	10	9		
003	7	62	10	9	9	9		
005	7	63	10	9	9	9		
006	8	64	10	8	8	8		
005	8	65	10	8	5	5		
000	8	66	10	10	9	9		
008	8	67	10	9	9	8		
004	8	69	10	7	6	6		
003	8	70	11	11	11	10		
002	8	71	10	10	8	7		
001	8	72	10	10	10	10		
001	9	73	10	9			214.7	209.94
005	9	74	10	10			214.11	207.4
004	9	75	10	10			215.76	210.42
007	9	76	10	8			213.4	209.04
003	9	79	10	8			212.38	209.37
006	9	80	10	10			215.91	209.66
008	9	81	10	9			214.77	208.97
006	10	82	10	8			213.72	208.83
007	10	83	10	10			213.78	207.07
005	10	84	10	7			211.83	207.44
003	10	85	10	10			212.75	208.49
001	10	86	10	10			214.71	209.18
004	10	88	10	10			213.23	209.47
008	10	89	10	10			215.33	209.98
002	10	90	10	10			214.94	208.35
001	11	91	10	10			212.89	207.6
004	11	92	10	10			215.52	208.85
000	11	93	10	10			216.74	208.02
006	11	94	10	10			214.76	210.32
003	11	95	10	10			215.19	209.53
005	11	96	10	9			215.4	208.14
007	11	97	10	9			213.67	208.18
002	11	98	10	9			218.76	210.99
008	11	99	10	9			211.52	207.11
006	12	100	10	10			216.19	210.47
008	12	101	10	10			214.57	209.12
002	12	102	10	9			215.14	208.42
000	12	103	10	9			213.21	207.51

Sample Code	Rep	Pos	# Exposed	28d Survival	35d Survival	42d Survival	28d Total Weight-mg	28d Tare Weight-mg
003	12	104	10	9			214.3	209.8
007	12	106	10	9			213.49	208.81
005	12	107	10	10			214.07	206.66
004	12	108	10	10			213.29	208.8

CETIS Test Data Worksheet

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Test Code: 09-3564-3918/22654Ha

Sample Code	Rep	Pos	28d Pan Count	42d Total Weight-mg	42d Tare Weight-mg	42d Pan Count	35d # Young	42d # Young
002	1	1		219.83	210.38	9	2	28
001	1	2		218.35	209.46	8	28	63
007	1	3		218.16	210.34	8	8	21
005	1	4		220.6	208.66	10	26	43
004	1	5		215.85	210.25	6	7	33
000	1	6		218.18	209.48	9	25	58
006	1	7		217.25	209.43	9	5	14
003	1	8		221.04	211.1	8	18	67
008	1	9		220.24	210.9	10	27	44
006	2	10		219.8	210.26	10	14	62
003	2	11		214.34	210.12	8	5	11
005	2	12		219.69	210.14	10	0	23
004	2	13		216.23	208.51	10	12	86
001	2	14		219.89	208.89	10	13	42
000	2	15		216.85	210.31	10	8	25
008	2	16		217.94	209.5	9	4	44
007	2	17		218.37	210.68	8	52	50
002	2	18		219.57	210.79	10	1	26
001	3	19		218.56	210.31	8	23	77
000	3	20		220.51	211.13	8	4	26
006	3	21		215.84	210.44	6	10	52
008	3	22		219.59	211.07	8	23	27
004	3	23		218.36	210.1	10	21	45
005	3	24		219.69	210.1	9	20	98
002	3	25		218	210.45	8	18	25
003	3	26		219.42	210.12	10	36	77
007	3	27		219.09	209.83	10	9	69
000	4	28		219.05	210.65	8	10	43
003	4	29		216.23	210.19	7	2	23
005	4	30		220.36	211.11	8	40	54
001	4	31		212.37	211.36	1	9	3
006	4	32		217.97	210.8	7	6	39
008	4	33		218.65	211.06	10	16	62
007	4	34		218.39	211.31	8	2	22
002	4	35		216.82	210.16	9	15	43
004	4	36		218.25	211.19	9	5	27
007	5	37		217.83	211.26	9	16	45
006	5	38		219.78	210.77	13	3	68
005	5	39		218.67	210.86	7	23	71
008	5	40		221.56	211.17	10	17	15
004	5	41		216.84	210.89	7	0	8
000	5	42		221.1	209.78	10	26	51
003	5	43		216.03	210.08	7	6	27
002	5	44		217.74	210.53	9	18	66
001	5	45		218.99	210.68	9	10	19
008	6	46		213.93	210.07	7	10	10
006	6	47		217.06	209.26	10	7	55
004	6	48		218.01	210.41	10	21	41
001	6	49		218.66	211.08	9	12	73
002	6	50		217.21	210.2	9	2	47
000	6	51		217.28	211.28	8	8	2
007	6	52		216.17	209.87	8	2	9

Sample Code	Rep	Pos	28d Pan Count	42d Total Weight-mg	42d Tare Weight-mg	42d Pan Count	35d # Young	42d # Young
003	6	53		219.28	211.93	10	11	57
005	6	54		216.65	210.98	7	3	37
007	7	55		217.89	209.99	9	11	36
002	7	56		217.31	209.3	10	25	46
008	7	57		217.29	208.61	10	25	40
004	7	58		214.23	207.76	7	0	14
006	7	59		216.01	209.02	9	0	10
000	7	60		215.37	208.94	8	5	50
001	7	61		217.85	211.3	9	8	23
003	7	62		217.41	210.64	9	14	68
005	7	63		217.06	207.81	9	11	86
006	8	64		215.35	207.89	8	10	27
005	8	65		214.76	209.03	5	16	18
000	8	66		215.27	209.39	9	18	47
008	8	67		217.33	209.8	8	23	54
004	8	69		215.23	209.35	6	0	7
003	8	70		215.39	209.24	10	6	16
002	8	71		215.53	209.16	7	21	38
001	8	72		215.3	207.39	10	32	72
001	9	73	9					
005	9	74	10					
004	9	75	10					
007	9	76	8					
003	9	79	8					
006	9	80	10					
008	9	81	9					
006	10	82	8					
007	10	83	10					
005	10	84	7					
003	10	85	10					
001	10	86	10					
004	10	88	10					
008	10	89	10					
002	10	90	10					
001	11	91	10					
004	11	92	10					
000	11	93	10					
006	11	94	10					
003	11	95	10					
005	11	96	9					
007	11	97	9					
002	11	98	9					
008	11	99	9					
006	12	100	10					
008	12	101	10					
002	12	102	9					
000	12	103	9					
003	12	104	9					
007	12	106	9					
005	12	107	10					
004	12	108	10					

Sample Code	Rep	Pos	# Females	Notes
002	1	1	2	
001	1	2	5	
007	1	3	3	
005	1	4	4	
004	1	5	4	
000	1	6	8	
006	1	7	3	
003	1	8	4	
008	1	9	6	
006	2	10	8	
003	2	11	6	
005	2	12	4	
004	2	13	8	
001	2	14	4	
000	2	15	6	
008	2	16	4	
007	2	17	5	
002	2	18	3	
001	3	19	5	
000	3	20	3	
006	3	21	4	
008	3	22	5	
004	3	23	5	
005	3	24	6	
002	3	25	2	
003	3	26	7	
007	3	27	6	
000	4	28	3	
003	4	29	3	
005	4	30	5	
001	4	31	1	
006	4	32	4	
008	4	33	7	
007	4	34	2	
002	4	35	7	
004	4	36	5	
007	5	37	5	
006	5	38	8	
005	5	39	5	
008	5	40	5	
004	5	41	3	
000	5	42	6	
003	5	43	3	
002	5	44	8	
001	5	45	4	
008	6	46	4	
006	6	47	7	
004	6	48	5	
001	6	49	7	
002	6	50	5	
000	6	51	3	
007	6	52	3	

Sample Code	Rep	Pos	# Females	Notes
003	6	53	6	
005	6	54	3	
007	7	55	4	
002	7	56	5	
008	7	57	7	
004	7	58	2	
006	7	59	3	
000	7	60	6	
001	7	61	2	
003	7	62	6	
005	7	63	6	
006	8	64	3	
005	8	65	3	
000	8	66	6	
008	8	67	6	
004	8	69	1	
003	8	70	4	
002	8	71	5	
001	8	72	7	
001	9	73		
005	9	74		
004	9	75		
007	9	76		
003	9	79		
006	9	80		
008	9	81		
006	10	82		
007	10	83		
005	10	84		
003	10	85		
001	10	86		
004	10	88		
008	10	89		
002	10	90		
001	11	91		
004	11	92		
000	11	93		
006	11	94		
003	11	95		
005	11	96		
007	11	97		
002	11	98		
008	11	99		
006	12	100		
008	12	101		
002	12	102		
000	12	103		
003	12	104		
007	12	106		
005	12	107		
004	12	108		

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Daily Overlying Water Qualities

	Temp	DO Conc	pH	SpCond	Salinity
Mean:	22.22	7.82		362	0.17
Minimum:	21.21	2.41	6.76	312	0.15
Maximum:	22.85	10.25	8.38	638	0.31

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-000	Laboratory Control	000	0	11/07/2012 09:31:16	22.24	5.11	7.27	323	0.16
22654-001	CAS04-SD20-1012	001	0	11/07/2012 09:32:07	22.14	7.25	7.48	346	0.17
22654-002	CAS04-SD19-1012	002	0	11/07/2012 09:32:19	22.13	7.38	7.50	347	0.17
22654-003	CAS04-SD18-1012	003	0	11/07/2012 09:32:27	22.10	7.40	7.50	349	0.17
22654-004	CAS04-SD23-1012	004	0	11/07/2012 09:32:38	22.09	7.25	7.50	352	0.17
22654-005	CAS04-SD21-1012	005	0	11/07/2012 09:33:00	22.00	7.47	7.55	358	0.17
22654-006	CAS04-SD22-1012	006	0	11/07/2012 09:33:09	22.05	7.41	7.56	339	0.16
22654-008	CAREFS04-SD02-1012	007	0	11/07/2012 09:33:20	22.04	7.22	7.53	343	0.17
22654-009	CAREFS04-SD04-1012	008	0	11/07/2012 09:33:35	21.99	6.80	7.55	363	0.18
22654-000	Laboratory Control	000	1	11/08/2012 08:34:59	22.30	4.77	7.33	367	0.18
22654-001	CAS04-SD20-1012	001	1	11/08/2012 08:35:49	22.22	6.66	7.45	377	0.18
22654-002	CAS04-SD19-1012	002	1	11/08/2012 08:35:57	22.18	6.79	7.46	378	0.18
22654-003	CAS04-SD18-1012	003	1	11/08/2012 08:36:05	22.12	6.82	7.46	388	0.19
22654-004	CAS04-SD23-1012	004	1	11/08/2012 08:36:13	22.04	6.65	7.47	383	0.19
22654-005	CAS04-SD21-1012	005	1	11/08/2012 08:36:23	21.98	6.66	7.48	398	0.19
22654-006	CAS04-SD22-1012	006	1	11/08/2012 08:36:31	21.90	6.61	7.49	392	0.19
22654-008	CAREFS04-SD02-1012	007	1	11/08/2012 08:36:41	21.80	6.46	7.48	351	0.17
22654-009	CAREFS04-SD04-1012	008	1	11/08/2012 08:36:55	21.65	6.39	7.50	372	0.18
22654-000	Laboratory Control	000	2	11/09/2012 08:51:49	22.50	3.79	7.23	350	0.17
22654-001	CAS04-SD20-1012	001	2	11/09/2012 08:52:28	22.32	5.95	7.36	367	0.18
22654-002	CAS04-SD19-1012	002	2	11/09/2012 08:52:39	22.30	6.45	7.39	370	0.18
22654-003	CAS04-SD18-1012	003	2	11/09/2012 08:53:00	22.24	6.50	7.48	376	0.18
22654-004	CAS04-SD23-1012	004	2	11/09/2012 08:53:12	22.18	6.38	7.48	375	0.18
22654-005	CAS04-SD21-1012	005	2	11/09/2012 08:53:22	22.15	6.41	7.49	391	0.19
22654-006	CAS04-SD22-1012	006	2	11/09/2012 08:53:49	22.02	6.49	7.49	368	0.18
22654-008	CAREFS04-SD02-1012	007	2	11/09/2012 08:54:01	22.01	6.29	7.48	358	0.17
22654-009	CAREFS04-SD04-1012	008	2	11/09/2012 08:54:14	21.93	6.20	7.50	387	0.19
22654-000	Laboratory Control	000	3	11/10/2012 11:07:29	22.65	3.98	7.40	342	0.17
22654-001	CAS04-SD20-1012	001	3	11/10/2012 11:09:08	22.58	6.61	7.54	361	0.17
22654-002	CAS04-SD19-1012	002	3	11/10/2012 11:09:37	22.59	6.66	7.59	367	0.18
22654-003	CAS04-SD18-1012	003	3	11/10/2012 11:10:13	22.57	6.44	7.65	372	0.18
22654-004	CAS04-SD23-1012	004	3	11/10/2012 11:10:59	22.51	6.13	7.59	369	0.18
22654-005	CAS04-SD21-1012	005	3	11/10/2012 11:11:30	22.48	6.27	7.72	386	0.19
22654-006	CAS04-SD22-1012	006	3	11/10/2012 11:11:56	22.41	6.30	7.67	370	0.18
22654-008	CAREFS04-SD02-1012	007	3	11/10/2012 11:13:41	22.32	5.61	7.56	367	0.18
22654-009	CAREFS04-SD04-1012	008	3	11/10/2012 11:14:06	22.20	6.17	7.62	390	0.19
22654-000	Laboratory Control	000	4	11/11/2012 09:58:25	22.59	4.53	7.37	345	0.17

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-001	CAS04-SD20-1012	001	4	11/11/2012 09:59:33	22.50	6.70	7.54	356	0.17
22654-002	CAS04-SD19-1012	002	4	11/11/2012 09:59:54	22.43	6.68	7.52	360	0.17
22654-003	CAS04-SD18-1012	003	4	11/11/2012 10:00:20	22.41	6.55	7.55	371	0.18
22654-004	CAS04-SD23-1012	004	4	11/11/2012 10:00:47	22.34	6.35	7.52	361	0.17
22654-005	CAS04-SD21-1012	005	4	11/11/2012 10:01:12	22.31	6.31	7.65	374	0.18
22654-006	CAS04-SD22-1012	006	4	11/11/2012 10:01:31	22.29	6.31	7.61	375	0.18
22654-008	CAREFS04-SD02-1012	007	4	11/11/2012 10:01:56	22.24	6.26	7.56	389	0.19
22654-009	CAREFS04-SD04-1012	008	4	11/11/2012 10:02:13	22.16	6.31	7.61	415	0.20
22654-000	Laboratory Control	000	5	11/12/2012 09:25:43	22.54	4.21	7.42	339	0.16
22654-001	CAS04-SD20-1012	001	5	11/12/2012 09:26:26	22.46	5.63	7.56	345	0.17
22654-002	CAS04-SD19-1012	002	5	11/12/2012 09:26:40	22.40	6.49	7.59	352	0.17
22654-003	CAS04-SD18-1012	003	5	11/12/2012 09:26:51	22.37	6.56	7.59	362	0.17
22654-004	CAS04-SD23-1012	004	5	11/12/2012 09:27:05	22.30	6.49	7.60	350	0.17
22654-005	CAS04-SD21-1012	005	5	11/12/2012 09:27:14	22.27	6.45	7.67	363	0.18
22654-006	CAS04-SD22-1012	006	5	11/12/2012 09:27:24	22.23	6.46	7.70	378	0.18
22654-008	CAREFS04-SD02-1012	007	5	11/12/2012 09:27:35	22.17	6.39	7.66	382	0.18
22654-009	CAREFS04-SD04-1012	008	5	11/12/2012 09:27:49	22.08	6.49	7.71	397	0.19
22654-000	Laboratory Control	000	6	11/13/2012 09:30:34	22.74	3.27	7.16	334	0.16
22654-001	CAS04-SD20-1012	001	6	11/13/2012 09:31:16	22.71	5.35	7.25	341	0.16
22654-002	CAS04-SD19-1012	002	6	11/13/2012 09:31:24	22.69	5.81	7.28	339	0.16
22654-003	CAS04-SD18-1012	003	6	11/13/2012 09:31:33	22.68	6.28	7.30	356	0.17
22654-004	CAS04-SD23-1012	004	6	11/13/2012 09:31:43	22.65	6.19	7.31	342	0.17
22654-005	CAS04-SD21-1012	005	6	11/13/2012 09:31:53	22.62	6.11	7.39	354	0.17
22654-006	CAS04-SD22-1012	006	6	11/13/2012 09:32:03	22.59	6.17	7.44	359	0.17
22654-008	CAREFS04-SD02-1012	007	6	11/13/2012 09:32:14	22.56	6.12	7.44	356	0.17
22654-009	CAREFS04-SD04-1012	008	6	11/13/2012 09:32:24	22.48	5.95	7.41	388	0.19
22654-000	Laboratory Control	000	7	11/14/2012 10:16:21	22.26	4.47	6.81	339	0.16
22654-001	CAS04-SD20-1012	001	7	11/14/2012 10:17:31	22.19	6.87	7.34	356	0.17
22654-002	CAS04-SD19-1012	002	7	11/14/2012 10:17:51	22.11	7.60	7.47	348	0.17
22654-003	CAS04-SD18-1012	003	7	11/14/2012 10:18:27	22.06	6.68	7.39	360	0.17
22654-004	CAS04-SD23-1012	004	7	11/14/2012 10:18:50	21.96	6.54	7.36	355	0.17
22654-005	CAS04-SD21-1012	005	7	11/14/2012 10:19:14	21.93	6.81	7.88	374	0.18
22654-006	CAS04-SD22-1012	006	7	11/14/2012 10:19:36	21.84	6.80	7.75	364	0.18
22654-008	CAREFS04-SD02-1012	007	7	11/14/2012 10:19:56	21.72	6.46	7.50	350	0.17
22654-009	CAREFS04-SD04-1012	008	7	11/14/2012 10:20:08	21.59	6.42	7.42	386	0.19
22654-000	Laboratory Control	000	8	11/15/2012 09:04:49	22.16	3.86	6.98	323	0.16
22654-001	CAS04-SD20-1012	001	8	11/15/2012 09:05:28	22.03	4.87	7.06	337	0.16
22654-002	CAS04-SD19-1012	002	8	11/15/2012 09:05:40	21.96	5.98	7.25	336	0.16
22654-003	CAS04-SD18-1012	003	8	11/15/2012 09:05:52	21.84	6.77	7.36	343	0.17
22654-004	CAS04-SD23-1012	004	8	11/15/2012 09:06:15	21.74	6.33	7.40	340	0.16
22654-005	CAS04-SD21-1012	005	8	11/15/2012 09:06:28	21.68	6.29	7.66	351	0.17
22654-006	CAS04-SD22-1012	006	8	11/15/2012 09:06:45	21.61	6.41	7.77	344	0.17
22654-008	CAREFS04-SD02-1012	007	8	11/15/2012 09:07:04	21.43	6.24	7.59	337	0.16
22654-009	CAREFS04-SD04-1012	008	8	11/15/2012 09:07:31	21.29	6.08	7.50	362	0.17
22654-000	Laboratory Control	000	9	11/16/2012 10:09:53	22.45	3.91	6.76	341	0.16
22654-001	CAS04-SD20-1012	001	9	11/16/2012 10:10:42	22.42	5.59	7.14	363	0.18
22654-002	CAS04-SD19-1012	002	9	11/16/2012 10:10:53	22.37	6.19	7.46	357	0.17
22654-003	CAS04-SD18-1012	003	9	11/16/2012 10:11:04	22.28	7.42	7.68	365	0.18

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-004	CAS04-SD23-1012	004	9	11/16/2012 10:11:27	22.17	6.72	7.56	365	0.18
22654-005	CAS04-SD21-1012	005	9	11/16/2012 10:11:41	22.13	6.71	8.02	385	0.19
22654-006	CAS04-SD22-1012	006	9	11/16/2012 10:11:56	22.09	6.96	7.98	371	0.18
22654-008	CAREFS04-SD02-1012	007	9	11/16/2012 10:12:08	21.98	6.84	7.74	346	0.17
22654-009	CAREFS04-SD04-1012	008	9	11/16/2012 10:12:18	21.85	6.64	7.59	375	0.18
22654-000	Laboratory Control	000	10	11/17/2012 11:18:28	22.63	3.88	6.97	338	0.16
22654-001	CAS04-SD20-1012	001	10	11/17/2012 11:19:10	22.55	5.54	7.29	360	0.17
22654-002	CAS04-SD19-1012	002	10	11/17/2012 11:20:09	22.30	8.19	8.14	357	0.17
22654-003	CAS04-SD18-1012	003	10	11/17/2012 11:20:37	22.27	8.32	8.09	364	0.18
22654-004	CAS04-SD23-1012	004	10	11/17/2012 11:22:01	22.18	6.97	7.71	361	0.17
22654-005	CAS04-SD21-1012	005	10	11/17/2012 11:22:25	22.16	7.42	8.33	387	0.19
22654-006	CAS04-SD22-1012	006	10	11/17/2012 11:22:54	22.09	7.75	8.03	367	0.18
22654-008	CAREFS04-SD02-1012	007	10	11/17/2012 11:23:30	21.93	6.94	7.59	342	0.17
22654-009	CAREFS04-SD04-1012	008	10	11/17/2012 11:24:00	21.82	6.82	7.62	372	0.18
22654-000	Laboratory Control	000	11	11/18/2012 12:15:10	22.38	5.36	7.01	381	0.18
22654-001	CAS04-SD20-1012	001	11	11/18/2012 12:16:27	22.40	7.24	7.45	366	0.18
22654-002	CAS04-SD19-1012	002	11	11/18/2012 12:17:01	22.35	9.44	8.14	364	0.18
22654-003	CAS04-SD18-1012	003	11	11/18/2012 12:17:52	22.33	8.60	7.92	400	0.19
22654-004	CAS04-SD23-1012	004	11	11/18/2012 12:18:28	22.21	7.60	7.84	373	0.18
22654-005	CAS04-SD21-1012	005	11	11/18/2012 12:18:56	22.21	7.51	8.38	406	0.20
22654-006	CAS04-SD22-1012	006	11	11/18/2012 12:19:45	22.15	8.79	8.04	380	0.18
22654-008	CAREFS04-SD02-1012	007	11	11/18/2012 12:20:18	22.05	7.69	7.57	350	0.17
22654-009	CAREFS04-SD04-1012	008	11	11/18/2012 12:20:42	21.92	7.47	7.70	380	0.18
22654-000	Laboratory Control	000	12	11/19/2012 08:39:15	22.37	4.01	7.00	353	0.17
22654-001	CAS04-SD20-1012	001	12	11/19/2012 08:41:10	22.25	5.80	7.29	365	0.18
22654-002	CAS04-SD19-1012	002	12	11/19/2012 08:41:30	22.16	6.58	7.60	357	0.17
22654-003	CAS04-SD18-1012	003	12	11/19/2012 08:41:42	22.11	6.88	7.67	369	0.18
22654-004	CAS04-SD23-1012	004	12	11/19/2012 08:41:53	22.03	6.88	7.68	359	0.17
22654-005	CAS04-SD21-1012	005	12	11/19/2012 08:42:09	21.97	6.26	7.93	393	0.19
22654-006	CAS04-SD22-1012	006	12	11/19/2012 08:42:21	21.93	6.07	7.94	367	0.18
22654-008	CAREFS04-SD02-1012	007	12	11/19/2012 08:42:35	21.84	6.72	7.72	352	0.17
22654-009	CAREFS04-SD04-1012	008	12	11/19/2012 08:42:49	21.73	6.71	7.60	377	0.18
22654-000	Laboratory Control	000	12	11/19/2012 08:44:27	22.16	2.41	6.84	329	0.16
22654-000	Laboratory Control	000	13	11/20/2012 09:15:09	22.43	8.05	7.64	390	0.19
22654-001	CAS04-SD20-1012	001	13	11/20/2012 09:15:37	22.44	7.91	7.79	417	0.20
22654-002	CAS04-SD19-1012	002	13	11/20/2012 09:15:45	22.43	8.19	7.90	408	0.20
22654-003	CAS04-SD18-1012	003	13	11/20/2012 09:15:54	22.40	8.39	7.97	419	0.20
22654-004	CAS04-SD23-1012	004	13	11/20/2012 09:16:11	22.36	8.49	7.97	416	0.20
22654-005	CAS04-SD21-1012	005	13	11/20/2012 09:16:23	22.38	8.42	8.01	450	0.22
22654-006	CAS04-SD22-1012	006	13	11/20/2012 09:16:36	22.32	8.38	8.04	412	0.20
22654-008	CAREFS04-SD02-1012	007	13	11/20/2012 09:16:46	22.29	8.46	8.01	375	0.18
22654-009	CAREFS04-SD04-1012	008	13	11/20/2012 09:16:58	22.22	8.46	7.93	404	0.20
22654-000	Laboratory Control	000	14	11/21/2012 10:31:37	22.53	8.39	7.61	371	0.18
22654-001	CAS04-SD20-1012	001	14	11/21/2012 10:32:20	22.52	8.35	7.83	396	0.19
22654-002	CAS04-SD19-1012	002	14	11/21/2012 10:32:32	22.50	8.57	7.92	399	0.19
22654-003	CAS04-SD18-1012	003	14	11/21/2012 10:33:08	22.41	8.69	8.04	448	0.22
22654-004	CAS04-SD23-1012	004	14	11/21/2012 10:33:30	22.30	8.70	8.05	394	0.19
22654-005	CAS04-SD21-1012	005	14	11/21/2012 10:34:07	22.34	8.54	8.08	439	0.21

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-006	CAS04-SD22-1012	006	14	11/21/2012 10:34:15	22.27	8.57	8.07	403	0.19
22654-008	CAREFS04-SD02-1012	007	14	11/21/2012 10:34:26	22.16	8.73	8.02	366	0.18
22654-009	CAREFS04-SD04-1012	008	14	11/21/2012 10:34:36	22.10	8.76	7.98	400	0.19
22654-000	Laboratory Control	000	15	11/22/2012 11:18:27	22.67	7.88	7.60	360	0.17
22654-001	CAS04-SD20-1012	001	15	11/22/2012 11:20:18	22.59	8.23	7.85	376	0.18
22654-002	CAS04-SD19-1012	002	15	11/22/2012 11:20:38	22.60	8.27	7.89	368	0.18
22654-003	CAS04-SD18-1012	003	15	11/22/2012 11:20:51	22.63	8.27	7.89	394	0.19
22654-004	CAS04-SD23-1012	004	15	11/22/2012 11:21:29	22.54	5.33	7.60	377	0.18
22654-005	CAS04-SD21-1012	005	15	11/22/2012 11:23:22	22.44	8.21	7.81	416	0.20
22654-006	CAS04-SD22-1012	006	15	11/22/2012 11:23:47	22.52	8.26	7.82	388	0.19
22654-008	CAREFS04-SD02-1012	007	15	11/22/2012 11:24:03	22.45	8.33	7.84	359	0.17
22654-009	CAREFS04-SD04-1012	008	15	11/22/2012 11:24:16	22.39	8.34	7.84	392	0.19
22654-000	Laboratory Control	000	16	11/23/2012 12:24:53	22.72	8.12	7.73	341	0.16
22654-001	CAS04-SD20-1012	001	16	11/23/2012 12:25:28	22.71	8.06	7.89	360	0.17
22654-002	CAS04-SD19-1012	002	16	11/23/2012 12:25:55	22.65	8.26	7.96	360	0.17
22654-003	CAS04-SD18-1012	003	16	11/23/2012 12:26:15	22.66	8.26	7.98	377	0.18
22654-004	CAS04-SD23-1012	004	16	11/23/2012 12:27:04	22.38	6.83	7.84	373	0.18
22654-005	CAS04-SD21-1012	005	16	11/23/2012 12:27:23	22.58	7.21	7.92	405	0.20
22654-006	CAS04-SD22-1012	006	16	11/23/2012 12:27:39	22.59	7.95	7.97	397	0.19
22654-008	CAREFS04-SD02-1012	007	16	11/23/2012 12:27:51	22.55	8.19	7.97	351	0.17
22654-009	CAREFS04-SD04-1012	008	16	11/23/2012 12:28:12	22.09	8.58	7.96	384	0.19
22654-000	Laboratory Control	000	17	11/24/2012 08:45:43	22.79	8.59	7.74	336	0.16
22654-001	CAS04-SD20-1012	001	17	11/24/2012 08:46:25	22.83	8.37	7.85	357	0.17
22654-002	CAS04-SD19-1012	002	17	11/24/2012 08:46:48	22.75	8.54	7.97	353	0.17
22654-003	CAS04-SD18-1012	003	17	11/24/2012 08:47:00	22.73	8.56	7.98	364	0.18
22654-004	CAS04-SD23-1012	004	17	11/24/2012 08:47:18	22.61	7.13	7.83	364	0.18
22654-005	CAS04-SD21-1012	005	17	11/24/2012 08:47:49	22.43	8.09	7.80	397	0.19
22654-006	CAS04-SD22-1012	006	17	11/24/2012 08:48:03	22.53	8.21	7.91	391	0.19
22654-008	CAREFS04-SD02-1012	007	17	11/24/2012 08:48:11	22.50	8.33	7.94	354	0.17
22654-009	CAREFS04-SD04-1012	008	17	11/24/2012 08:48:20	22.36	8.48	7.93	383	0.18
22654-000	Laboratory Control	000	18	11/25/2012 13:57:06	22.49	7.86	7.83	365	0.18
22654-001	CAS04-SD20-1012	001	18	11/25/2012 13:57:58	21.70	8.58	7.86	366	0.18
22654-002	CAS04-SD19-1012	002	18	11/25/2012 13:58:21	22.44	8.27	7.97	359	0.17
22654-003	CAS04-SD18-1012	003	18	11/25/2012 13:58:46	22.53	8.20	7.94	369	0.18
22654-004	CAS04-SD23-1012	004	18	11/25/2012 13:59:06	22.42	8.25	7.91	375	0.18
22654-005	CAS04-SD21-1012	005	18	11/25/2012 13:59:22	22.47	8.22	7.93	406	0.20
22654-006	CAS04-SD22-1012	006	18	11/25/2012 13:59:41	22.38	8.20	7.94	400	0.19
22654-008	CAREFS04-SD02-1012	007	18	11/25/2012 14:00:03	22.33	8.28	7.93	356	0.17
22654-009	CAREFS04-SD04-1012	008	18	11/25/2012 14:00:48	22.06	8.40	7.96	378	0.18
22654-000	Laboratory Control	000	19	11/26/2012 12:18:55	22.46	8.00	7.80	364	0.18
22654-001	CAS04-SD20-1012	001	19	11/26/2012 12:19:40	22.58	7.85	7.56	356	0.17
22654-002	CAS04-SD19-1012	002	19	11/26/2012 12:19:48	22.52	7.98	7.70	353	0.17
22654-003	CAS04-SD18-1012	003	19	11/26/2012 12:19:56	22.50	8.15	7.85	365	0.18
22654-004	CAS04-SD23-1012	004	19	11/26/2012 12:20:11	22.46	8.13	7.90	389	0.19
22654-005	CAS04-SD21-1012	005	19	11/26/2012 12:20:20	22.46	8.09	7.92	407	0.20
22654-006	CAS04-SD22-1012	006	19	11/26/2012 12:20:30	22.38	7.84	7.90	394	0.19
22654-008	CAREFS04-SD02-1012	007	19	11/26/2012 12:20:47	22.08	7.35	7.85	358	0.17
22654-009	CAREFS04-SD04-1012	008	19	11/26/2012 12:21:05	22.17	8.17	8.00	380	0.18

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-000	Laboratory Control	000	20	11/27/2012 14:00:41	22.39	9.33	7.79	363	0.18
22654-001	CAS04-SD20-1012	001	20	11/27/2012 14:01:28	22.22	9.35	7.98	370	0.18
22654-002	CAS04-SD19-1012	002	20	11/27/2012 14:01:47	22.10	9.46	8.07	365	0.18
22654-003	CAS04-SD18-1012	003	20	11/27/2012 14:02:10	22.06	9.32	8.05	380	0.18
22654-004	CAS04-SD23-1012	004	20	11/27/2012 14:02:32	21.95	9.21	8.07	408	0.20
22654-005	CAS04-SD21-1012	005	20	11/27/2012 14:02:50	21.96	9.08	8.05	422	0.20
22654-006	CAS04-SD22-1012	006	20	11/27/2012 14:03:14	21.91	9.19	8.14	421	0.20
22654-008	CAREFS04-SD02-1012	007	20	11/27/2012 14:03:38	21.79	9.28	8.16	374	0.18
22654-009	CAREFS04-SD04-1012	008	20	11/27/2012 14:03:57	21.65	9.35	8.18	394	0.19
22654-000	Laboratory Control	000	21	11/28/2012 08:17:18	22.07	7.88	7.66	345	0.17
22654-001	CAS04-SD20-1012	001	21	11/28/2012 08:17:52	21.99	8.07	7.82	353	0.17
22654-002	CAS04-SD19-1012	002	21	11/28/2012 08:18:03	21.90	8.31	7.89	351	0.17
22654-003	CAS04-SD18-1012	003	21	11/28/2012 08:18:13	21.87	8.38	7.89	364	0.18
22654-004	CAS04-SD23-1012	004	21	11/28/2012 08:18:23	21.76	8.39	7.89	392	0.19
22654-005	CAS04-SD21-1012	005	21	11/28/2012 08:18:31	21.68	8.39	7.90	397	0.19
22654-006	CAS04-SD22-1012	006	21	11/28/2012 08:19:02	21.54	8.40	7.97	400	0.19
22654-008	CAREFS04-SD02-1012	007	21	11/28/2012 08:19:13	21.45	8.48	7.97	361	0.17
22654-009	CAREFS04-SD04-1012	008	21	11/28/2012 08:19:57	21.25	8.35	8.02	378	0.18
22654-000	Laboratory Control	000	22	11/29/2012 12:46:34	22.16	8.31	7.39	344	0.17
22654-001	CAS04-SD20-1012	001	22	11/29/2012 12:47:40	21.95	8.70	7.68	360	0.17
22654-002	CAS04-SD19-1012	002	22	11/29/2012 12:48:10	22.12	8.64	7.74	358	0.17
22654-003	CAS04-SD18-1012	003	22	11/29/2012 12:48:31	22.09	8.57	7.71	366	0.18
22654-004	CAS04-SD23-1012	004	22	11/29/2012 12:48:58	22.01	8.56	7.76	382	0.18
22654-005	CAS04-SD21-1012	005	22	11/29/2012 12:50:03	22.04	6.59	7.11	405	0.20
22654-006	CAS04-SD22-1012	006	22	11/29/2012 12:50:47	21.93	8.42	7.75	397	0.19
22654-008	CAREFS04-SD02-1012	007	22	11/29/2012 12:51:12	21.83	8.54	7.73	356	0.17
22654-009	CAREFS04-SD04-1012	008	22	11/29/2012 12:51:30	21.70	8.63	7.79	376	0.18
22654-000	Laboratory Control	000	23	11/30/2012 14:41:58	21.86	7.90	7.55	332	0.16
22654-001	CAS04-SD20-1012	001	23	11/30/2012 14:42:56	21.83	7.93	7.67	367	0.18
22654-002	CAS04-SD19-1012	002	23	11/30/2012 14:43:03	21.82	8.13	7.75	347	0.17
22654-003	CAS04-SD18-1012	003	23	11/30/2012 14:43:10	21.75	8.29	7.79	355	0.17
22654-004	CAS04-SD23-1012	004	23	11/30/2012 14:43:17	21.60	8.40	7.83	376	0.18
22654-005	CAS04-SD21-1012	005	23	11/30/2012 14:43:25	21.54	8.44	7.85	404	0.20
22654-006	CAS04-SD22-1012	006	23	11/30/2012 14:43:34	21.53	8.45	7.88	396	0.19
22654-008	CAREFS04-SD02-1012	007	23	11/30/2012 14:43:42	21.51	8.46	7.93	358	0.17
22654-009	CAREFS04-SD04-1012	008	23	11/30/2012 14:43:55	21.21	8.71	7.87	418	0.20
22654-000	Laboratory Control	000	24	12/01/2012 09:29:53	21.43	7.92	8.12	396	0.19
22654-001	CAS04-SD20-1012	001	24	12/01/2012 09:31:19	21.94	8.40	8.03	364	0.18
22654-002	CAS04-SD19-1012	002	24	12/01/2012 09:31:44	22.01	8.41	8.06	345	0.17
22654-003	CAS04-SD18-1012	003	24	12/01/2012 09:32:15	21.83	8.44	8.04	352	0.17
22654-004	CAS04-SD23-1012	004	24	12/01/2012 09:32:44	21.71	8.36	8.06	369	0.18
22654-005	CAS04-SD21-1012	005	24	12/01/2012 09:33:04	21.81	8.39	8.07	388	0.19
22654-006	CAS04-SD22-1012	006	24	12/01/2012 09:33:23	21.76	8.46	8.12	388	0.19
22654-008	CAREFS04-SD02-1012	007	24	12/01/2012 09:33:38	21.66	8.53	8.09	583	0.28
22654-009	CAREFS04-SD04-1012	008	24	12/01/2012 09:34:01	21.54	8.61	8.12	638	0.31
22654-000	Laboratory Control	000	25	12/02/2012 11:44:13	22.21	8.06	7.44	350	0.17
22654-001	CAS04-SD20-1012	001	25	12/02/2012 11:45:56	22.11	8.41	7.63	360	0.17

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-002	CAS04-SD19-1012	002	25	12/02/2012 11:46:24	22.15	8.53	7.82	349	0.17
22654-003	CAS04-SD18-1012	003	25	12/02/2012 11:46:45	21.96	8.55	7.82	360	0.17
22654-004	CAS04-SD23-1012	004	25	12/02/2012 11:47:09	21.83	8.56	7.86	383	0.19
22654-005	CAS04-SD21-1012	005	25	12/02/2012 11:47:47	21.87	8.50	7.91	401	0.19
22654-006	CAS04-SD22-1012	006	25	12/02/2012 11:48:04	21.84	8.59	7.97	400	0.19
22654-008	CAREFS04-SD02-1012	007	25	12/02/2012 11:48:22	21.70	8.67	7.93	470	0.23
22654-009	CAREFS04-SD04-1012	008	25	12/02/2012 11:48:41	21.58	8.73	7.96	529	0.26
22654-000	Laboratory Control	000	26	12/03/2012 13:34:55	22.77	8.07	7.74	344	0.17
22654-001	CAS04-SD20-1012	001	26	12/03/2012 13:35:42	22.80	7.66	7.74	360	0.17
22654-002	CAS04-SD19-1012	002	26	12/03/2012 13:35:53	22.82	8.05	7.84	354	0.17
22654-003	CAS04-SD18-1012	003	26	12/03/2012 13:36:02	22.80	8.27	7.89	363	0.18
22654-004	CAS04-SD23-1012	004	26	12/03/2012 13:36:12	22.75	8.34	7.91	393	0.19
22654-005	CAS04-SD21-1012	005	26	12/03/2012 13:36:21	22.74	8.34	7.94	408	0.20
22654-006	CAS04-SD22-1012	006	26	12/03/2012 13:36:29	22.72	8.34	7.99	408	0.20
22654-008	CAREFS04-SD02-1012	007	26	12/03/2012 13:36:37	22.67	8.41	8.02	412	0.20
22654-009	CAREFS04-SD04-1012	008	26	12/03/2012 13:36:46	22.62	8.46	7.99	465	0.22
22654-000	Laboratory Control	000	27	12/04/2012 08:06:09	22.19	8.08	7.13	341	0.16
22654-001	CAS04-SD20-1012	001	27	12/04/2012 08:06:46	22.25	7.82	7.43	357	0.17
22654-002	CAS04-SD19-1012	002	27	12/04/2012 08:07:02	22.26	8.22	7.64	353	0.17
22654-003	CAS04-SD18-1012	003	27	12/04/2012 08:07:12	22.16	8.34	7.68	359	0.17
22654-004	CAS04-SD23-1012	004	27	12/04/2012 08:08:00	21.90	8.28	7.78	392	0.19
22654-005	CAS04-SD21-1012	005	27	12/04/2012 08:08:24	22.01	8.28	7.86	397	0.19
22654-006	CAS04-SD22-1012	006	27	12/04/2012 08:08:35	21.97	8.32	7.89	397	0.19
22654-008	CAREFS04-SD02-1012	007	27	12/04/2012 08:08:52	21.83	8.46	7.88	388	0.19
22654-009	CAREFS04-SD04-1012	008	27	12/04/2012 08:09:13	21.78	8.46	7.95	453	0.22
22654-000	Laboratory Control	000	28	12/05/2012 08:01:27	22.76	8.19	7.37	312	0.15
22654-001	CAS04-SD20-1012	001	28	12/05/2012 08:02:03	22.80	8.13	7.61	324	0.16
22654-002	CAS04-SD19-1012	002	28	12/05/2012 08:02:18	22.80	8.42	7.74	321	0.15
22654-003	CAS04-SD18-1012	003	28	12/05/2012 08:02:41	22.76	8.39	7.78	324	0.16
22654-004	CAS04-SD23-1012	004	28	12/05/2012 08:03:06	22.70	8.38	7.79	349	0.17
22654-005	CAS04-SD21-1012	005	28	12/05/2012 08:03:13	22.70	8.35	7.80	353	0.17
22654-006	CAS04-SD22-1012	006	28	12/05/2012 08:03:22	22.68	8.40	7.85	360	0.17
22654-008	CAREFS04-SD02-1012	007	28	12/05/2012 08:03:43	22.51	8.56	7.88	350	0.17
22654-009	CAREFS04-SD04-1012	008	28	12/05/2012 08:04:14	22.49	8.56	7.98	414	0.20
22654-000	Laboratory Control	000	29	12/06/2012 08:38:34	22.15	8.20	7.70	324	0.16
22654-001	CAS04-SD20-1012	001	29	12/06/2012 08:39:57	22.19	8.43	7.79	337	0.16
22654-002	CAS04-SD19-1012	002	29	12/06/2012 08:40:31	22.16	8.47	7.79	328	0.16
22654-003	CAS04-SD18-1012	003	29	12/06/2012 08:40:44	22.03	8.52	7.80	329	0.16
22654-004	CAS04-SD23-1012	004	29	12/06/2012 08:44:02	21.90	8.44	7.76	332	0.16
22654-005	CAS04-SD21-1012	005	29	12/06/2012 08:44:38	21.95	8.56	7.77	331	0.16
22654-006	CAS04-SD22-1012	006	29	12/06/2012 08:45:09	21.94	8.56	7.77	333	0.16
22654-008	CAREFS04-SD02-1012	007	29	12/06/2012 08:45:29	21.97	8.53	7.78	335	0.16
22654-009	CAREFS04-SD04-1012	008	29	12/06/2012 08:45:44	21.92	8.52	7.78	336	0.16
22654-000	Laboratory Control	000	30	12/07/2012 09:32:06	22.16	8.44	7.80	336	0.16
22654-001	CAS04-SD20-1012	001	30	12/07/2012 09:32:34	22.10	8.17	7.76	335	0.16
22654-002	CAS04-SD19-1012	002	30	12/07/2012 09:32:44	22.06	8.38	7.75	328	0.16
22654-003	CAS04-SD18-1012	003	30	12/07/2012 09:32:55	21.96	8.53	7.75	334	0.16
22654-004	CAS04-SD23-1012	004	30	12/07/2012 09:33:10	21.89	8.65	7.73	334	0.16

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-005	CAS04-SD21-1012	005	30	12/07/2012 09:33:22	21.81	8.68	7.73	335	0.16
22654-006	CAS04-SD22-1012	006	30	12/07/2012 09:33:32	21.68	8.67	7.72	338	0.16
22654-008	CAREFS04-SD02-1012	007	30	12/07/2012 09:33:45	21.60	8.74	7.73	338	0.16
22654-009	CAREFS04-SD04-1012	008	30	12/07/2012 09:33:55	21.51	8.71	7.69	345	0.17
22654-000	Laboratory Control	000	31	12/08/2012 11:03:22	22.39	8.57	7.71	325	0.16
22654-001	CAS04-SD20-1012	001	31	12/08/2012 11:04:38	22.33	8.47	7.93	333	0.16
22654-002	CAS04-SD19-1012	002	31	12/08/2012 11:04:55	22.31	8.58	7.92	326	0.16
22654-003	CAS04-SD18-1012	003	31	12/08/2012 11:05:11	22.17	8.62	7.95	333	0.16
22654-004	CAS04-SD23-1012	004	31	12/08/2012 11:05:25	22.17	8.63	7.97	334	0.16
22654-005	CAS04-SD21-1012	005	31	12/08/2012 11:05:38	22.14	8.64	7.97	333	0.16
22654-006	CAS04-SD22-1012	006	31	12/08/2012 11:05:54	22.04	8.63	7.98	339	0.16
22654-008	CAREFS04-SD02-1012	007	31	12/08/2012 11:06:12	22.03	8.63	7.99	338	0.16
22654-009	CAREFS04-SD04-1012	008	31	12/08/2012 11:06:24	22.00	8.59	7.99	357	0.17
22654-000	Laboratory Control	000	32	12/09/2012 17:10:27	22.29	8.31	7.60	328	0.16
22654-001	CAS04-SD20-1012	001	32	12/09/2012 17:11:28	22.30	8.47	7.72	332	0.16
22654-002	CAS04-SD19-1012	002	32	12/09/2012 17:11:45	22.28	8.47	7.73	329	0.16
22654-003	CAS04-SD18-1012	003	32	12/09/2012 17:12:01	22.09	8.54	7.71	339	0.16
22654-004	CAS04-SD23-1012	004	32	12/09/2012 17:12:14	22.14	8.57	7.75	338	0.16
22654-005	CAS04-SD21-1012	005	32	12/09/2012 17:12:30	22.11	8.61	7.76	339	0.16
22654-006	CAS04-SD22-1012	006	32	12/09/2012 17:12:45	22.03	8.63	7.77	345	0.17
22654-008	CAREFS04-SD02-1012	007	32	12/09/2012 17:12:56	22.02	8.64	7.77	338	0.16
22654-009	CAREFS04-SD04-1012	008	32	12/09/2012 17:13:11	22.00	8.65	7.77	372	0.18
22654-000	Laboratory Control	000	33	12/10/2012 10:48:03	22.73	8.53	7.75	353	0.17
22654-001	CAS04-SD20-1012	001	33	12/10/2012 10:49:25	22.69	8.37	7.80	358	0.17
22654-002	CAS04-SD19-1012	002	33	12/10/2012 10:49:31	22.69	8.38	7.79	354	0.17
22654-003	CAS04-SD18-1012	003	33	12/10/2012 10:49:41	22.65	8.46	7.77	359	0.17
22654-004	CAS04-SD23-1012	004	33	12/10/2012 10:49:49	22.62	8.53	7.78	361	0.17
22654-005	CAS04-SD21-1012	005	33	12/10/2012 10:49:59	22.57	8.54	7.79	361	0.17
22654-006	CAS04-SD22-1012	006	33	12/10/2012 10:50:06	22.52	8.54	7.80	364	0.18
22654-008	CAREFS04-SD02-1012	007	33	12/10/2012 10:50:14	22.45	8.56	7.80	360	0.17
22654-009	CAREFS04-SD04-1012	008	33	12/10/2012 10:50:24	22.40	8.55	7.80	383	0.19
22654-000	Laboratory Control	000	34	12/11/2012 10:01:08	22.63	8.50	7.76	341	0.16
22654-001	CAS04-SD20-1012	001	34	12/11/2012 10:01:39	22.60	8.11	7.79	343	0.17
22654-002	CAS04-SD19-1012	002	34	12/11/2012 10:01:46	22.57	8.27	7.79	344	0.17
22654-003	CAS04-SD18-1012	003	34	12/11/2012 10:01:53	22.51	8.43	7.77	351	0.17
22654-004	CAS04-SD23-1012	004	34	12/11/2012 10:02:00	22.46	8.53	7.80	354	0.17
22654-005	CAS04-SD21-1012	005	34	12/11/2012 10:02:07	22.43	8.57	7.78	349	0.17
22654-006	CAS04-SD22-1012	006	34	12/11/2012 10:02:13	22.38	8.60	7.80	355	0.17
22654-008	CAREFS04-SD02-1012	007	34	12/11/2012 10:02:20	22.33	8.64	7.81	360	0.17
22654-009	CAREFS04-SD04-1012	008	34	12/11/2012 10:02:27	22.29	8.66	7.82	384	0.19
22654-000	Laboratory Control	000	35	12/12/2012 08:18:47	22.14	8.52	7.83	326	0.16
22654-001	CAS04-SD20-1012	001	35	12/12/2012 08:19:38	22.15	8.48	7.82	332	0.16
22654-002	CAS04-SD19-1012	002	35	12/12/2012 08:20:06	22.12	8.49	7.80	331	0.16
22654-003	CAS04-SD18-1012	003	35	12/12/2012 08:20:27	21.97	8.55	7.81	339	0.16
22654-004	CAS04-SD23-1012	004	35	12/12/2012 08:20:39	21.97	8.59	7.82	340	0.16
22654-005	CAS04-SD21-1012	005	35	12/12/2012 08:20:50	21.95	8.60	7.82	335	0.16
22654-006	CAS04-SD22-1012	006	35	12/12/2012 08:21:07	21.91	8.61	7.81	340	0.16
22654-008	CAREFS04-SD02-1012	007	35	12/12/2012 08:21:19	21.83	8.65	7.82	344	0.17

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-009	CAREFS04-SD04-1012	008	35	12/12/2012 08:21:30	21.76	8.65	7.82	373	0.18
22654-000	Laboratory Control	000	36	12/13/2012 13:35:59	22.49	8.46	7.74	327	0.16
22654-001	CAS04-SD20-1012	001	36	12/13/2012 13:36:28	22.60	8.17	7.83	329	0.16
22654-002	CAS04-SD19-1012	002	36	12/13/2012 13:36:41	22.57	8.34	7.81	327	0.16
22654-003	CAS04-SD18-1012	003	36	12/13/2012 13:36:49	22.54	8.39	7.82	331	0.16
22654-004	CAS04-SD23-1012	004	36	12/13/2012 13:36:58	22.52	8.46	7.83	334	0.16
22654-005	CAS04-SD21-1012	005	36	12/13/2012 13:37:06	22.51	8.48	7.84	333	0.16
22654-006	CAS04-SD22-1012	006	36	12/13/2012 13:37:15	22.47	8.48	7.84	337	0.16
22654-008	CAREFS04-SD02-1012	007	36	12/13/2012 13:37:31	22.45	8.46	7.86	337	0.16
22654-009	CAREFS04-SD04-1012	008	36	12/13/2012 13:37:43	22.36	8.46	7.86	341	0.16
22654-000	Laboratory Control	000	37	12/14/2012 08:50:04	22.35	8.51	7.87	324	0.16
22654-001	CAS04-SD20-1012	001	37	12/14/2012 08:50:45	22.41	8.00	7.93	324	0.16
22654-002	CAS04-SD19-1012	002	37	12/14/2012 08:50:51	22.40	8.24	7.91	325	0.16
22654-003	CAS04-SD18-1012	003	37	12/14/2012 08:50:57	22.37	8.38	7.90	327	0.16
22654-004	CAS04-SD23-1012	004	37	12/14/2012 08:51:04	22.34	8.49	7.90	329	0.16
22654-005	CAS04-SD21-1012	005	37	12/14/2012 08:51:10	22.33	8.53	7.90	327	0.16
22654-006	CAS04-SD22-1012	006	37	12/14/2012 08:51:17	22.28	8.56	7.87	328	0.16
22654-008	CAREFS04-SD02-1012	007	37	12/14/2012 08:51:29	22.26	8.55	7.88	324	0.16
22654-009	CAREFS04-SD04-1012	008	37	12/14/2012 08:51:38	22.22	8.55	7.87	329	0.16
22654-000	Laboratory Control	000	38	12/15/2012 08:44:13	22.37	8.72	8.20	332	0.16
22654-001	CAS04-SD20-1012	001	38	12/15/2012 08:45:39	22.35	8.30	8.17	331	0.16
22654-002	CAS04-SD19-1012	002	38	12/15/2012 08:45:55	22.30	8.56	8.08	327	0.16
22654-003	CAS04-SD18-1012	003	38	12/15/2012 08:46:10	22.24	8.63	8.10	328	0.16
22654-004	CAS04-SD23-1012	004	38	12/15/2012 08:46:30	22.25	8.61	8.09	329	0.16
22654-005	CAS04-SD21-1012	005	38	12/15/2012 08:46:49	22.22	8.61	8.08	327	0.16
22654-006	CAS04-SD22-1012	006	38	12/15/2012 08:47:00	22.16	8.62	8.08	331	0.16
22654-008	CAREFS04-SD02-1012	007	38	12/15/2012 08:47:21	22.17	8.57	8.11	323	0.16
22654-009	CAREFS04-SD04-1012	008	38	12/15/2012 08:47:30	22.12	8.55	8.10	328	0.16
22654-000	Laboratory Control	000	39	12/16/2012 07:41:11	22.06	8.85	7.93	330	0.16
22654-001	CAS04-SD20-1012	001	39	12/16/2012 07:42:08	22.08	8.64	7.93	332	0.16
22654-002	CAS04-SD19-1012	002	39	12/16/2012 07:42:17	22.11	8.70	7.94	328	0.16
22654-003	CAS04-SD18-1012	003	39	12/16/2012 07:42:27	22.06	8.71	7.94	330	0.16
22654-004	CAS04-SD23-1012	004	39	12/16/2012 07:42:37	22.01	8.74	7.95	330	0.16
22654-005	CAS04-SD21-1012	005	39	12/16/2012 07:42:45	21.99	8.71	7.94	330	0.16
22654-006	CAS04-SD22-1012	006	39	12/16/2012 07:42:55	21.91	8.74	7.91	335	0.16
22654-008	CAREFS04-SD02-1012	007	39	12/16/2012 07:43:03	21.82	8.78	7.92	332	0.16
22654-009	CAREFS04-SD04-1012	008	39	12/16/2012 07:43:12	21.72	8.83	7.95	341	0.16
22654-000	Laboratory Control	000	40	12/17/2012 09:04:09	21.97	8.70	7.92	327	0.16
22654-001	CAS04-SD20-1012	001	40	12/17/2012 09:04:36	22.11	8.56	8.03	329	0.16
22654-002	CAS04-SD19-1012	002	40	12/17/2012 09:04:45	22.12	8.62	7.97	327	0.16
22654-003	CAS04-SD18-1012	003	40	12/17/2012 09:04:53	22.03	8.65	7.92	330	0.16
22654-004	CAS04-SD23-1012	004	40	12/17/2012 09:05:01	21.94	8.71	7.89	330	0.16
22654-005	CAS04-SD21-1012	005	40	12/17/2012 09:05:08	21.89	8.73	7.86	333	0.16
22654-006	CAS04-SD22-1012	006	40	12/17/2012 09:05:15	21.84	8.74	7.90	339	0.16
22654-008	CAREFS04-SD02-1012	007	40	12/17/2012 09:05:22	21.78	8.78	7.91	334	0.16
22654-009	CAREFS04-SD04-1012	008	40	12/17/2012 09:05:28	21.72	8.84	7.95	346	0.17
22654-000	Laboratory Control	000	41	12/18/2012 09:41:27	22.83	10.25	8.17	320	0.15

LabID	Field ID	Sample Number	Day	DateTime M/D/Y	Temp C	DO Conc mg/L	pH SU	SpCond uS/cm	Salinity ppt
22654-001	CAS04-SD20-1012	001	41	12/18/2012 09:42:06	22.85	9.50	8.24	327	0.16
22654-002	CAS04-SD19-1012	002	41	12/18/2012 09:42:15	22.81	9.48	8.20	326	0.16
22654-003	CAS04-SD18-1012	003	41	12/18/2012 09:42:24	22.77	9.42	8.19	326	0.16
22654-004	CAS04-SD23-1012	004	41	12/18/2012 09:42:32	22.74	9.41	8.19	325	0.16
22654-005	CAS04-SD21-1012	005	41	12/18/2012 09:42:39	22.73	9.29	8.13	341	0.16
22654-006	CAS04-SD22-1012	006	41	12/18/2012 09:42:46	22.72	9.22	8.09	331	0.16
22654-008	CAREFS04-SD02-1012	007	41	12/18/2012 09:42:56	22.71	9.25	8.13	329	0.16
22654-009	CAREFS04-SD04-1012	008	41	12/18/2012 09:43:06	22.69	9.28	8.14	332	0.16
22654-000	Laboratory Control	000	42	12/19/2012 11:49:31	22.36	8.64	8.26	320	0.15
22654-001	CAS04-SD20-1012	001	42	12/19/2012 11:50:11	22.47	8.45	8.20	324	0.16
22654-002	CAS04-SD19-1012	002	42	12/19/2012 11:50:22	22.47	8.71	8.16	323	0.16
22654-003	CAS04-SD18-1012	003	42	12/19/2012 11:50:33	22.42	8.84	8.15	318	0.15
22654-004	CAS04-SD23-1012	004	42	12/19/2012 11:50:46	22.35	8.82	8.07	323	0.16
22654-005	CAS04-SD21-1012	005	42	12/19/2012 11:50:55	22.33	8.77	8.03	325	0.16
22654-006	CAS04-SD22-1012	006	42	12/19/2012 11:51:03	22.26	8.80	8.04	328	0.16
22654-008	CAREFS04-SD02-1012	007	42	12/19/2012 11:51:12	22.17	8.84	8.05	327	0.16
22654-009	CAREFS04-SD04-1012	008	42	12/19/2012 11:51:23	22.03	8.89	8.04	338	0.16

Hyalella azteca 42 Day Sediment Assay

Study: 22654	Client: CH2M Hill	Project: CTO-WE04, Cheatham Annex

Day	Date	Overlying Water Qualities Measured, Water Renewed and Chambers Fed		Notes
		Check	Initial	
0	11/07/12	✓	AM/JTP	
1	11/08/12	✓	AM/JTP	
2	11/09/12	✓	AM/JTP	
3	11/10/12	✓	ND / DM	
4	11/11/12	✓	JTP / ND	
5	11/12/12	✓	AM/JTP/DM	
6	11/13/12	✓	AM/JTP/DM	
7	11/14/12	✓	AM/JTP/DM	
8	11/15/12	✓	AM/JTP	
9	11/16/12	✓	AM/JTP	
10	11/17/12	✓	~/ND	
11	11/18/12	✓	ND/AM	
12	11/19/12	✓	AM/JTP	Lab replicate checked for DO. DO below 2.5mg/L. Air was added
13	11/20/12	✓	AM/JTP	
14	11/21/12	✓	ND/JTP AM	
15	11/22/12	✓	ND/CS	
16	11/23/12	✓	~	Readings taken on two test replicates accidently. Disregard final two data points.
17	11/24/12	✓	AM	
18	11/25/12	✓	JM/ND	
19	11/26/12	✓	AM/DM	
20	11/27/12	✓	JTP/DM	
21	11/28/12	✓	AM	
22	11/29/12	✓	ND	
23	11/30/12	✓	AM/JM	
24	12/1/12	✓	JM	
25	12/2/12	✓	ND	
26	12/3/12	✓	AM	
27	12/4/12	✓	AM	
28	12/5/12	✓	AM	

Alkalinity, Hardness, Ammonia & Sulfide on Days 0, 7, 14, 21, 28 TOC on Days 0 and 28	Day 0	Initial: AM
	Day 7	Initial: AM/JTP
	Day 14	Initial: ND
	Day 21	Initial: AM
	Day 28	Initial: AM

Notes:	23 °C	Overlying Water = MHR/Pond	Feed 1 mL of YCT	Aerate if DO is below 2.5 mg/L	Two Volume Additions Daily

Hyalella azteca 42 Day Sediment Assay

Study: 22654	Client: CH2M Hill	Project: CTO-WE04, Cheatham Annex

Day	Date	Overlying Water Qualities Measured, Water Renewed and Chambers Fed		Notes
		Check	Initial	
29	12/6/12	✓	AM	
30	12/7/12	✓	AM/JTP	
31	12/8/12	✓	JM	
32	12/9/12	✓	JM/ND	
33	12/10/12	✓	AM	
34	12/11/12	✓	AM/JTP	
35	12/12/12	✓	JTP/JM	
36	12/13/12	✓	AM/JTP	
37	12/14/12	✓	AM	
38	12/15/12	✓	JM	
39	12/16/12	✓	AM	
40	12/17/12	✓	AM	
41	12/18/12	✓	AM/JTP	
42	12/19/12	✓	AM	

Alkalinity, Hardness, Ammonia & Sulfide on Days 35 and 42	Day 35	Initial: AM
	Day 42	Initial: AM

Notes:	23 °C	Overlying Water = MHR/Pond	Feed 1 mL of YCT	Aerate if DO is below 2.5 mg/L	Two Volume Additions Daily

Hyalella azteca Sediment Evaluation
Initial Weight

Study Number: **22654**

Client: **CH2M Hill**

Project: **CTO-WE04, Cheatham Annex**

Start Date:

	REP	TARE WEIGHT (mg)	*H. azteca*+ FOIL (mg)	NET WEIGHT (mg)	# *H. azteca*	MEAN DRY WEIGHT PER Individual (mg)
START ORGANISMS	A	209.37	209.56	0.19	10	0.019
	B	207.85	208.00	0.15	10	0.015
	C	208.89	209.04	0.15	10	0.015
	D	209.66	209.80	0.14	10	0.014
RECORDED BY:		AM	AM	Overall Mean Dry Weight Per Individual:		
DATE:		11/07/12	11/08/12	0.016		

NOTES:

Hyalella azteca 42 Day Sediment Assay
Day 28 Recovery

STUDY: 22654 **PROJECT: CTO-WE04, Cheatham Annex**

DATE: 12/05/12 **CLIENT: CH2M Hill**

Sample Code	Sample Number	Rep	Pos	Survived	Initials
22654-002	002	1	1	10	RAM
22654-001	001	1	2	9	
22654-008	007	1	3	9	
22654-005	005	1	4	10	
22654-004	004	1	5	9	
22654-000	000	1	6	10	RAM
22654-006	006	1	7	10	
22654-003	003	1	8	10	
22654-009	008	1	9	10	
22654-006	006	2	10	10	
22654-003	003	2	11	9	RAM
22654-005	005	2	12	9	
22654-004	004	2	13	10	
22654-001	001	2	14	10	
22654-000	000	2	15	10	RAM
22654-009	008	2	16	9	
22654-008	007	2	17	9	
22654-002	002	2	18	10	
22654-001	001	3	19	8	
22654-000	000	3	20	10	RAM
22654-006	006	3	21	10	
22654-009	008	3	22	10	
22654-004	004	3	23	10	
22654-005	005	3	24	10	
22654-002	002	3	25	9	
22654-003	003	3	26	10	
22654-008	007	3	27	10	
22654-000	000	4	28	9	RAM
22654-003	003	4	29	11	SG
22654-005	005	4	30	9	
22654-001	001	4	31	10	
22654-006	006	4	32	9	
22654-009	008	4	33	10	
22654-008	007	4	34	10	
22654-002	002	4	35	10	
22654-004	004	4	36	10	
22654-008	007	5	37	8	
22654-006	006	5	38 ①	(10) 13 ~~8~~ RAM	
22654-005	005	5	39	7	RAM
22654-009	008	5	40 ②	(9) 10	RAM

① Counts conducted on 12/05/12 were done on live, moving animals and when checked again on 12/12/12 and 12/19/12 it was found that the replicate contained 13 animals instead of 10. The counts conducted on 12/19/12 were checked after animals were immobilized, confirming the total of 13 animals. RAM

② Counts conducted on 12/05/12 were done on live, moving animals and when checked again on 12/12/12 and 12/19/12 it was found that the replicate contained 10 animals instead of 9. The counts conducted on 12/19/12 were checked after animals were immobilized, confirming the total of 10 animals. RAM

Hyalella azteca 42 Day Sediment Assay
Day 28 Recovery

STUDY: 22654		PROJECT: CTO-WE04, Cheatham Annex			
DATE: 12/05/12		CLIENT: CH2M Hill			
Sample Code	**Sample Number**	**Rep**	**Pos**	**Survived**	**Initials**
22654-004	004	5	41	8	RAM
22654-000	000	5	42	10	RAM
22654-003	003	5	43	8	
22654-002	002	5	44	9	
22654-001	001	5	45	9	
22654-009	008	6	46	9	
22654-006	006	6	47	10	
22654-004	004	6	48	10	
22654-001	001	6	49	9	
22654-002	002	6	50	9	
22654-000	000	6	51	10	RAM
22654-008	007	6	52	9	
22654-003	003	6	53	10	
22654-005	005	6	54	9	
22654-008	007	7	55	9	
22654-002	002	7	56	10	
22654-009	008	7	57	10	
22654-004	004	7	58	9	
22654-006	006	7	59	9	EP
22654-000	000	7	60	10	RAM
22654-001	001	7	61	10	EP
22654-003	003	7	62	9	EP
22654-005	005	7	63	9	EP
22654-006	006	8	64	7	EP
22654-005	005	8	65	8	EP
22654-000	000	8	66	10	RAM
22654-009	008	8	67	9	EP
22654-008	007	8	68	37	EP
22654-004	004	8	69	7	EP
22654-003	003	8	70	11	EP
22654-002	002	8	71	10	EP
22654-001	001	8	72	10	EP
22654-001	001	9	73	9	EP
22654-005	005	9	74	10	EP
22654-004	004	9	75	10	EP
22654-008	007	9	76	8	EP
22654-000	000	9	77	35	RAM
22654-002	002	9	78	23	EP
22654-003	003	9	79	8	EP
22654-006	006	9	80	10	EP

Hyalella azteca 42 Day Sediment Assay
Day 28 Recovery

STUDY: 22654		PROJECT: CTO-WE04, Cheatham Annex			
DATE: 12/05/12		CLIENT: CH2M Hill			
Sample Code	**Sample Number**	**Rep**	**Pos**	**Survived**	**Initials**
22654-009	008	9	81	9	SG
22654-006	006	10	82	8	SG
22654-008	007	10	83	10	SG
22654-005	005	10	84	9	SG
22654-003	003	10	85	10	SG
22654-001	001	10	86	10	SG
22654-000	000	10	87	16	RAM
22654-004	004	10	88	10	SG
22654-009	008	10	89	10	SG
22654-002	002	10	90	10	SG
22654-001	001	11	91	10	SG
22654-004	004	11	92	10	SG
22654-000	000	11	93	10	RAM
22654-006	006	11	94	10	SG
22654-003	003	11	95	10	SG
22654-005	005	11	96	9	SG
22654-008	007	11	97	9	SG
22654-002	002	11	98	9	SG
22654-009	008	11	99	9	SG
22654-006	006	12	100	10	SG
22654-009	008	12	101	10	SG
22654-002	002	12	102	9	SG
22654-000	000	12	103 SG	~~9~~ 9	RAM
22654-003	003	12	104	9	SG
22654-001	001	12	105	15	SG
22654-008	007	12	106	9	SG
22654-005	005	12	107	10	SG
22654-004	004	12	108	10	SG

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Day 28 Dry Weight Data - AccuSeries Balance Output File
BALANCE: AccuSeries Model 225D
Serial #: 17008376

Date / Init:	01/03/13 JTP	12/05/12 RAM; 12/20/12 AM	Duplicates	
Position	**Total Wt (mg)**	**Tare Wt (mg)**	**Total Wt (mg)**	**Tare Wt (mg)**
073	214.70	209.94		
074	214.11	207.40		
075	215.76	210.42		
076	213.40	209.04		
077	223.18	208.27		
078	213.57	207.77		
079	212.38	209.37		
080	215.91	209.66	215.91	
081	214.77	208.97		
082	213.72	208.83		
083	213.78	207.07		
084	211.83	207.44	211.82	207.43
085	212.75	208.49		
086	214.71	209.18		
087	222.82	209.74		
088	213.23	209.47		
089	215.33	209.98		
090	214.94	208.35		
091	212.89	207.60		
092	215.52	208.85		
093	216.74	208.02		
094	214.76	210.32		
095	215.19	209.53		
096	215.40	208.14		
097	213.67	208.18		
098	218.76	210.99		
099	211.52	207.11		
100	216.19	210.47	214.58	210.47
101	214.57	209.12		
102	215.14	208.42		
103	213.21	207.51		
104	214.30	209.80		
105	212.63	208.23		
106	213.49	208.81		
107	214.07	206.66		
108	213.29	208.80	213.29	208.78

Hyalella azteca 42 Day Sediment Assay
Day 35 Survival Counts

STUDY: 22654			PROJECT: CTO-WE04, Cheatham Annex			
DATE: 12/12/12			CLIENT: CH2M Hill			
Sample Code	Sample Number	Rep	Pos	Adults	Juveniles	Initials
22654-002	002	1	1	9	2	JM
22654-001	001	1	2	8	28	
22654-008	007	1	3	9	8	
22654-005	005	1	4	10	26	
22654-004	004	1	5	8	7	
22654-000	000	1	6	9	25	
22654-006	006	1	7	10	5	
22654-003	003	1	8	9	18	
22654-009	008	1	9	10	27	
22654-006	006	2	10	10	14	
22654-003	003	2	11	9	3	
22654-005	005	2	12	10	0	
22654-004	004	2	13	10	12	
22654-001	001	2	14	10	13	
22654-000	000	2	15	10	8	
22654-009	008	2	16	9	4	
22654-008	007	2	17	9	52	
22654-002	002	2	18	10	1	
22654-001	001	3	19	8	23	
22654-000	000	3	20	9	4	
22654-006	006	3	21	10	10	
22654-009	008	3	22	9	23	
22654-004	004	3	23	10	21	
22654-005	005	3	24	9	20	
22654-002	002	3	25	9	18	
22654-003	003	3	26	10	36	
22654-008	007	3	27	10	9	
22654-000	000	4	28	8	10	
22654-003	003	4	29	9	2	
22654-005	005	4	30	8	40	
22654-001	001	4	31	3	9	
22654-006	006	4	32	8	6	
22654-009	008	4	33	10	16	
22654-008	007	4	34	9	2	
22654-002	002	4	35	9	15	
22654-004	004	4	36	9	5	
22654-008	007	5	37	9	16	
22654-006	006	5	38	13	3	
22654-005	005	5	39	7	23	
22654-009	008	5	40	10	17	

Hyalella azteca 42 Day Sediment Assay
Day 35 Survival Counts

STUDY: 22654			PROJECT: CTO-WE04, Cheatham Annex			
DATE: 12/12/12			CLIENT: CH2M Hill			
Sample Code	Sample Number	Rep	Pos	Adults	Juveniles	Initials
22654-004	004	5	41	8	0	JTP
22654-000	000	5	42	10	26	↓
22654-003	003	5	43	7	6	↓
22654-002	002	5	44	9	18	↓
22654-001	001	5	45	9	10	↓
22654-009	008	6	46 ①	(6) 7	10	↓
22654-006	006	6	47	10	7	↓
22654-004	004	6	48	10	21	↓
22654-001	001	6	49	9	12	↓
22654-002	002	6	50	9	2	↓
22654-000	000	6	51	10	8	↓
22654-008	007	6	52	8	2	↓
22654-003	003	6	53	10	11	↓
22654-005	005	6	54	9	3	↓
22654-008	007	7	55	9	11	↓
22654-002	002	7	56	10	25	↓
22654-009	008	7	57	10	25	↓
22654-004	004	7	58	7	0	↓
22654-006	006	7	59	9	0	↓
22654-000	000	7	60	9	5	↓
22654-001	001	7	61	10	8	↓
22654-003	003	7	62	9	14	↓
22654-005	005	7	63	9	11	↓
22654-006	006	8	64	8	10	↓
22654-005	005	8	65	5	16	↓
22654-000	000	8	66	9	18	↓
22654-009	008	8	67	9	23	↓
22654-008	007	8	68 ②	(32) 35	10	JM
22654-004	004	8	69	6	0	JTP
22654-003	003	8	70	11	6	↓
22654-002	002	8	71	8	21	↓
22654-001	001	8	72	10	32	JM

① Counts conducted on 12/12/12 were done on live, moving animals and when checked again on 12/19/12 it was found that the replicate contained 7 animals instead of 6. The counts conducted on 12/19/12 were checked after animals were immobilized, confirming the total of 7 animals. RAM

② Counts conducted on 12/12/12 were done on live, moving animals and when checked again on 12/19/12 it was found that the replicate contained 35 animals instead of 32. The counts conducted on 12/19/12 were checked after animals were immobilized, confirming the total of 35 animals. RAM

✓

Hyalella azteca 42 Day Sediment Assay
Day 42 Survival Counts

STUDY: 22654			PROJECT: CTO-WE04, Cheatham Annex				
DATE: 12/19/12			CLIENT: CH2M Hill				
Sample Code	Sample Number	Rep	Pos	Adults	Juveniles	Females	Initials
22654-002	002	1	1	9	28	2	AM
22654-001	001	1	2	8	63	5	
22654-008	007	1	3	8	21	3	
22654-005	005	1	4	10	43	4	
22654-004	004	1	5	6	33	4	
22654-000	000	1	6	9	58	8	
22654-006	006	1	7	9	14	3	
22654-003	003	1	8	8	67	4	
22654-009	008	1	9	10	44	6	
22654-006	006	2	10	10	62	8	
22654-003	003	2	11	8	11	6	
22654-005	005	2	12	10	23	4	
22654-004	004	2	13	10	86	8	
22654-001	001	2	14	10	42	4	
22654-000	000	2	15	10	25	6	
22654-009	008	2	16	9	44	4	
22654-008	007	2	17	8	50	5	
22654-002	002	2	18	10	26	3	
22654-001	001	3	19	8	77	5	
22654-000	000	3	20	8	26	3	
22654-006	006	3	21	6	52	4	
22654-009	008	3	22	8	27	5	
22654-004	004	3	23	10	45	5	
22654-005	005	3	24	9	98	6	
22654-002	002	3	25	8	25	2	
22654-003	003	3	26	10	77	7	
22654-008	007	3	27	10	69	6	
22654-000	000	4	28	8	43	3	
22654-003	003	4	29	7	23	3	
22654-005	005	4	30	8	54	5	
22654-001	001	4	31	1	3	1	
22654-006	006	4	32	7	39	4	
22654-009	008	4	33	10	62	7	
22654-008	007	4	34	8	22	2	
22654-002	002	4	35	9	43	7	
22654-004	004	4	36	9	27	5	
22654-008	007	5	37	9	45	5	
22654-006	006	5	38	13	68	8	
22654-005	005	5	39	7	71	5	
22654-009	008	5	40	10	15	5	

Hyalella azteca 42 Day Sediment Assay
Day 42 Survival Counts

STUDY: 22654		PROJECT: CTO-WE04, Cheatham Annex					
DATE: 12/19/12				CLIENT: CH2M Hill			
Sample Code	Sample Number	Rep	Pos	Adults	Juveniles	Females	Initials
22654-004	004	5	41	~~7~~ ~~10~~ ~~7~~	~~15~~ 8	3	DM
22654-000	000	5	42	~~0~~ 10	51	6	
22654-003	003	5	43	7	77	3	
22654-002	002	5	44	9	66	8	
22654-001	001	5	45	9	19	4	
22654-009	008	6	46	7	10	4	
22654-006	006	6	47	10	55	7	
22654-004	004	6	48	10	41	5	
22654-001	001	6	49	9	73	7	
22654-002	002	6	50	9	47	5	
22654-000	000	6	51	8	2	3	
22654-008	007	6	52	8	9	3	
22654-003	003	6	53	10	57	6	
22654-005	005	6	54	7	37	3	
22654-008	007	7	55	9	36	4	
22654-002	002	7	56	10	46	5	
22654-009	008	7	57	10	40	7	
22654-004	004	7	58	7	14	2	
22654-006	006	7	59	9	10	3	
22654-000	000	7	60	8	50	6	
22654-001	001	7	61	9 ~~8~~	~~54~~ 23	2	AM
22654-003	003	7	62	9 ~~35~~	~~27~~ 68	6	
22654-005	005	7	63	9	86	6	
22654-006	006	8	64	8	27	3	
22654-005	005	8	65	5	18	3	
22654-000	000	8	66	9	47	6	
22654-009	008	8	67	8	54	6	DM
22654-008	007	8	68	35	21	23	
22654-004	004	8	69	6	7	1	
22654-003	003	8	70	10	16	4	
22654-002	002	8	71	7	38	5	
22654-001	001	8	72	10	72	7	

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Day 42 Dry Weight Data - AccuSeries Balance Output File
BALANCE: AccuSeries Model 225D
Serial #: 17008376

Date / Init:	01/03/13 JTP	12/05/12 RAM; 12/20/12 AM	Duplicates	
Position	**Total Wt (mg)**	**Tare Wt (mg)**	**Total Wt (mg)**	**Tare Wt (mg)**
001	219.83	210.38		
002	218.35	209.46		
003	218.16	210.34		
004	220.60	208.66		
005	215.85	210.25		
006	218.18	209.48		
007	217.25	209.43		
008	221.04	211.10		
009	220.24	210.90		
010	219.80	210.26		
011	214.34	210.12		
012	219.69	210.14		
013	216.23	208.51		
014	219.89	208.89		
015	216.85	210.31		
016	217.94	209.50		
017	218.37	210.68		
018	219.57	210.79		
019	218.56	210.31		
020	220.51	211.13	220.51	
021	215.84	210.44		
022	219.59	211.07		
023	218.36	210.10		
024	219.69	210.10		
025	218.00	210.45		
026	219.42	210.12		
027	219.09	209.83		
028	219.05	210.65		
029	216.23	210.19		
030	220.36	211.11		
031	212.37	211.36		
032	217.97	210.80		
033	218.65	211.06		
034	218.39	211.31		
035	216.82	210.16		
036	218.25	211.19		
037	217.83	211.26		
038	219.78	210.77		
039	218.67	210.86		
040	221.56	211.17	221.57	
041	216.84	210.89		
042	221.10	209.78		
043	216.03	210.08		
044	217.74	210.53		
045	218.99	210.68		

TASK: Day 42 Dry Weight Data - AccuSeries Balance Output File
BALANCE: AccuSeries Model 225D
Serial #: 17008376

Date / Init:	01/03/13 JTP	12/05/12 RAM; 12/20/12 AM	Duplicates	
Position	**Total Wt (mg)**	**Tare Wt (mg)**	**Total Wt (mg)**	**Tare Wt (mg)**
046	213.93	210.07		
047	217.06	209.26		
048	218.01	210.41		
049	218.66	211.08		
050	217.21	210.20		
051	217.28	211.28		
052	216.17	209.87		
053	219.28	211.93		
054	216.65	210.98		
055	217.89	209.99		
056	217.31	209.30		
057	217.29	208.61		
058	214.23	207.76		
059	216.01	209.02		
060	215.37	208.94	215.37	
061	217.85	211.30		
062	217.41	210.64		
063	217.06	207.81		
064	215.35	207.89		
065	214.76	209.03	214.76	209.03
066	215.27	209.39		
067	217.33	209.80		
068	218.11	208.50		
069	215.23	209.35		
070	215.39	209.24		
071	215.53	209.16		
072	215.30	207.39		

CETIS Analytical Reports
Day 28 Survival Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date:	08 Jan-13 15:54 (p 1 of 2)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-0233-1899	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
01-8675-2828	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
03-6886-5075	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
06-9974-0110	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
16-2084-5087	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
16-5723-6009	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
16-9552-0088	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria
21-0415-4096	28d Proportion Survived	Control Resp	0.98	0.8 - NL	Yes	Passes Acceptability Criteria

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	10	0.98	0.9498	1	0.9	1	0.01333	0.04216	4.3%	0.0%
007	11	0.9182	0.8777	0.9587	0.8	1	0.01818	0.0603	6.57%	6.31%
008	12	0.9583	0.9256	0.9911	0.9	1	0.01486	0.05149	5.37%	2.21%
001	11	0.9455	0.8993	0.9916	0.8	1	0.02073	0.06876	7.27%	3.53%
002	11	0.9545	0.9195	0.9896	0.9	1	0.01575	0.05222	5.47%	2.6%
003	12	0.9417	0.8913	0.992	0.8	1	0.02289	0.0793	8.42%	3.91%
004	12	0.9417	0.8784	1	0.7	1	0.02876	0.09962	10.58%	3.91%
005	12	0.8917	0.8228	0.9605	0.7	1	0.03128	0.1084	12.15%	9.01%
006	12	0.95	0.8993	1	0.8	1	0.02303	0.07977	8.4%	3.06%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
001	0.9	1	0.8	1	0.9	0.9	1	1	0.9	1
	1									
002	1	1	0.9	1	0.9	0.9	1	1	1	0.9
	0.9									
003	1	0.9	1	1	0.8	1	0.9	1	0.8	1
	1	0.9								
004	0.9	1	1	1	0.8	1	0.9	0.7	1	1
	1	1								
005	1	0.9	1	0.9	0.7	0.9	0.9	0.8	1	0.7
	0.9	1								
006	1	1	1	0.9	1	1	0.9	0.8	1	0.8
	1	1								

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-6886-5075	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.08%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		006	128	NA	2	20	0.2291	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.275	2.758	0.3470	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01043596	0.01043596	1	0.9847	0.3329	Non-Significant Effect
Error	0.2119641	0.0105982	20			
Total	0.2224		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.263	6.314	0.0865	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7682	0.8757	0.0002	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
006	12	0.95	0.8993	1	1	0.8	1	0.02303	8.4%	3.06%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
006	12	1.336	1.257	1.415	1.412	1.107	1.432	0.03583	9.29%	3.17%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
006	1	1	1	0.9	1	1	0.9	0.8	1	0.8
	1	1								

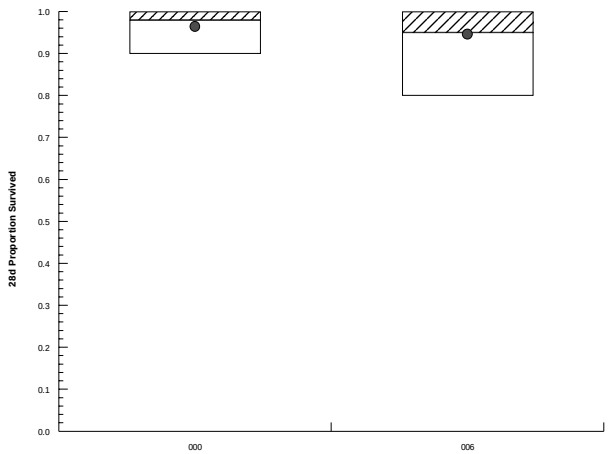
Angular (Corrected) Transformed Detail

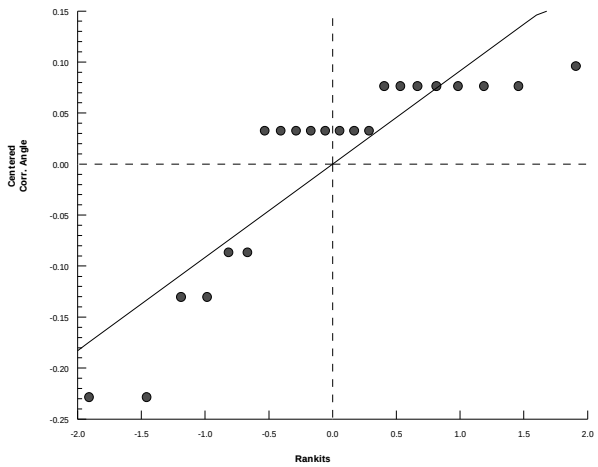
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
006	1.412	1.412	1.412	1.249	1.432	1.412	1.249	1.107	1.412	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-6886-5075	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-0233-1899	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.87%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		005	107	NA	2	20	0.0166	Exact	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.147	2.758	0.5265	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09340422	0.09340422	1	6.188	0.0218	Significant Effect
Error	0.3018779	0.01509389	20			
Total	0.3952821		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.994	6.314	0.0226	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8623	0.8757	0.0057	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
005	12	0.8917	0.8228	0.9605	0.9	0.7	1	0.03128	12.15%	9.01%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
005	12	1.249	1.151	1.346	1.249	0.9912	1.412	0.04433	12.3%	9.49%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
005	1	0.9	1	0.9	0.7	0.9	0.9	0.8	1	0.7
	0.9	1								

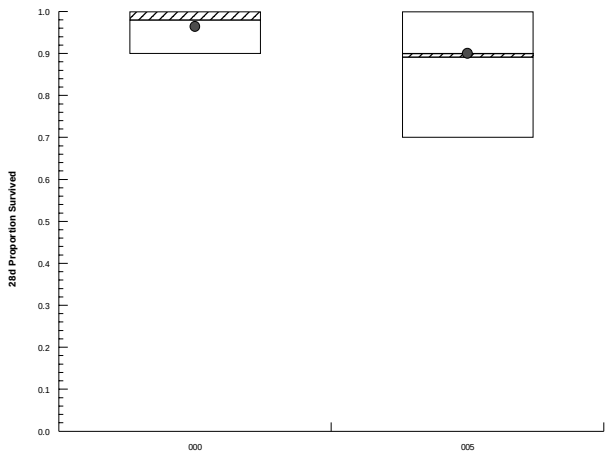
Angular (Corrected) Transformed Detail

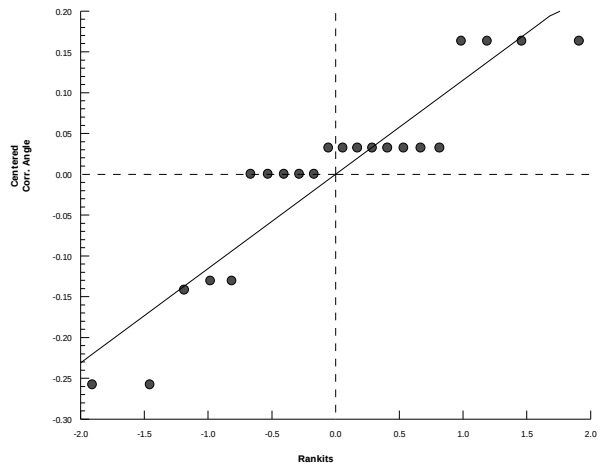
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
005	1.412	1.249	1.412	1.249	0.9912	1.249	1.249	1.107	1.412	0.9912

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-0233-1899	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	21-0415-4096	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.65%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		004	116	NA	2	19	0.4502	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00320921	0.00320921	1	0.4001	0.5346	Non-Significant Effect
Error	0.1523833	0.008020173	19			
Total	0.1555925		20			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.327	6.417	0.2193	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.6749	0.871	<0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
004	11	0.9636	0.9183	1	1	0.8	1	0.02033	7.0%	1.67%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
004	11	1.355	1.284	1.425	1.412	1.107	1.412	0.03161	7.74%	1.79%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
004	0.9	1	1	1	0.8	1	0.9	Outlier	1	1
	1	1								

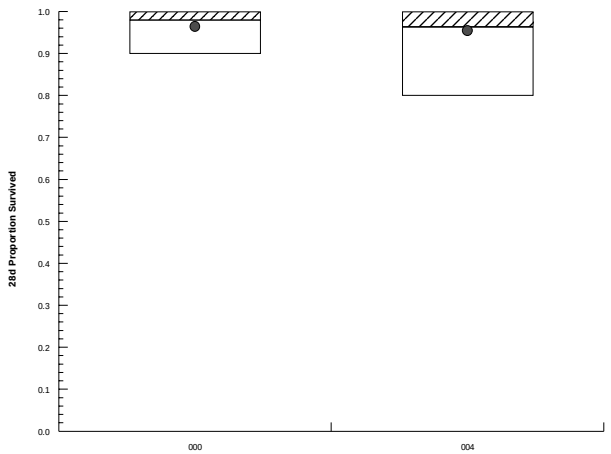
Angular (Corrected) Transformed Detail

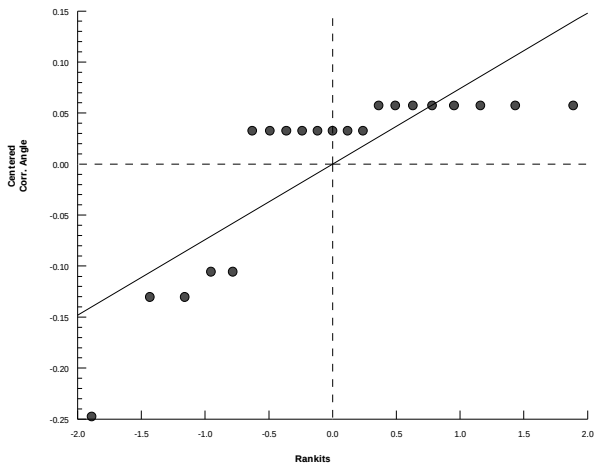
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
004	1.249	1.412	1.412	1.412	1.107	1.412	1.249	1.412	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	21-0415-4096	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-2084-5087	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.63%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		004	128	NA	2	20	0.2291	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.92	2.758	0.0221	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01652695	0.01652695	1	1.208	0.2847	Non-Significant Effect
Error	0.2735134	0.01367567	20			
Total	0.2900403		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.448	6.314	0.0332	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7582	0.8757	0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
004	12	0.9417	0.8784	1	1	0.7	1	0.02876	10.58%	3.91%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
004	12	1.324	1.232	1.416	1.412	0.9912	1.412	0.04183	10.94%	3.99%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
004	0.9	1	1	1	0.8	1	0.9	0.7	1	1
	1	1								

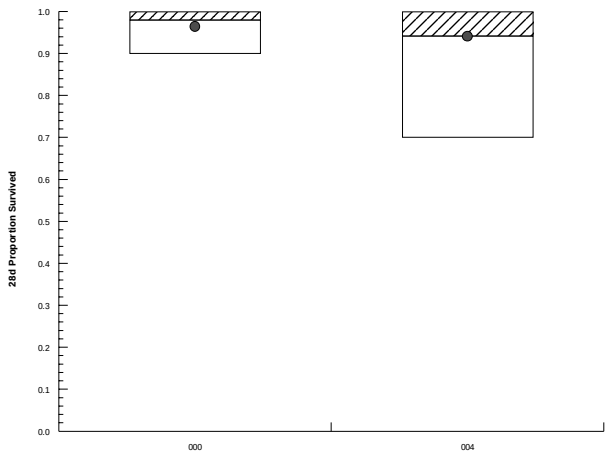
Angular (Corrected) Transformed Detail

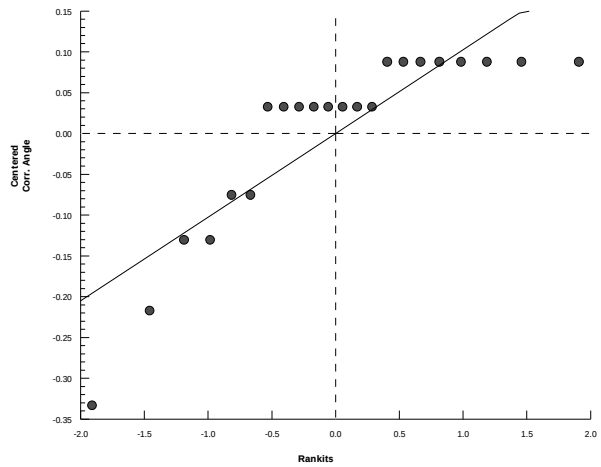
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
004	1.249	1.412	1.412	1.412	1.107	1.412	1.249	0.9912	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-2084-5087	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9552-0088	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.07%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		003	123	NA	2	20	0.1130	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.144	2.758	0.5313	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0181714	0.0181714	1	1.728	0.2035	Non-Significant Effect
Error	0.2102958	0.01051479	20			
Total	0.2284672		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.231	6.314	0.0890	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8255	0.8757	0.0013	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
003	12	0.9417	0.8913	0.992	1	0.8	1	0.02289	8.42%	3.91%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
003	12	1.322	1.243	1.4	1.412	1.107	1.419	0.03565	9.35%	4.18%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
003	1	0.9	1	1	0.8	1	0.9	1	0.8	1
	1	0.9								

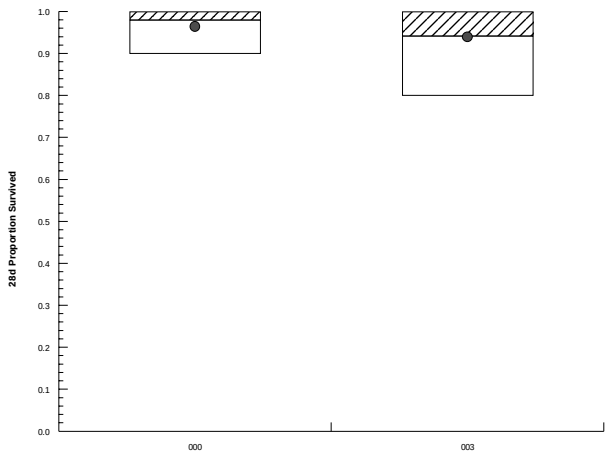
Angular (Corrected) Transformed Detail

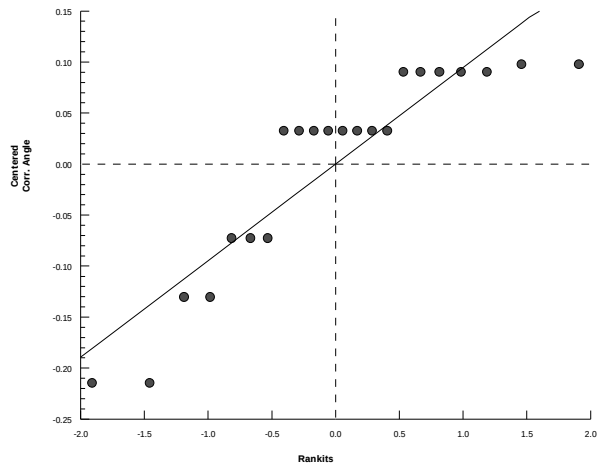
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
003	1.412	1.249	1.412	1.419	1.107	1.412	1.249	1.419	1.107	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9552-0088	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5723-6009	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.21%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		002	107	NA	2	19	0.1401	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.72	2.734	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009014077	0.009014077	1	1.49	0.2371	Non-Significant Effect
Error	0.1149295	0.00604892	19			
Total	0.1239436		20			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.534	6.417	0.5318	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7862	0.871	0.0004	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
002	11	0.9545	0.9195	0.9896	1	0.9	1	0.01575	5.47%	2.6%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
002	11	1.338	1.281	1.395	1.412	1.249	1.412	0.02566	6.36%	3.01%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
002	1	1	0.9	1	0.9	0.9	1	1	1	0.9
	0.9									

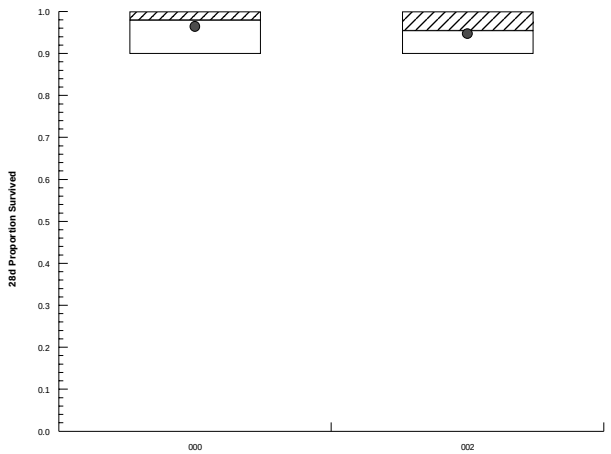
Angular (Corrected) Transformed Detail

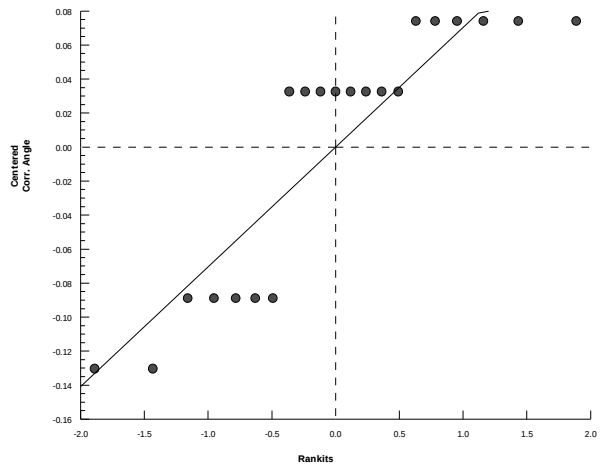
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
002	1.412	1.412	1.249	1.412	1.249	1.249	1.412	1.412	1.412	1.249

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5723-6009	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-9974-0110	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.14%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		008	125	NA	2	20	0.1130	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.725	2.758	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006800799	0.006800799	1	1.134	0.2996	Non-Significant Effect
Error	0.1199596	0.005997982	20			
Total	0.1267604		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.491	6.314	0.5579	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7554	0.8757	0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	2.21%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	2.56%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								

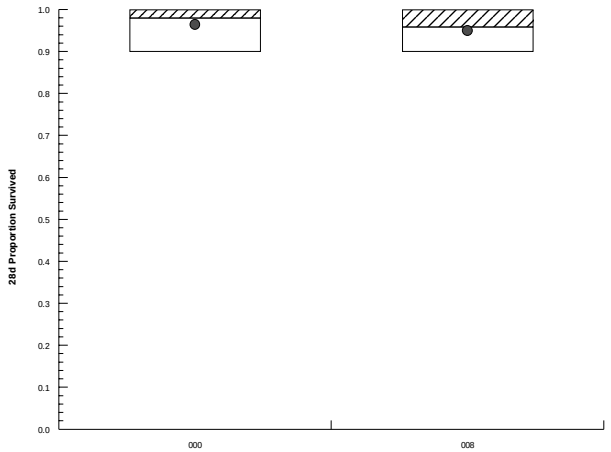
Angular (Corrected) Transformed Detail

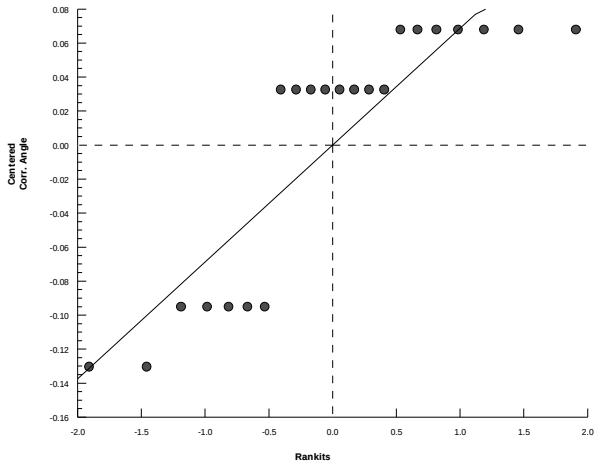
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-9974-0110	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-8675-2828	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.41%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	2.72	1.729	0.063	19	0.0068	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.14	2.734	0.5044	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05116194	0.05116194	1	7.4	0.0136	Significant Effect
Error	0.1313605	0.006913713	19			
Total	0.1825225		20			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.882	6.417	0.3555	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8979	0.871	0.0318	Normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	6.31%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	7.17%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									

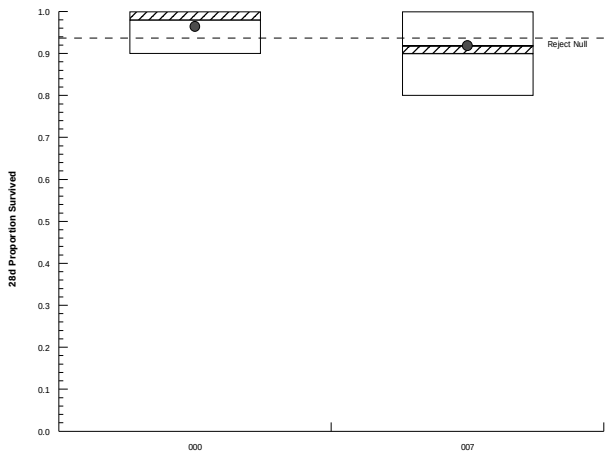
Angular (Corrected) Transformed Detail

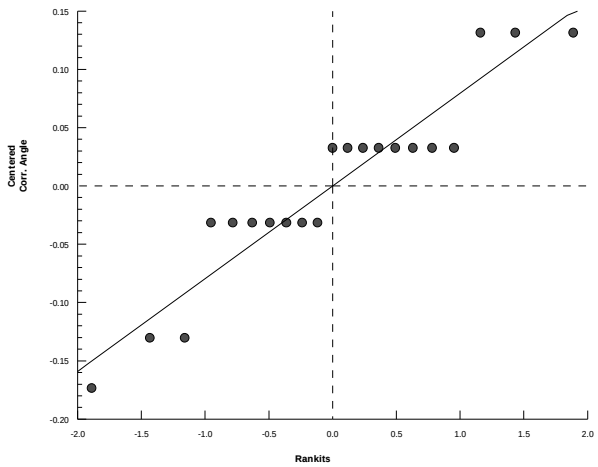
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-8675-2828	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-9166-7184	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.32%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		006	164	NA	3	21	0.9397	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.109	2.78	0.6280	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01741693	0.01741693	1	1.416	0.2474	Non-Significant Effect
Error	0.2583348	0.01230165	21			
Total	0.2757517		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.734	5.746	0.3949	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8788	0.88	0.0095	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
006	12	0.95	0.8993	1	1	0.8	1	0.02303	8.4%	-3.47%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
006	12	1.336	1.257	1.415	1.412	1.107	1.432	0.03583	9.29%	-4.3%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
006	1	1	1	0.9	1	1	0.9	0.8	1	0.8
	1	1								

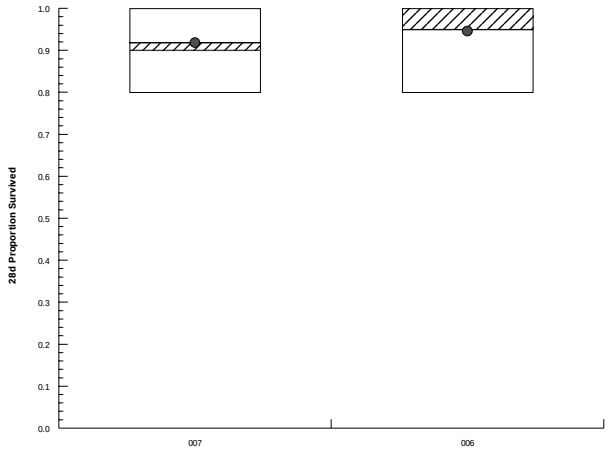
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

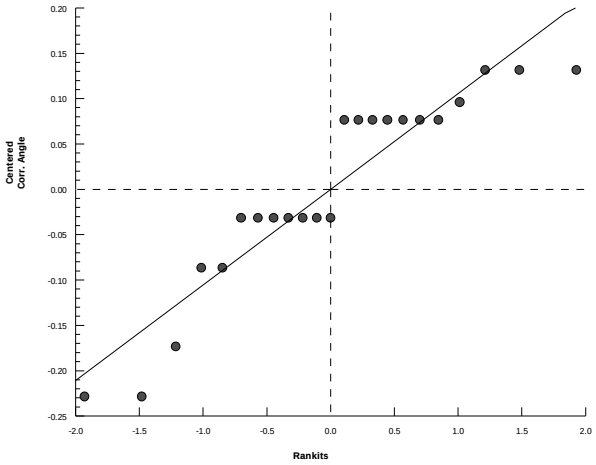
Analysis ID:	17-9166-7184	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
006	1.412	1.412	1.412	1.249	1.432	1.412	1.249	1.107	1.412	1.107

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-7583-7073	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.28%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	0.5959	1.721	0.093	21	0.2788	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.046	2.78	0.7572	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.005887733	0.005887733	1	0.355	0.5576	Non-Significant Effect
Error	0.3482486	0.01658327	21			
Total	0.3541363		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.653	5.746	0.1354	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8835	0.88	0.0117	Normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
005	12	0.8917	0.8228	0.9605	0.9	0.7	1	0.03128	12.15%	2.89%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
005	12	1.249	1.151	1.346	1.249	0.9912	1.412	0.04433	12.3%	2.5%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
005	1	0.9	1	0.9	0.7	0.9	0.9	0.8	1	0.7
	0.9	1								

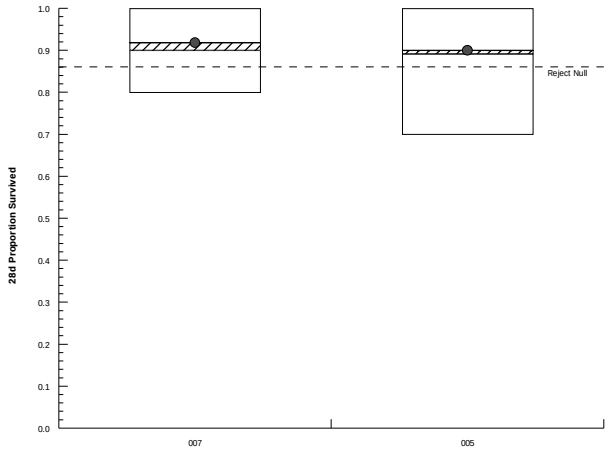
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

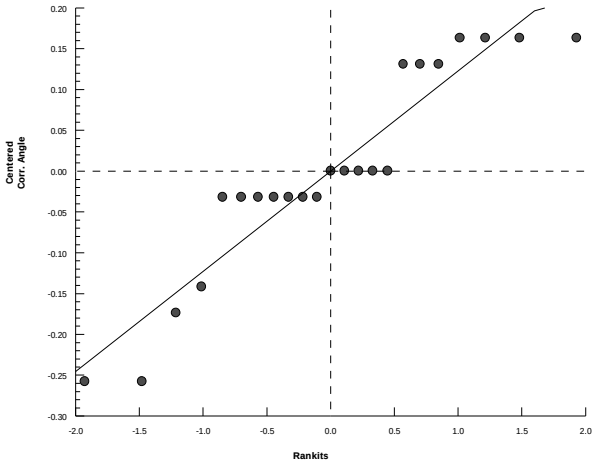
Analysis ID:	08-7583-7073	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
005	1.412	1.249	1.412	1.249	0.9912	1.249	1.249	1.107	1.412	0.9912

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-1283-2938	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.99%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		004	163.5	NA	3	21	0.8987	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.763	2.78	0.0541	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01100246	0.01100246	1	0.7223	0.4050	Non-Significant Effect
Error	0.3198841	0.01523258	21			
Total	0.3308865		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.363	5.746	0.1865	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8513	0.88	0.0029	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
004	12	0.9417	0.8784	1	1	0.7	1	0.02876	10.58%	-2.56%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
004	12	1.324	1.232	1.416	1.412	0.9912	1.412	0.04183	10.94%	-3.42%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
004	0.9	1	1	1	0.8	1	0.9	0.7	1	1
	1	1								

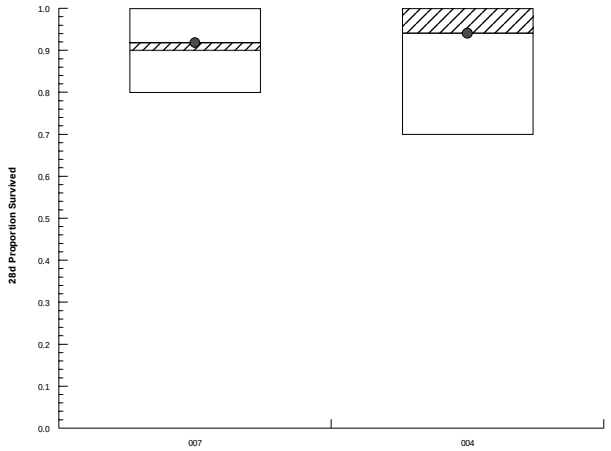
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

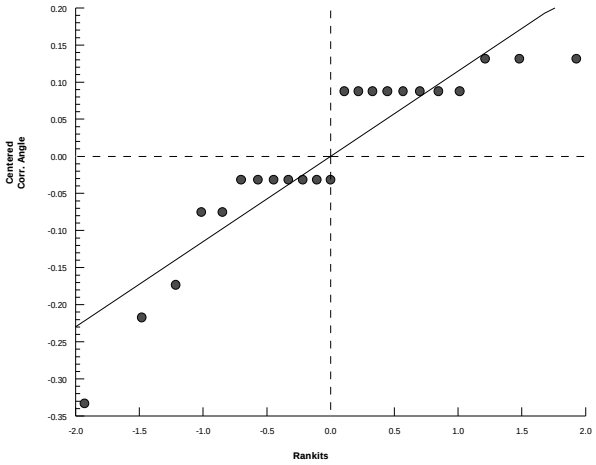
Analysis ID:	05-1283-2938	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
004	1.249	1.412	1.412	1.412	1.107	1.412	1.249	0.9912	1.412	1.412

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-8670-6467	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.3%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		003	159	NA	3	21	0.8882	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.986	2.78	0.8976	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009699816	0.009699816	1	0.7936	0.3831	Non-Significant Effect
Error	0.2566665	0.01222221	21			
Total	0.2663663		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.717	5.746	0.4035	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8781	0.88	0.0092	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
003	12	0.9417	0.8913	0.992	1	0.8	1	0.02289	8.42%	-2.56%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
003	12	1.322	1.243	1.4	1.412	1.107	1.419	0.03565	9.35%	-3.21%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
003	1	0.9	1	1	0.8	1	0.9	1	0.8	1
	1	0.9								

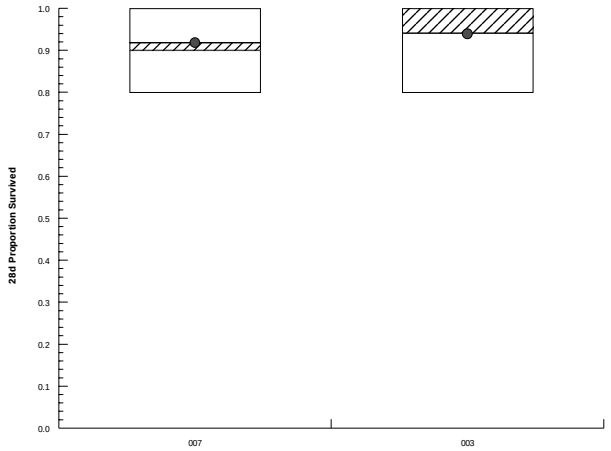
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

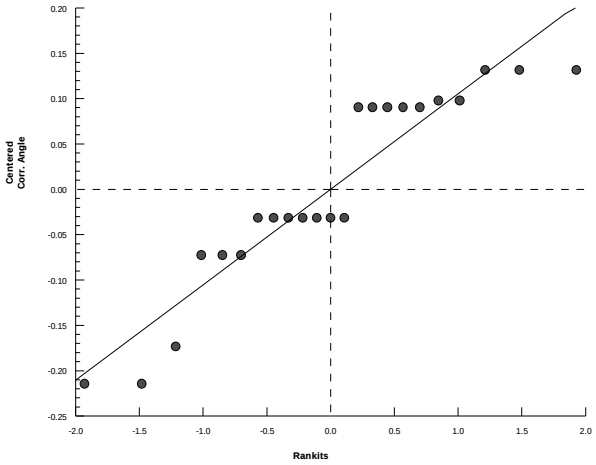
Analysis ID:	09-8670-6467	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
003	1.412	1.249	1.412	1.419	1.107	1.412	1.249	1.419	1.107	1.412

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7390-8420	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.34%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-1.498	1.725	0.066	20	0.9251	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.979	2.758	0.8674	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01808722	0.01808722	1	2.243	0.1499	Non-Significant Effect
Error	0.1613002	0.008065008	20			
Total	0.1793874		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.227	5.847	0.7527	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8993	0.8757	0.0287	Normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
002	11	0.9545	0.9195	0.9896	1	0.9	1	0.01575	5.47%	-3.96%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
002	11	1.338	1.281	1.395	1.412	1.249	1.412	0.02566	6.36%	-4.48%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
002	1	1	0.9	1	0.9	0.9	1	1	1	0.9
	0.9									

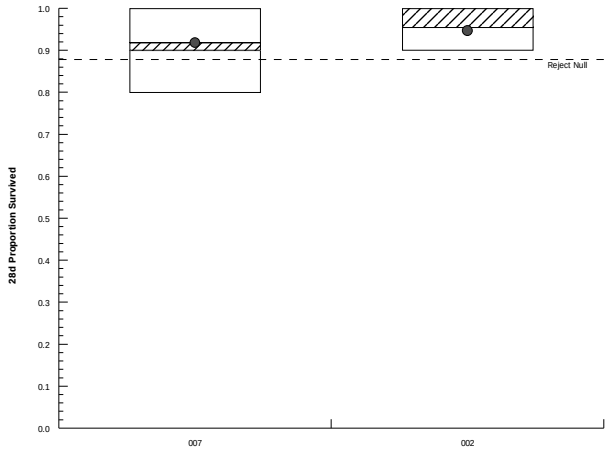
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

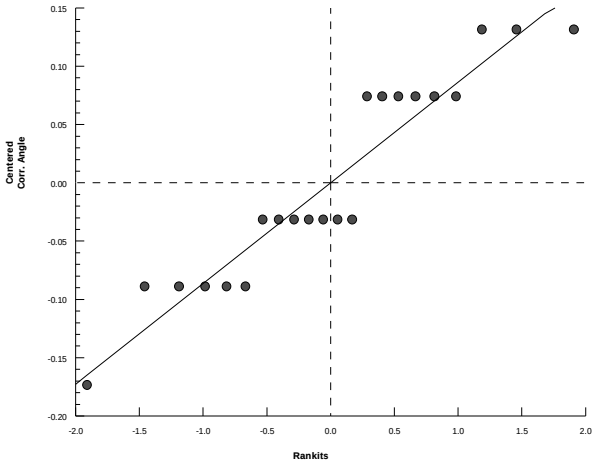
Analysis ID:	01-7390-8420	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
002	1.412	1.412	1.249	1.412	1.249	1.249	1.412	1.412	1.412	1.249

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-8605-9711	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.94%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-1.03	1.725	0.074	20	0.8423	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.206	2.758	0.4357	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01086518	0.01086518	1	1.061	0.3153	Non-Significant Effect
Error	0.2048318	0.01024159	20			
Total	0.215697		21			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.305	5.847	0.6819	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8953	0.8757	0.0239	Normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	0.9182	0.8777	0.9587	0.9	0.8	1	0.01818	6.57%	0.0%
001	11	0.9455	0.8993	0.9916	1	0.8	1	0.02073	7.27%	-2.97%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	11	1.281	1.217	1.344	1.249	1.107	1.412	0.02842	7.36%	0.0%
001	11	1.325	1.253	1.397	1.412	1.107	1.412	0.03247	8.13%	-3.47%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.9	0.9	1	1	0.9	0.9	0.9	0.8	1	0.9
	0.9									
001	0.9	1	0.8	1	0.9	0.9	1	1	0.9	1
	1									

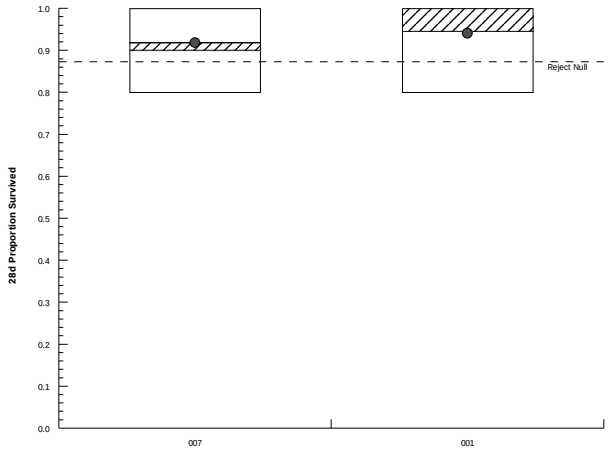
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

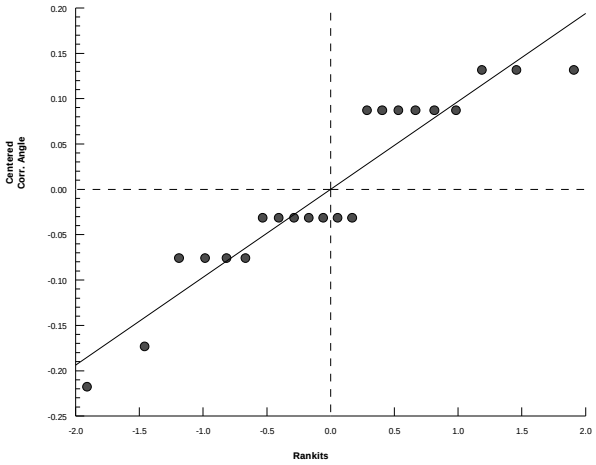
Analysis ID:	18-8605-9711	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	1.249	1.249	1.412	1.412	1.249	1.249	1.249	1.107	1.412	1.249
001	1.249	1.412	1.107	1.412	1.249	1.249	1.412	1.412	1.249	1.412

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-1562-4714	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.82%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		006	151	NA	2	22	0.5500	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.206	2.802	0.4930	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004264481	0.0004264481	1	0.03799	0.8472	Non-Significant Effect
Error	0.2469338	0.01122427	22			
Total	0.2473603		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.188	5.32	0.2099	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7396	0.884	<0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
006	12	0.95	0.8993	1	1	0.8	1	0.02303	8.4%	0.87%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
006	12	1.336	1.257	1.415	1.412	1.107	1.432	0.03583	9.29%	0.63%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
006	1	1	1	0.9	1	1	0.9	0.8	1	0.8
	1	1								

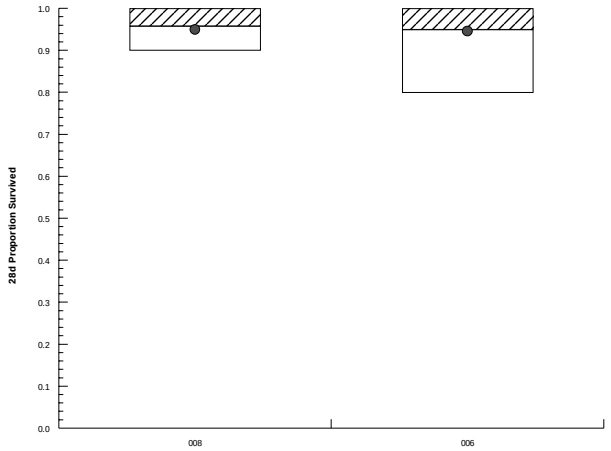
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

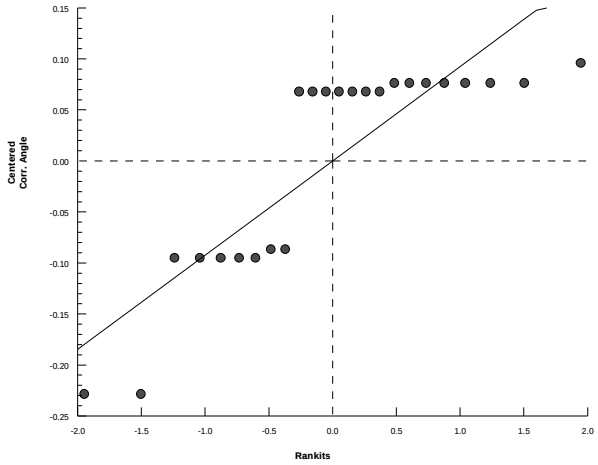
Analysis ID:	20-1562-4714	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
006	1.412	1.412	1.412	1.249	1.432	1.412	1.249	1.107	1.412	1.107

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-3753-7930	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.57%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	1.891	1.717	0.087	22	0.0359	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.127	2.802	0.6288	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05477752	0.05477752	1	3.578	0.0718	Non-Significant Effect
Error	0.3368477	0.01531126	22			
Total	0.3916252		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.348	5.32	0.0568	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9137	0.884	0.0425	Normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
005	12	0.8917	0.8228	0.9605	0.9	0.7	1	0.03128	12.15%	6.96%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
005	12	1.249	1.151	1.346	1.249	0.9912	1.412	0.04433	12.3%	7.11%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
005	1	0.9	1	0.9	0.7	0.9	0.9	0.8	1	0.7
	0.9	1								

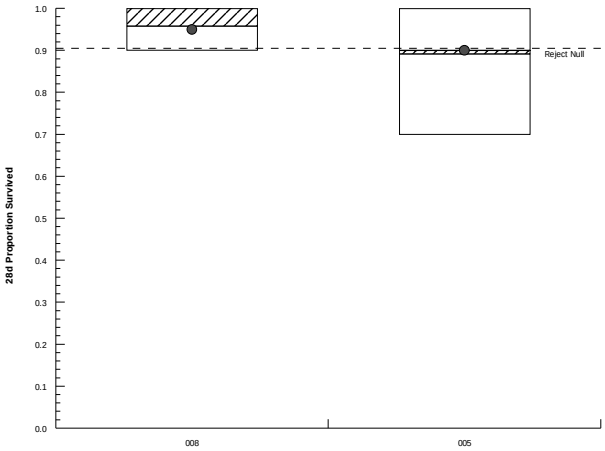
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

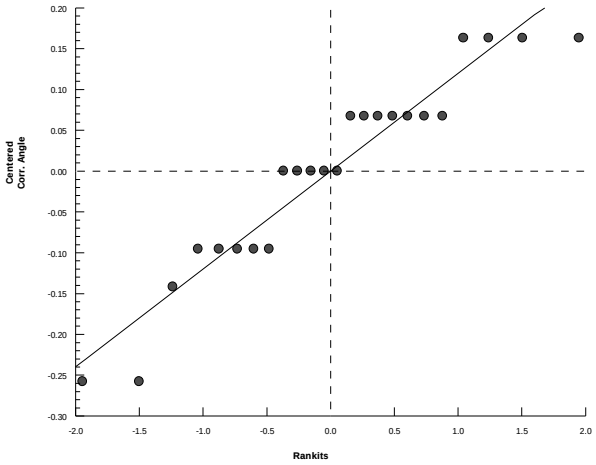
Analysis ID:	10-3753-7930	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
005	1.412	1.249	1.412	1.249	0.9912	1.249	1.249	1.107	1.412	0.9912

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-4392-2931	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	09 Jan-13 16:17	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	5.34%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		004	151	NA	2	22	0.5500	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.877	2.802	0.0349	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00233674	0.00233674	1	0.1666	0.6871	Non-Significant Effect
Error	0.3084832	0.01402196	22			
Total	0.3108199		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.982	5.32	0.0835	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7471	0.884	<0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
004	12	0.9417	0.8784	1	1	0.7	1	0.02876	10.58%	1.74%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
004	12	1.324	1.232	1.416	1.412	0.9912	1.412	0.04183	10.94%	1.47%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
004	0.9	1	1	1	0.8	1	0.9	0.7	1	1
	1	1								

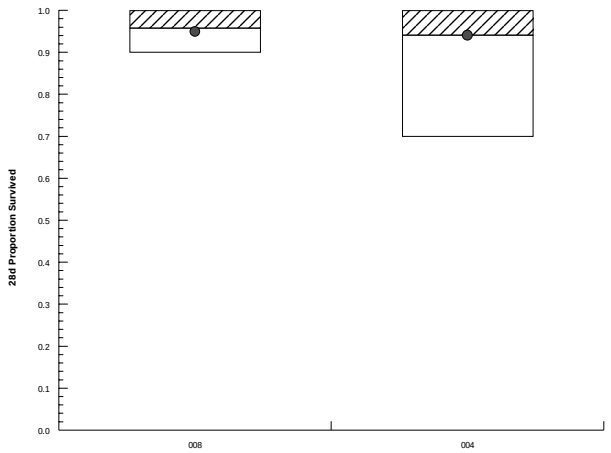
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

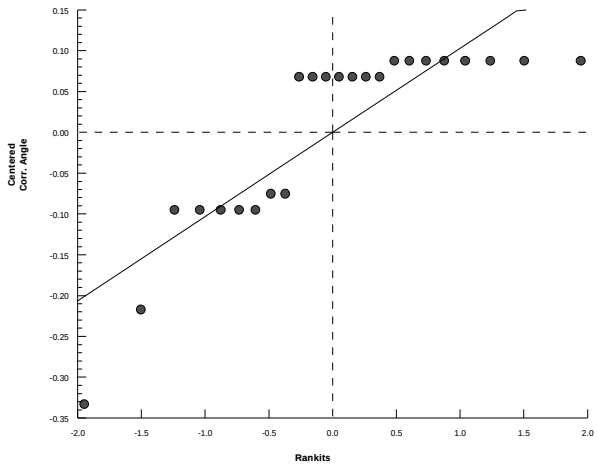
Analysis ID:	04-4392-2931	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	09 Jan-13 16:17	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
004	1.249	1.412	1.412	1.412	1.107	1.412	1.249	0.9912	1.412	1.412

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-1955-8040	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.45%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		004	139	NA	2	21	0.7221	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006397632	0.0006397632	1	0.07171	0.7915	Non-Significant Effect
Error	0.1873531	0.008921575	21			
Total	0.1879928		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.56	5.418	0.4760	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7064	0.88	<0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
004	11	0.9636	0.9183	1	1	0.8	1	0.02033	7.0%	-0.55%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
004	11	1.355	1.284	1.425	1.412	1.107	1.412	0.03161	7.74%	-0.79%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
004	0.9	1	1	1	0.8	1	0.9	Outlier	1	1
	1	1								

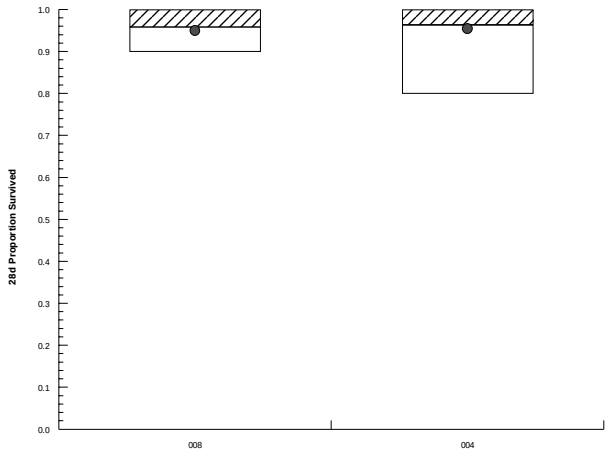
Angular (Corrected) Transformed Detail

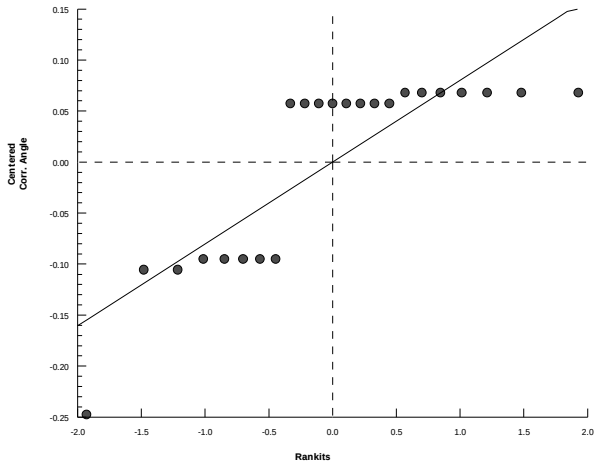
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
004	1.249	1.412	1.412	1.412	1.107	1.412	1.249	1.412	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-1955-8040	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-8962-5196	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.81%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		003	145	NA	2	22	0.4112	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.078	2.802	0.7283	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003012777	0.003012777	1	0.2702	0.6084	Non-Significant Effect
Error	0.2452656	0.01114844	22			
Total	0.2482784		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.166	5.32	0.2156	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7945	0.884	0.0002	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
003	12	0.9417	0.8913	0.992	1	0.8	1	0.02289	8.42%	1.74%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
003	12	1.322	1.243	1.4	1.412	1.107	1.419	0.03565	9.35%	1.67%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
003	1	0.9	1	1	0.8	1	0.9	1	0.8	1
	1	0.9								

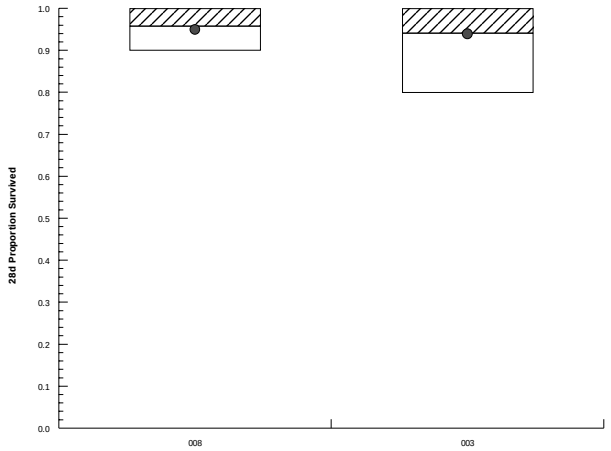
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

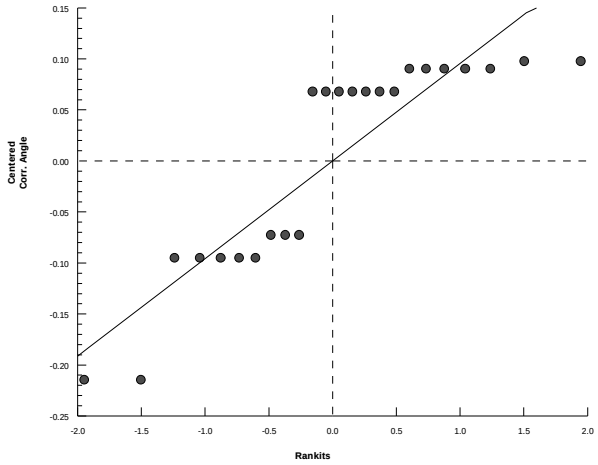
Analysis ID:	08-8962-5196	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
003	1.412	1.249	1.412	1.419	1.107	1.412	1.249	1.419	1.107	1.412

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-4466-1362	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.03%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		002	129.5	NA	2	21	0.4067	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.152	2.78	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002187033	0.0002187033	1	0.03064	0.8627	Non-Significant Effect
Error	0.1498993	0.00713806	21			
Total	0.150118		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.029	5.418	0.9566	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.6625	0.88	<0.0001	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
002	11	0.9545	0.9195	0.9896	1	0.9	1	0.01575	5.47%	0.4%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
002	11	1.338	1.281	1.395	1.412	1.249	1.412	0.02566	6.36%	0.46%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
002	1	1	0.9	1	0.9	0.9	1	1	1	0.9
	0.9									

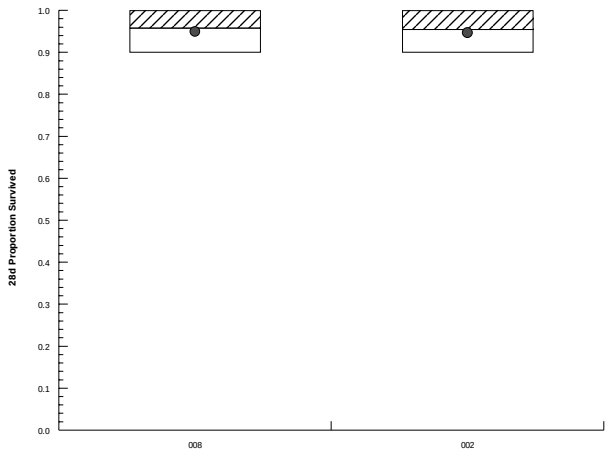
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

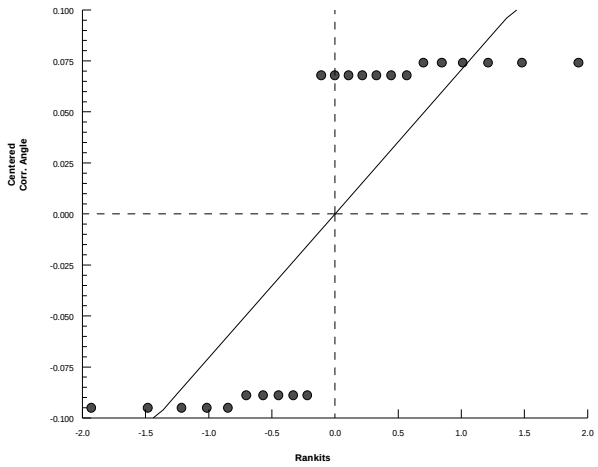
Analysis ID:	08-4466-1362	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
002	1.412	1.412	1.249	1.412	1.249	1.249	1.412	1.412	1.412	1.249

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-7854-0113	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.51%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		001	127	NA	2	21	0.4067	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.324	2.78	0.3137	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002087744	0.002087744	1	0.2267	0.6389	Non-Significant Effect
Error	0.1934309	0.009210994	21			
Total	0.1955186		22			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.647	5.418	0.4253	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7769	0.88	0.0002	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	0.9583	0.9256	0.9911	1	0.9	1	0.01486	5.37%	0.0%
001	11	0.9455	0.8993	0.9916	1	0.8	1	0.02073	7.27%	1.34%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	12	1.344	1.291	1.397	1.412	1.249	1.412	0.02423	6.24%	0.0%
001	11	1.325	1.253	1.397	1.412	1.107	1.412	0.03247	8.13%	1.42%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1	0.9	1	1	1	0.9	1	0.9	0.9	1
	0.9	1								
001	0.9	1	0.8	1	0.9	0.9	1	1	0.9	1
	1									

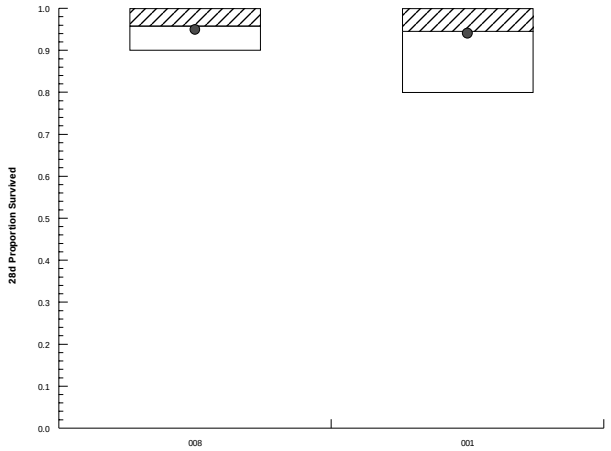
Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

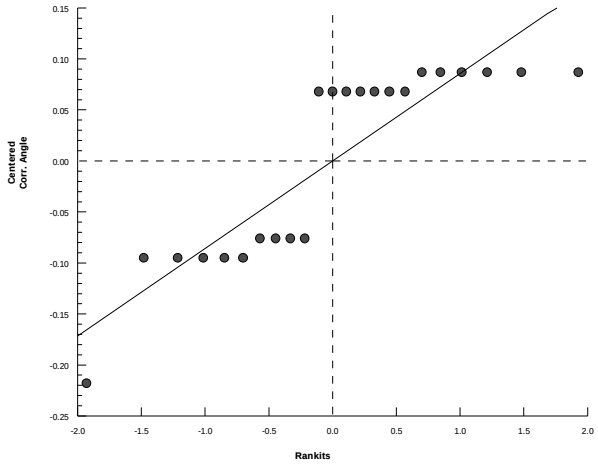
Analysis ID:	13-7854-0113	**Endpoint:**	28d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	1.412	1.249	1.412	1.412	1.412	1.249	1.412	1.249	1.249	1.412
001	1.249	1.412	1.107	1.412	1.249	1.249	1.412	1.412	1.249	1.412

Graphics





CETIS Analytical Report

Report Date: 08 Jan-13 16:26 (p 1 of 1)
Test Code: 22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID: 07-9078-3366 **Endpoint:** 28d Proportion Survived **CETIS Version:** CETISv1.8.6
Analyzed: 08 Jan-13 16:24 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	4.72%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		001	106	NA	2	19	0.1401	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.448	2.734	0.1715	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01549177	0.01549177	1	1.858	0.1888	Non-Significant Effect
Error	0.1584611	0.008340058	19			
Total	0.1739529		20			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.456	6.417	0.1920	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8364	0.871	0.0025	Non-normal Distribution

28d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	0.98	0.9498	1	1	0.9	1	0.01333	4.3%	0.0%
001	11	0.9455	0.8993	0.9916	1	0.8	1	0.02073	7.27%	3.53%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	10	1.379	1.33	1.429	1.412	1.249	1.412	0.02173	4.98%	0.0%
001	11	1.325	1.253	1.397	1.412	1.107	1.412	0.03247	8.13%	3.94%

28d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1	1	1	0.9	1	1	1	1	1	0.9
001	0.9	1	0.8	1	0.9	0.9	1	1	0.9	1
	1									

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	1.412	1.412	1.412	1.249	1.412	1.412	1.412	1.412	1.412	1.249
001	1.249	1.412	1.107	1.412	1.249	1.249	1.412	1.412	1.249	1.412

CETIS Analytical Reports
Day 35 Survival Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date:	08 Jan-13 15:57 (p 1 of 2)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.8	1	0.025	0.07071	7.64%	0.0%
007	7	0.9	0.8466	0.9534	0.8	1	0.02182	0.05774	6.42%	2.7%
008	8	0.925	0.8385	1	0.7	1	0.0366	0.1035	11.19%	0.0%
001	8	0.8375	0.643	1	0.3	1	0.08224	0.2326	27.77%	9.46%
002	8	0.9125	0.8589	0.9661	0.8	1	0.02266	0.06409	7.02%	1.35%
003	8	0.9023	0.8148	0.9898	0.7	1	0.037	0.1046	11.6%	2.46%
004	8	0.85	0.7236	0.9764	0.6	1	0.05345	0.1512	17.79%	8.11%
005	8	0.8375	0.6966	0.9784	0.5	1	0.05957	0.1685	20.12%	9.46%
006	8	0.9375	0.8609	1	0.8	1	0.03239	0.09161	9.77%	-1.35%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.9	1	0.9	0.8	1	1	0.9	0.9		
007	0.9	0.9	1	0.9	0.9	0.8	0.9			
008	1	0.9	0.9	1	1	0.7	1	0.9		
001	0.8	1	0.8	0.3	0.9	0.9	1	1		
002	0.9	1	0.9	0.9	0.9	0.9	1	0.8		
003	0.9	0.9	1	0.8182	0.7	1	0.9	1		
004	0.8	1	1	0.9	0.8	1	0.7	0.6		
005	1	1	0.9	0.8	0.7	0.9	0.9	0.5		
006	1	1	1	0.8	1	1	0.9	0.8		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-8596-8005	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.55%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		006	72.5	NA	3	14	0.7328	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.714	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002593366	0.002593366	1	0.1601	0.6951	Non-Significant Effect
Error	0.2267092	0.01619351	14			
Total	0.2293026		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.675	8.885	0.5126	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8252	0.8408	0.0060	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
006	8	0.9375	0.8609	1	1	0.8	1	0.03239	9.77%	-1.35%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
006	8	1.318	1.199	1.437	1.412	1.107	1.432	0.05035	10.81%	-1.97%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
006	1	1	1	0.8	1	1	0.9	0.8

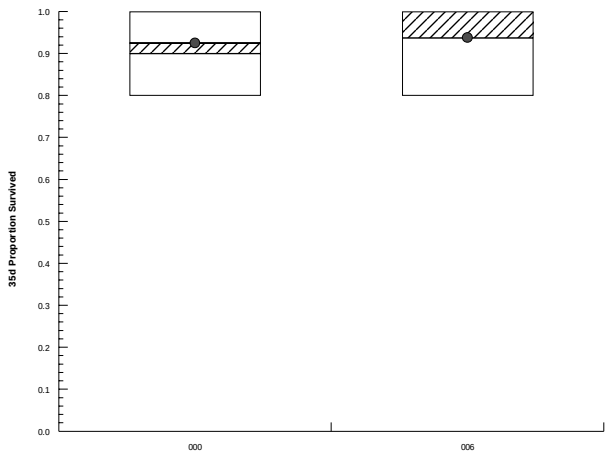
Angular (Corrected) Transformed Detail

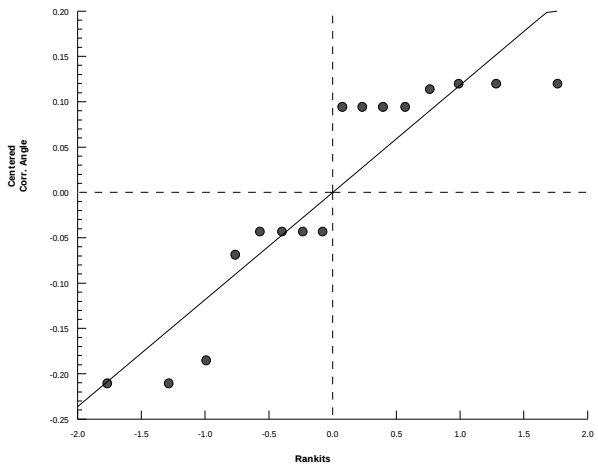
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
006	1.412	1.412	1.412	1.107	1.432	1.412	1.249	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-8596-8005	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9870-5065	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	1.303	1.761	0.15	14	0.1068	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.418	2.586	0.1122	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04889705	0.04889705	1	1.697	0.2137	Non-Significant Effect
Error	0.4033774	0.02881267	14			
Total	0.4522745		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.759	8.885	0.1018	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9324	0.8408	0.2658	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
005	8	0.8375	0.6966	0.9784	0.9	0.5	1	0.05957	20.12%	9.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
005	8	1.182	1.003	1.36	1.249	0.7854	1.412	0.07543	18.05%	8.56%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
005	1	1	0.9	0.8	0.7	0.9	0.9	0.5

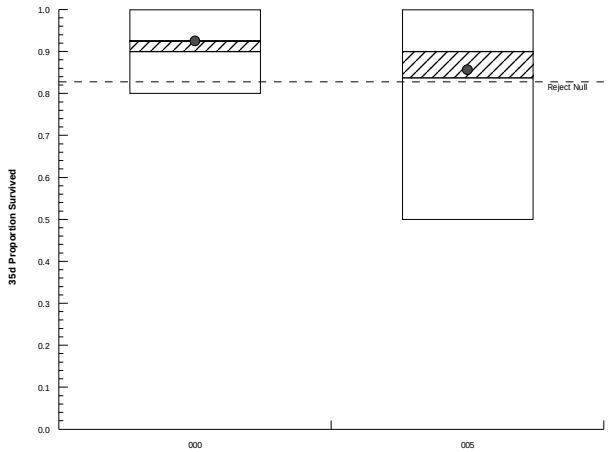
Angular (Corrected) Transformed Detail

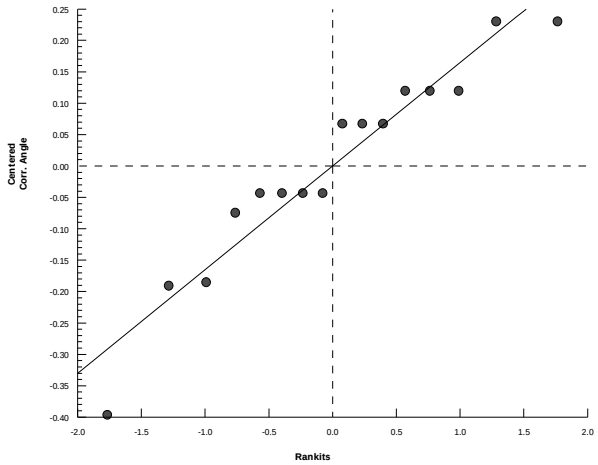
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
005	1.412	1.412	1.249	1.107	0.9912	1.249	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9870-5065	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-0596-8428	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	1.155	1.761	0.145	14	0.1336	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.95	2.586	0.6223	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03636219	0.03636219	1	1.335	0.2673	Non-Significant Effect
Error	0.381356	0.02723971	14			
Total	0.4177182		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.499	8.885	0.1205	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9385	0.8408	0.3305	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
004	8	0.85	0.7236	0.9764	0.85	0.6	1	0.05345	17.79%	8.11%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
004	8	1.197	1.025	1.369	1.178	0.8861	1.412	0.07278	17.2%	7.38%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
004	0.8	1	1	0.9	0.8	1	0.7	0.6

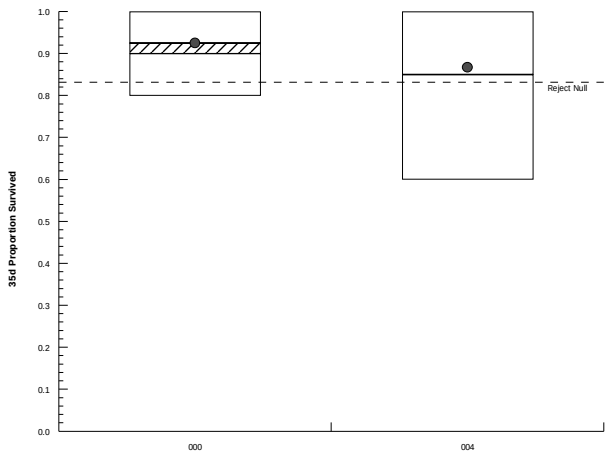
Angular (Corrected) Transformed Detail

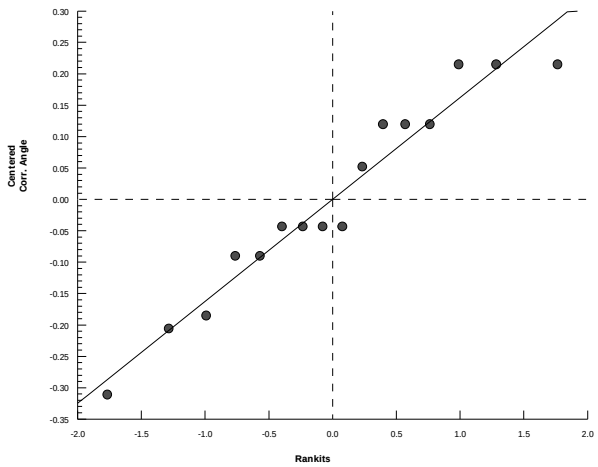
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
004	1.107	1.412	1.412	1.249	1.107	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-0596-8428	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1190-7152	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.08%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	0.3887	1.761	0.092	14	0.3517	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.83	2.586	0.8828	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001659958	0.001659958	1	0.1511	0.7033	Non-Significant Effect
Error	0.1537799	0.01098428	14			
Total	0.1554398		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.228	8.885	0.7933	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8574	0.8408	0.0175	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
002	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	1.35%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
002	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	1.58%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
002	0.9	1	0.9	0.9	0.9	0.9	1	0.8

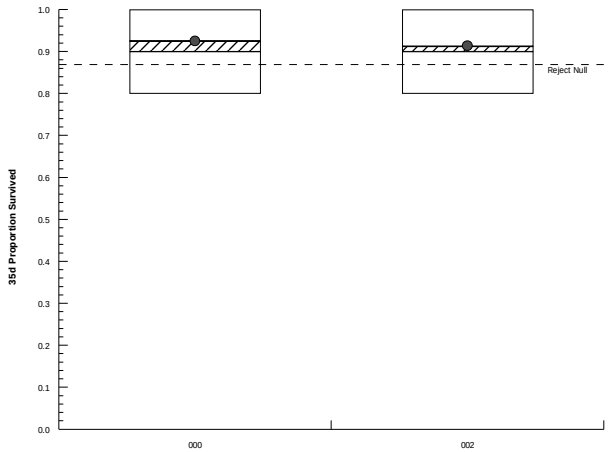
Angular (Corrected) Transformed Detail

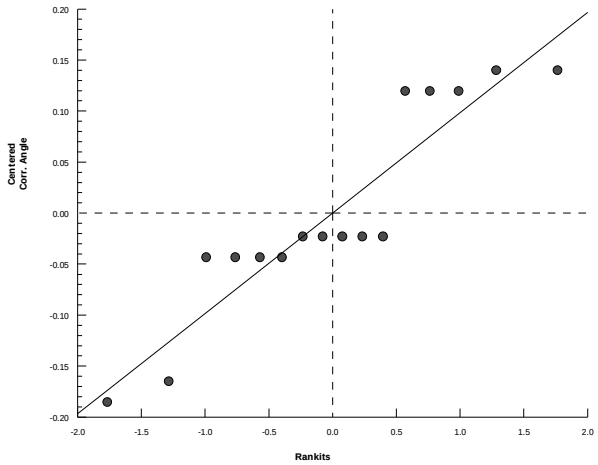
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
002	1.249	1.412	1.249	1.249	1.249	1.249	1.412	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1190-7152	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-2461-5235	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.65%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	0.22	1.771	0.113	13	0.4147	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007395239	0.0007395239	1	0.04838	0.8293	Non-Significant Effect
Error	0.1986976	0.01528443	13			
Total	0.1994371		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.568	9.155	0.5675	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8407	0.8328	0.0129	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
001	7	0.9143	0.8311	0.9975	0.9	0.8	1	0.03401	9.84%	1.16%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
001	7	1.278	1.151	1.406	1.249	1.107	1.412	0.05208	10.78%	1.09%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
001	0.8	1	0.8	Outlier	0.9	0.9	1	1

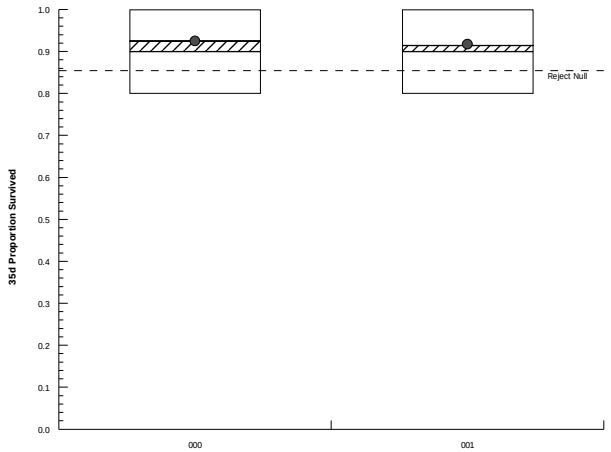
Angular (Corrected) Transformed Detail

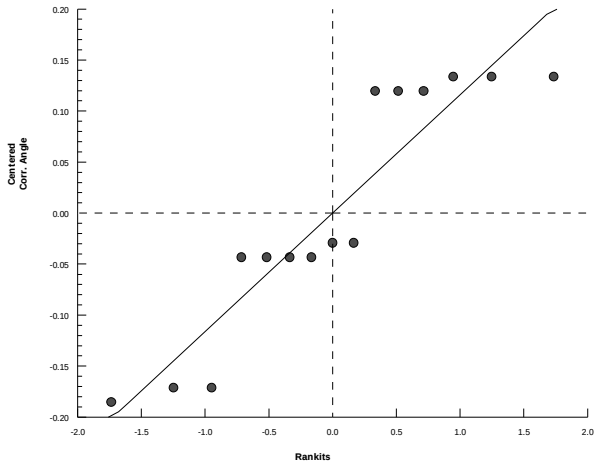
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
001	1.107	1.412	1.107	1.249	1.249	1.412	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-2461-5235	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-8053-7746	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.6%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		001	62.5	NA	3	14	0.3019	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.993	2.586	0.0034	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0411383	0.0411383	1	0.9202	0.3537	Non-Significant Effect
Error	0.6258669	0.04470478	14			
Total	0.6670052		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.384	8.885	0.0258	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8256	0.8408	0.0061	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
001	8	0.8375	0.643	1	0.9	0.3	1	0.08224	27.77%	9.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
001	8	1.191	0.9586	1.423	1.249	0.5796	1.412	0.0983	23.34%	7.85%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
001	0.8	1	0.8	0.3	0.9	0.9	1	1

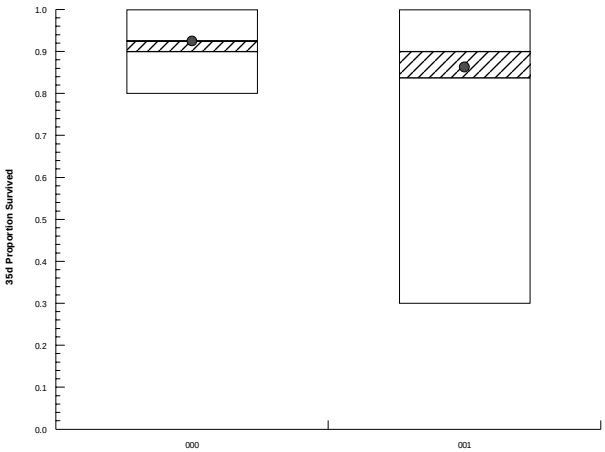
Angular (Corrected) Transformed Detail

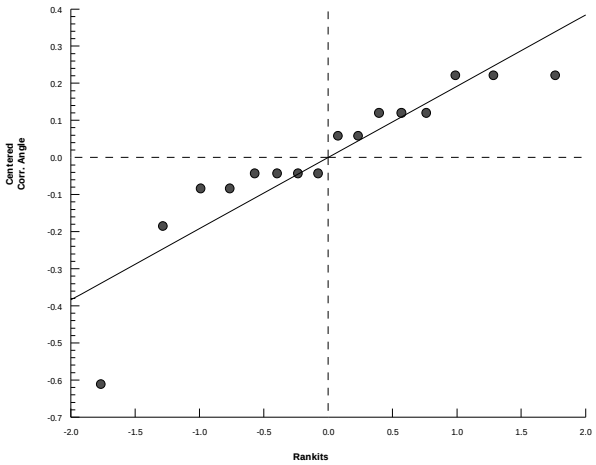
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
001	1.107	1.412	1.107	0.5796	1.249	1.249	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-8053-7746	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-0086-8456	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.76%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		008	71	NA	2	14	0.6523	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.438	2.586	0.1025	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001379345	0.0001379345	1	0.00811	0.9295	Non-Significant Effect
Error	0.2381009	0.0170072	14			
Total	0.2382388		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.809	8.885	0.4523	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8094	0.8408	0.0036	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	-0.45%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
008	1	0.9	0.9	1	1	0.7	1	0.9

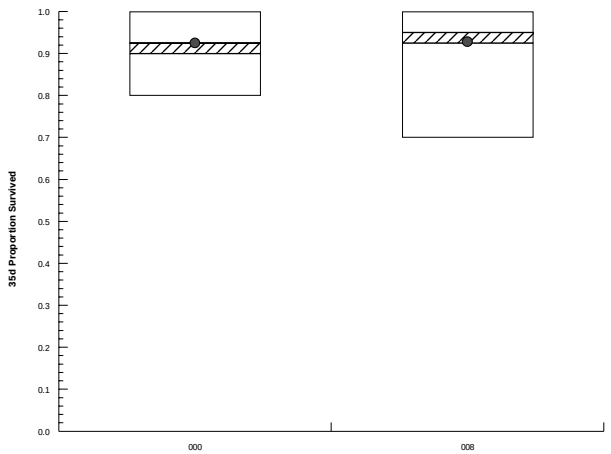
Angular (Corrected) Transformed Detail

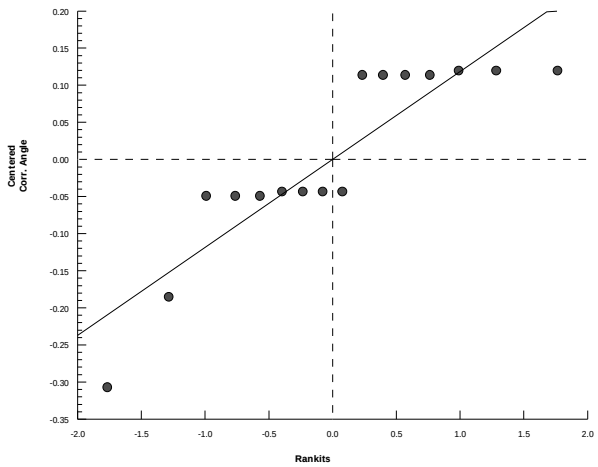
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-0086-8456	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-4920-5635	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.07%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	0.7758	1.771	0.092	13	0.2259	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.912	2.548	0.6385	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006083229	0.006083229	1	0.6019	0.4517	Non-Significant Effect
Error	0.1313911	0.01010701	13			
Total	0.1374743		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.558	10.79	0.6053	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9087	0.8328	0.1292	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	2.7%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	3.12%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
007	0.9	0.9	1	0.9	0.9	0.8	0.9	

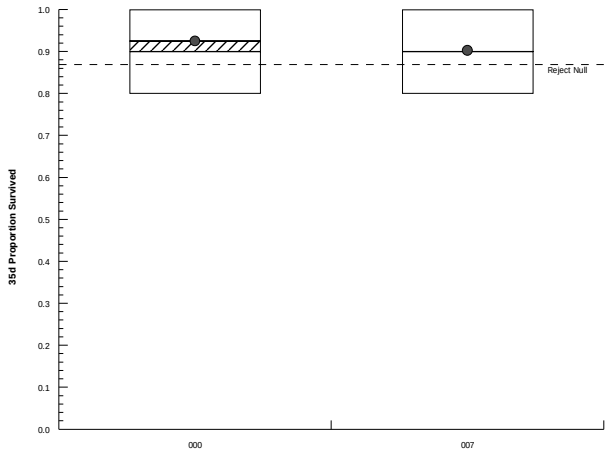
Angular (Corrected) Transformed Detail

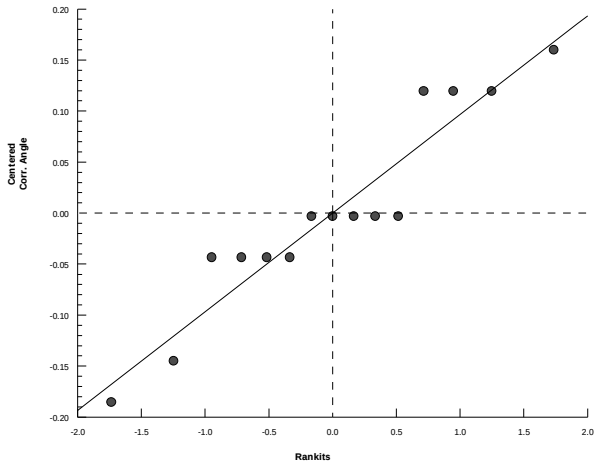
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-4920-5635	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4192-8567	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.12%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	-1.056	1.771	0.110	13	0.8449	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.816	2.548	0.8455	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01617816	0.01617816	1	1.115	0.3102	Non-Significant Effect
Error	0.1885794	0.01450611	13			
Total	0.2047576		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.609	10.79	0.2631	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.892	0.8328	0.0720	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
006	8	0.9375	0.8609	1	1	0.8	1	0.03239	9.77%	-4.17%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
006	8	1.318	1.199	1.437	1.412	1.107	1.432	0.05035	10.81%	-5.26%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
006	1	1	1	0.8	1	1	0.9	0.8

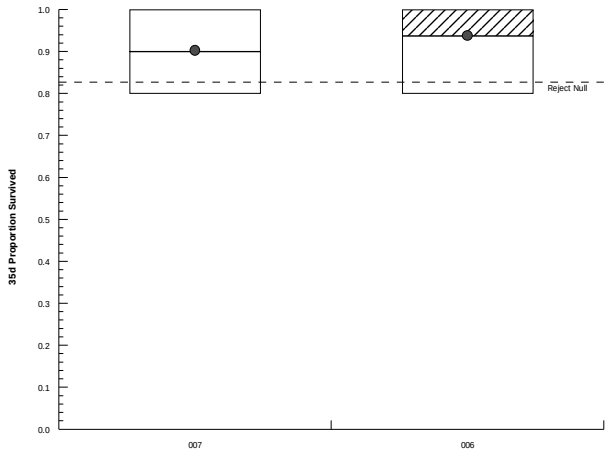
Angular (Corrected) Transformed Detail

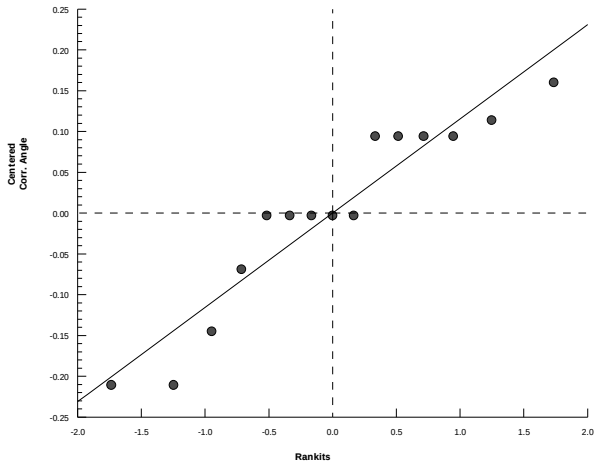
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
006	1.412	1.412	1.412	1.107	1.432	1.412	1.249	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4192-8567	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-1086-9064	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	11.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	0.8092	1.771	0.154	13	0.2165	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.455	2.548	0.0806	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0183965	0.0183965	1	0.6548	0.4330	Non-Significant Effect
Error	0.3652477	0.02809598	13			
Total	0.3836442		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	5.857	10.79	0.0468	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9217	0.8328	0.2045	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
005	8	0.8375	0.6966	0.9784	0.9	0.5	1	0.05957	20.12%	6.94%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
005	8	1.182	1.003	1.36	1.249	0.7854	1.412	0.07543	18.05%	5.61%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
005	1	1	0.9	0.8	0.7	0.9	0.9	0.5

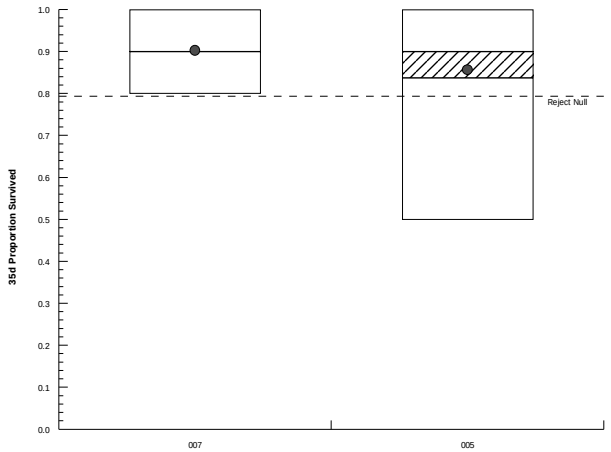
Angular (Corrected) Transformed Detail

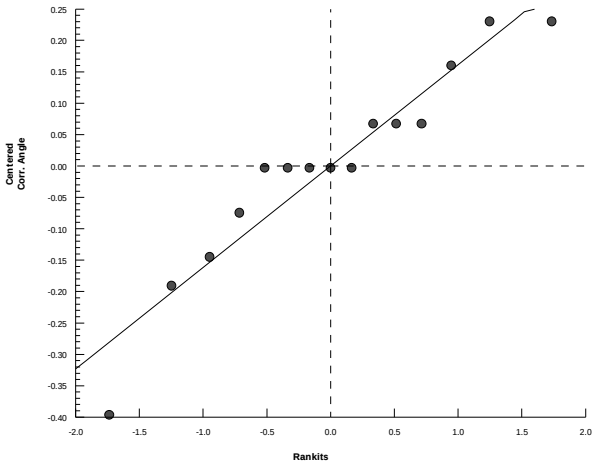
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
005	1.412	1.412	1.249	1.107	0.9912	1.249	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-1086-9064	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-7596-9432	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	11.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.6538	1.771	0.149	13	0.2623	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.986	2.548	0.5079	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01128434	0.01128434	1	0.4274	0.5247	Non-Significant Effect
Error	0.3432262	0.02640202	13			
Total	0.3545105		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	5.452	10.79	0.0554	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.933	0.8328	0.3019	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
004	8	0.85	0.7236	0.9764	0.85	0.6	1	0.05345	17.79%	5.56%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
004	8	1.197	1.025	1.369	1.178	0.8861	1.412	0.07278	17.2%	4.39%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
004	0.8	1	1	0.9	0.8	1	0.7	0.6

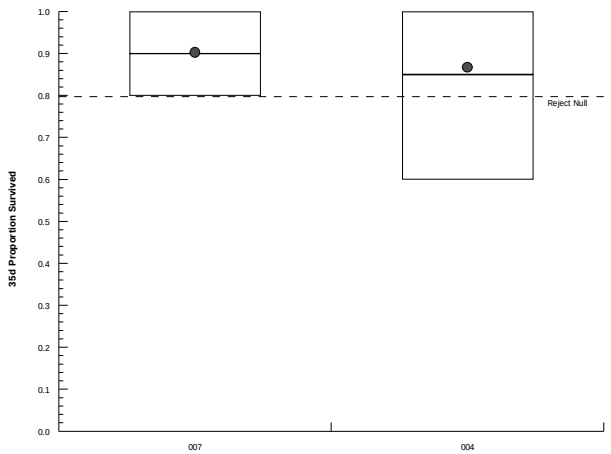
Angular (Corrected) Transformed Detail

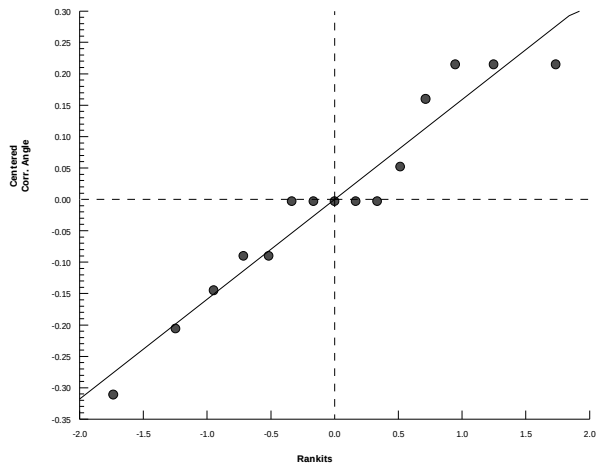
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
004	1.107	1.412	1.412	1.249	1.107	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-7596-9432	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-0049-1688	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.58%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	-0.1828	1.771	0.116	13	0.5711	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.241	2.548	0.2056	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0005334143	0.0005334143	1	0.0334	0.8578	Non-Significant Effect
Error	0.2076111	0.01597008	13			
Total	0.2081445		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.959	10.79	0.2074	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8729	0.8328	0.0372	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
003	8	0.9023	0.8148	0.9898	0.9	0.7	1	0.037	11.6%	-0.25%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
003	8	1.264	1.137	1.391	1.249	0.9912	1.419	0.05362	12.0%	-0.95%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
003	0.9	0.9	1	0.8182	0.7	1	0.9	1

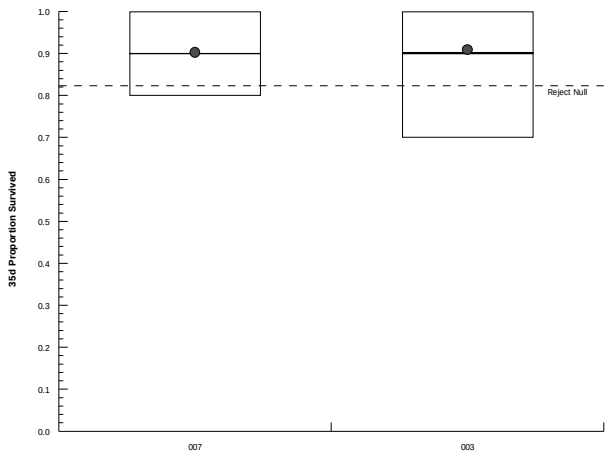
Angular (Corrected) Transformed Detail

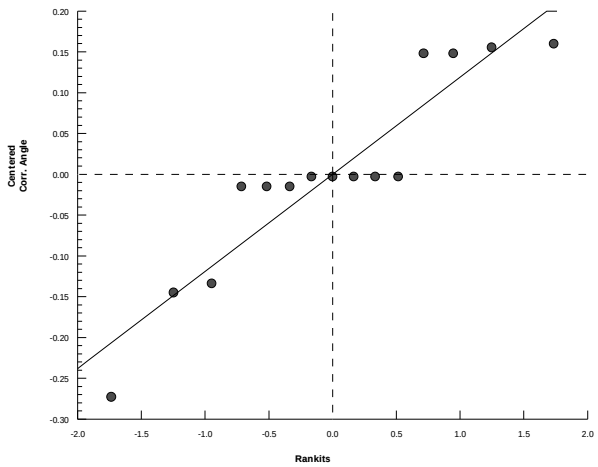
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
003	1.249	1.249	1.412	1.13	0.9912	1.412	1.249	1.419

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-0049-1688	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-6463-7712	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	6.15%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.4096	1.771	0.086	13	0.6556	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.814	2.548	0.8489	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001492584	0.001492584	1	0.1678	0.6888	Non-Significant Effect
Error	0.1156501	0.008896161	13			
Total	0.1171427		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.269	10.79	0.7877	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8376	0.8328	0.0116	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
002	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	-1.39%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
002	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	-1.6%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
002	0.9	1	0.9	0.9	0.9	0.9	1	0.8

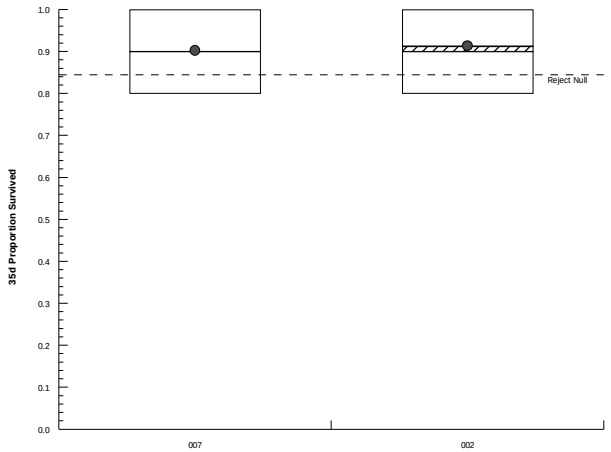
Angular (Corrected) Transformed Detail

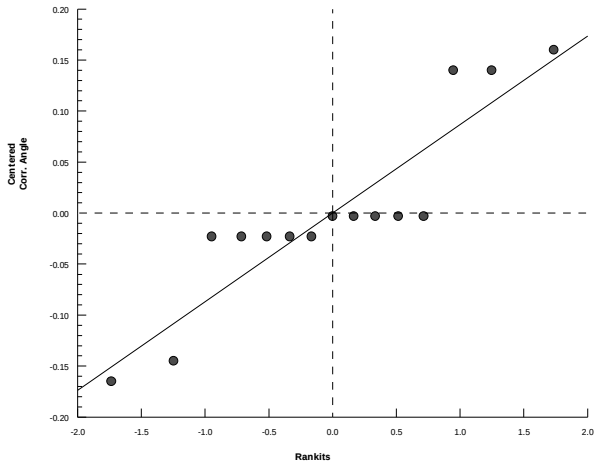
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
002	1.249	1.412	1.249	1.249	1.249	1.249	1.412	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-6463-7712	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-3014-5858	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.11%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-0.4252	1.782	0.110	12	0.6609	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002419433	0.002419433	1	0.1808	0.6782	Non-Significant Effect
Error	0.1605678	0.01338065	12			
Total	0.1629872		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.443	11.07	0.3013	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8811	0.8239	0.0603	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
001	7	0.9143	0.8311	0.9975	0.9	0.8	1	0.03401	9.84%	-1.59%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
001	7	1.278	1.151	1.406	1.249	1.107	1.412	0.05208	10.78%	-2.1%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
001	0.8	1	0.8	Outlier	0.9	0.9	1	1

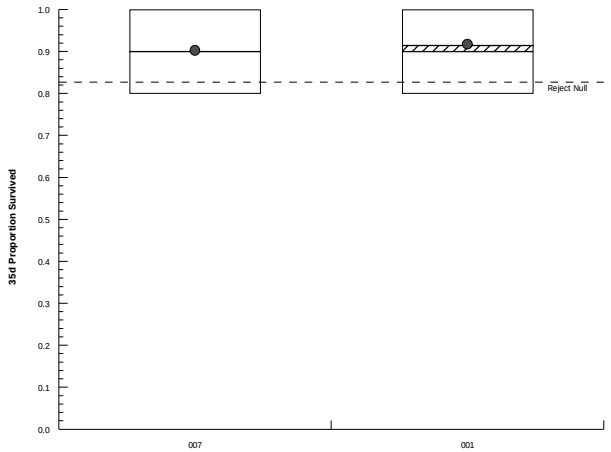
Angular (Corrected) Transformed Detail

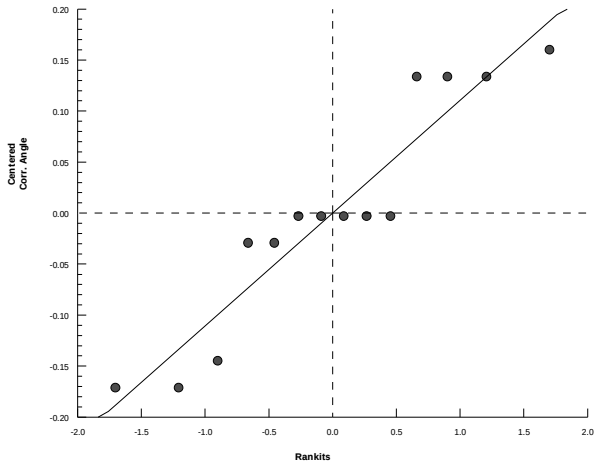
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
001	1.107	1.412	1.107	1.249	1.249	1.412	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-3014-5858	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8053-9433	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	15.7%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		001	63.5	NA	3	13	0.4912	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.984	2.548	0.0023	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01391297	0.01391297	1	0.3077	0.5885	Non-Significant Effect
Error	0.5877371	0.04521054	13			
Total	0.6016501		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	9.946	10.79	0.0124	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7986	0.8328	0.0035	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.9	0.8466	0.9534	0.9	0.8	1	0.02182	6.42%	0.0%
001	8	0.8375	0.643	1	0.9	0.3	1	0.08224	27.77%	6.94%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.252	1.171	1.334	1.249	1.107	1.412	0.03332	7.04%	0.0%
001	8	1.191	0.9586	1.423	1.249	0.5796	1.412	0.0983	23.34%	4.88%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9	0.9	1	0.9	0.9	0.8	0.9	
001	0.8	1	0.8	0.3	0.9	0.9	1	1

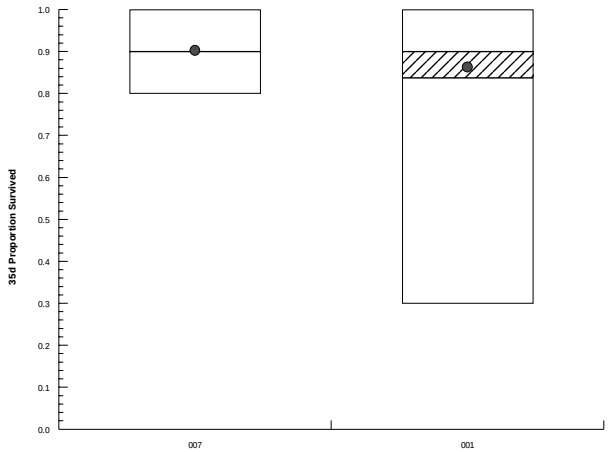
Angular (Corrected) Transformed Detail

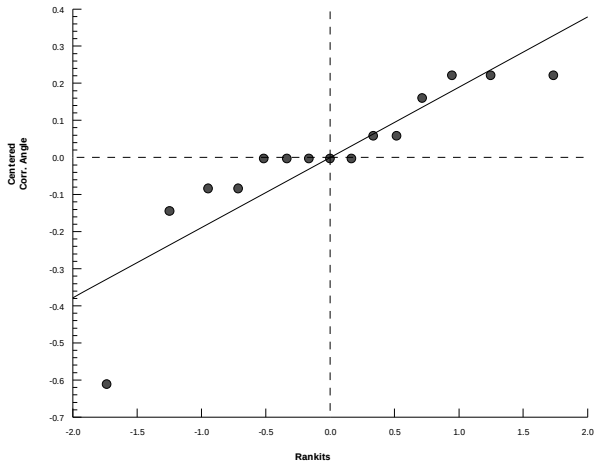
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.249	1.249	1.412	1.249	1.249	1.107	1.249	
001	1.107	1.412	1.107	0.5796	1.249	1.249	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8053-9433	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5714-1923	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	11.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	1.268	1.761	0.162	14	0.1127	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.235	2.586	0.2372	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05422906	0.05422906	1	1.609	0.2254	Non-Significant Effect
Error	0.4719574	0.03371125	14			
Total	0.5261865		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.078	8.885	0.3555	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9058	0.8408	0.0996	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
005	8	0.8375	0.6966	0.9784	0.9	0.5	1	0.05957	20.12%	9.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
005	8	1.182	1.003	1.36	1.249	0.7854	1.412	0.07543	18.05%	8.97%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
005	1	1	0.9	0.8	0.7	0.9	0.9	0.5

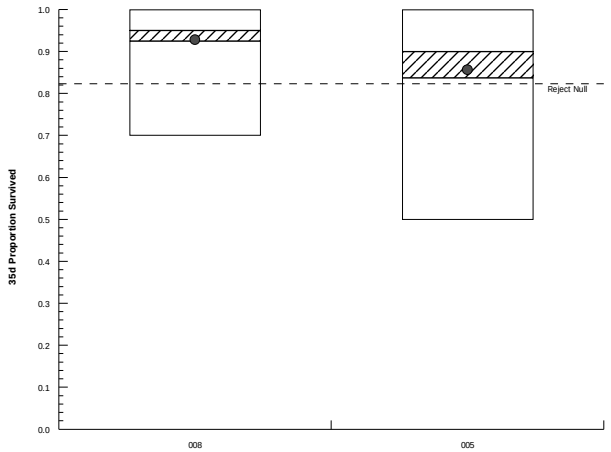
Angular (Corrected) Transformed Detail

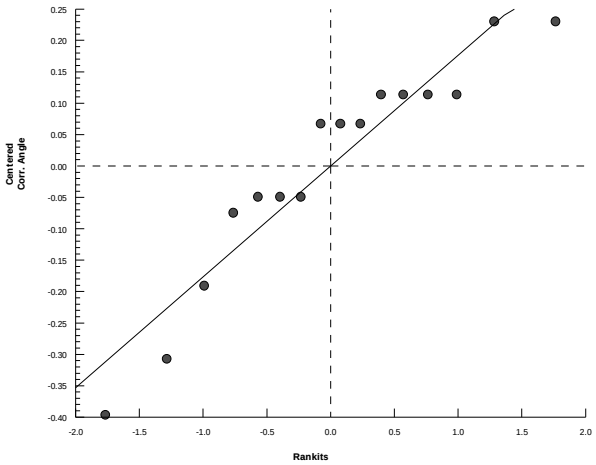
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
005	1.412	1.412	1.249	1.107	0.9912	1.249	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5714-1923	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-6049-7694	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	1.129	1.761	0.158	14	0.1389	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.796	2.586	0.9693	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04097923	0.04097923	1	1.275	0.2778	Non-Significant Effect
Error	0.449936	0.03213828	14			
Total	0.4909152		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.934	8.885	0.4037	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9126	0.8408	0.1282	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
004	8	0.85	0.7236	0.9764	0.85	0.6	1	0.05345	17.79%	8.11%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
004	8	1.197	1.025	1.369	1.178	0.8861	1.412	0.07278	17.2%	7.8%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
004	0.8	1	1	0.9	0.8	1	0.7	0.6

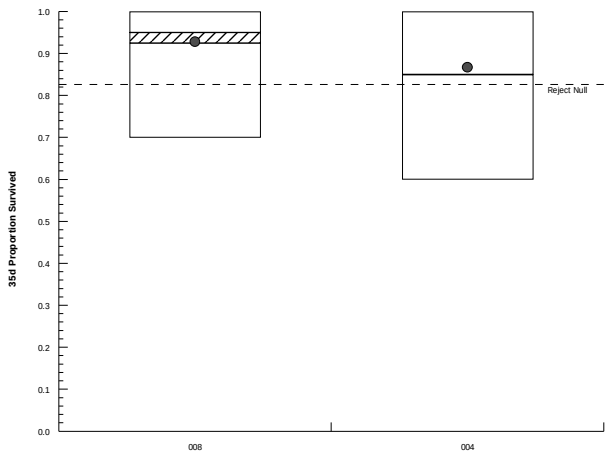
Angular (Corrected) Transformed Detail

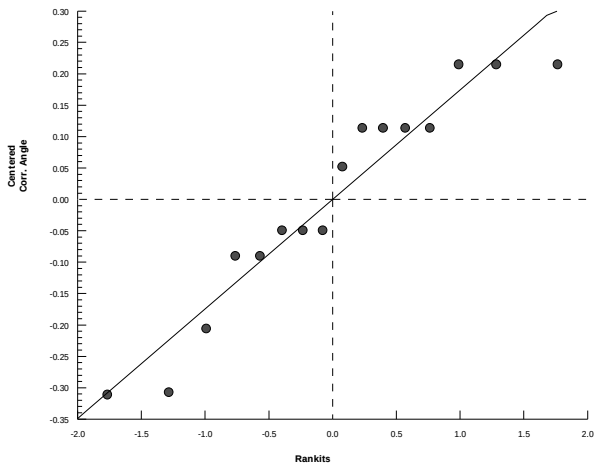
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
004	1.107	1.412	1.412	1.249	1.107	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-6049-7694	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-5588-1242	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.63%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	0.4576	1.761	0.132	14	0.3271	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.122	2.586	0.3575	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004701943	0.004701943	1	0.2094	0.6542	Non-Significant Effect
Error	0.3143209	0.02245149	14			
Total	0.3190228		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.05	8.885	0.9505	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.869	0.8408	0.0262	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
003	8	0.9023	0.8148	0.9898	0.9	0.7	1	0.037	11.6%	2.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
003	8	1.264	1.137	1.391	1.249	0.9912	1.419	0.05362	12.0%	2.64%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
003	0.9	0.9	1	0.8182	0.7	1	0.9	1

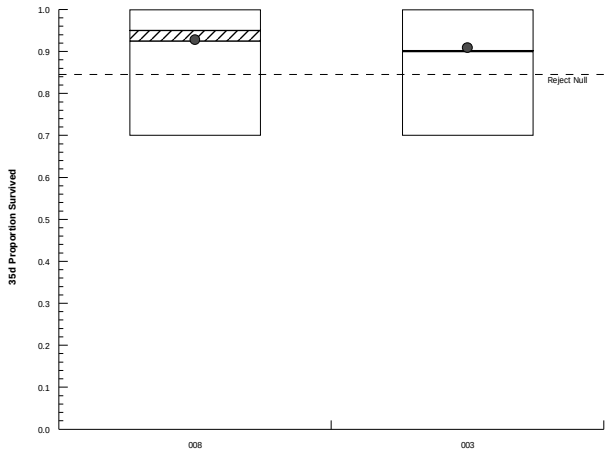
Angular (Corrected) Transformed Detail

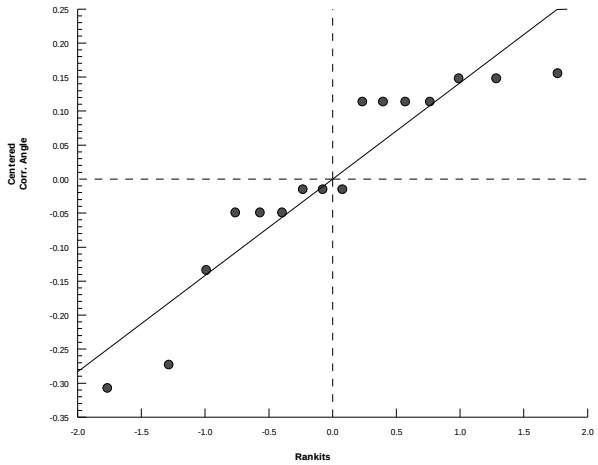
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
003	1.249	1.249	1.412	1.13	0.9912	1.412	1.249	1.419

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-5588-1242	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-9289-3106	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.03%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	0.4165	1.761	0.111	14	0.3417	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.523	2.586	0.0688	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002754899	0.002754899	1	0.1735	0.6834	Non-Significant Effect
Error	0.2223599	0.01588285	14			
Total	0.2251148		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.222	8.885	0.3142	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8566	0.8408	0.0171	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
002	8	0.9125	0.8589	0.9661	0.9	0.8	1	0.02266	7.02%	1.35%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
002	8	1.272	1.189	1.355	1.249	1.107	1.412	0.03511	7.81%	2.02%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
002	0.9	1	0.9	0.9	0.9	0.9	1	0.8

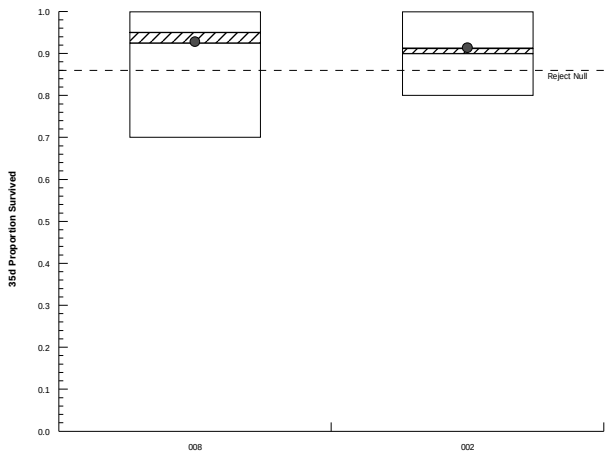
Angular (Corrected) Transformed Detail

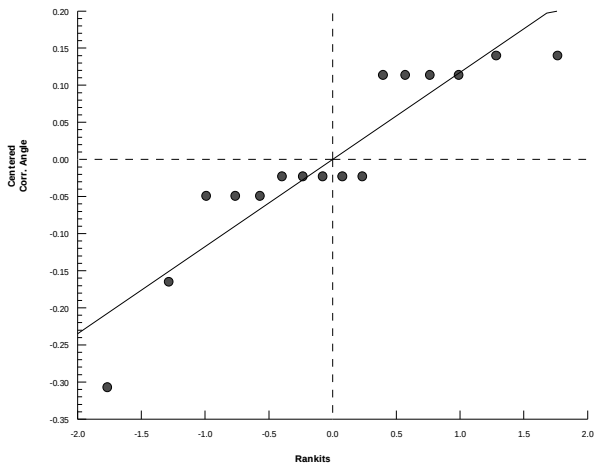
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
002	1.249	1.412	1.249	1.249	1.249	1.249	1.412	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-9289-3106	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1653-9379	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.59%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	0.2688	1.771	0.131	13	0.3962	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00148537	0.00148537	1	0.07225	0.7923	Non-Significant Effect
Error	0.2672775	0.02055981	13			
Total	0.2687629		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.154	10.79	0.8778	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8515	0.8328	0.0183	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
001	7	0.9143	0.8311	0.9975	0.9	0.8	1	0.03401	9.84%	1.16%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
001	7	1.278	1.151	1.406	1.249	1.107	1.412	0.05208	10.78%	1.54%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
001	0.8	1	0.8	Outlier	0.9	0.9	1	1

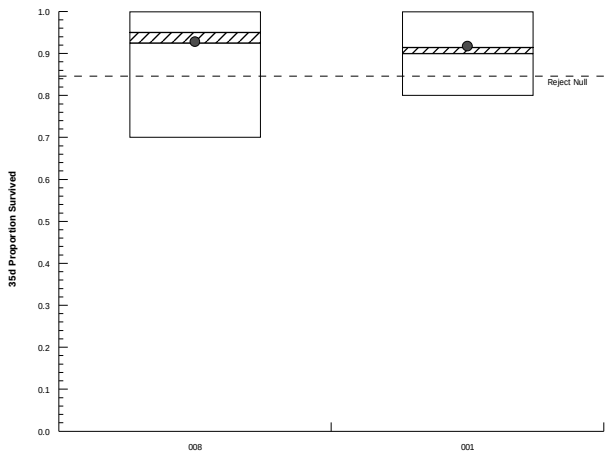
Angular (Corrected) Transformed Detail

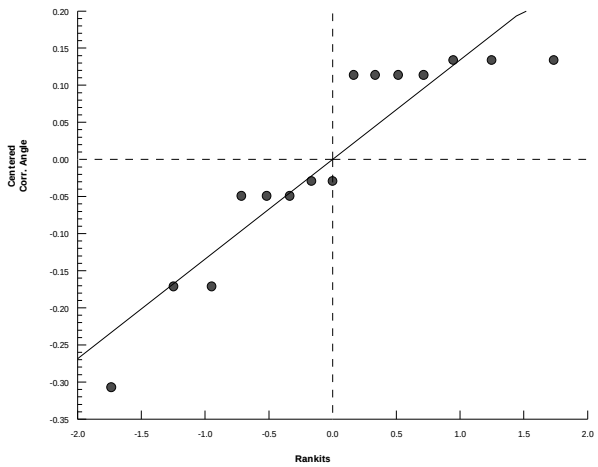
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
001	1.107	1.412	1.107	1.249	1.249	1.412	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1653-9379	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-1254-9997	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.9%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		001	61	NA	2	14	0.2460	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.841	2.586	0.0108	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04604042	0.04604042	1	0.9282	0.3517	Non-Significant Effect
Error	0.6944469	0.04960335	14			
Total	0.7404873		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.529	8.885	0.1182	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8306	0.8408	0.0072	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
001	8	0.8375	0.643	1	0.9	0.3	1	0.08224	27.77%	9.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
001	8	1.191	0.9586	1.423	1.249	0.5796	1.412	0.0983	23.34%	8.26%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
001	0.8	1	0.8	0.3	0.9	0.9	1	1

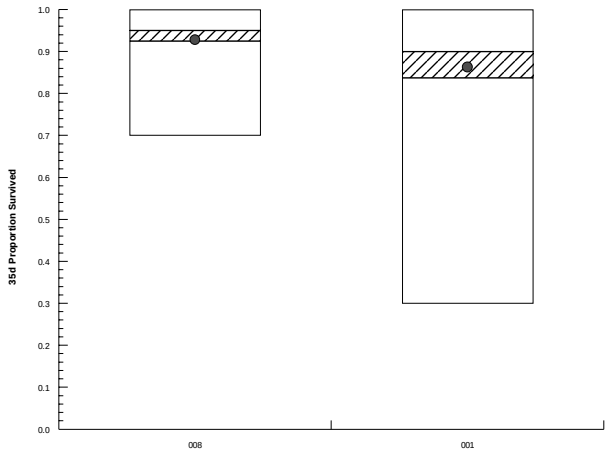
Angular (Corrected) Transformed Detail

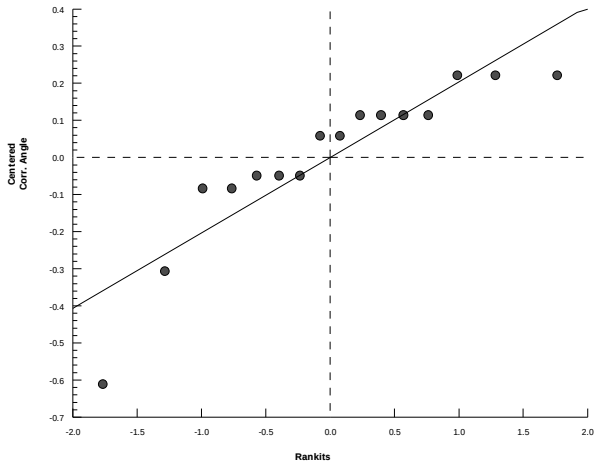
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
001	1.107	1.412	1.107	0.5796	1.249	1.249	1.412	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-1254-9997	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-7166-3518	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 16:24	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	7.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	0.4289	1.761	0.117	14	0.3373	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.132	2.586	0.3453	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003229213	0.003229213	1	0.184	0.6745	Non-Significant Effect
Error	0.2457409	0.01755292	14			
Total	0.2489701		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.899	8.885	0.4166	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9008	0.8408	0.0827	Normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.925	0.8659	0.9841	0.9	0.8	1	0.025	7.64%	0.0%
003	8	0.9023	0.8148	0.9898	0.9	0.7	1	0.037	11.6%	2.46%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.292	1.2	1.384	1.249	1.107	1.412	0.0389	8.51%	0.0%
003	8	1.264	1.137	1.391	1.249	0.9912	1.419	0.05362	12.0%	2.2%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.9	0.8	1	1	0.9	0.9
003	0.9	0.9	1	0.8182	0.7	1	0.9	1

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.249	1.107	1.412	1.412	1.249	1.249
003	1.249	1.249	1.412	1.13	0.9912	1.412	1.249	1.419

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-4972-4829	**Endpoint:**	35d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 16:24	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	8.32%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		006	70.5	NA	2	14	0.6273	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.189	2.586	0.2815	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001535116	0.001535116	1	0.07278	0.7913	Non-Significant Effect
Error	0.2952892	0.02109209	14			
Total	0.2968243		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.08	8.885	0.9215	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7908	0.8408	0.0021	Non-normal Distribution

35d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.925	0.8385	1	0.95	0.7	1	0.0366	11.19%	0.0%
006	8	0.9375	0.8609	1	1	0.8	1	0.03239	9.77%	-1.35%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.298	1.175	1.422	1.331	0.9912	1.412	0.05233	11.4%	0.0%
006	8	1.318	1.199	1.437	1.412	1.107	1.432	0.05035	10.81%	-1.51%

35d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.9	1	1	0.7	1	0.9
006	1	1	1	0.8	1	1	0.9	0.8

Angular (Corrected) Transformed Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.249	1.412	1.412	0.9912	1.412	1.249
006	1.412	1.412	1.412	1.107	1.432	1.412	1.249	1.107

CETIS Analytical Reports
Day 42 Survival Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.8	1	0.03134	0.08864	10.13%	0.0%
007	7	0.8571	0.7844	0.9299	0.8	1	0.02974	0.07868	9.18%	2.04%
008	8	0.9	0.8001	0.9999	0.7	1	0.04226	0.1195	13.28%	-2.86%
001	8	0.8	0.5552	1	0.1	1	0.1035	0.2928	36.6%	8.57%
002	8	0.8875	0.8046	0.9704	0.7	1	0.03504	0.0991	11.17%	-1.43%
003	8	0.8432	0.732	0.9543	0.6364	1	0.04701	0.133	15.77%	3.64%
004	8	0.8125	0.6614	0.9636	0.6	1	0.06391	0.1808	22.25%	7.14%
005	8	0.8125	0.6681	0.9569	0.5	1	0.06105	0.1727	21.25%	7.14%
006	8	0.8625	0.7366	0.9884	0.6	1	0.05324	0.1506	17.46%	1.43%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9		
007	0.8	0.8	1	0.8	0.9	0.8	0.9			
008	1	0.9	0.8	1	1	0.7	1	0.8		
001	0.8	1	0.8	0.1	0.9	0.9	0.9	1		
002	0.9	1	0.8	0.9	0.9	0.9	1	0.7		
003	0.8	0.8	1	0.6364	0.7	1	0.9	0.9091		
004	0.6	1	1	0.9	0.7	1	0.7	0.6		
005	1	1	0.9	0.8	0.7	0.7	0.9	0.5		
006	0.9	1	0.6	0.7	1	1	0.9	0.8		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-9811-3260	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	12.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	0.01803	1.761	0.153	14	0.4929	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.972	2.586	0.5829	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	9.827485E-06	9.827485E-06	1	0.000325	0.9859	Non-Significant Effect
Error	0.4231414	0.03022438	14			
Total	0.4231512		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.349	8.885	0.2825	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9017	0.8408	0.0855	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
006	8	0.8625	0.7366	0.9884	0.9	0.6	1	0.05324	17.46%	1.43%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
006	8	1.217	1.045	1.389	1.249	0.8861	1.432	0.0728	16.92%	0.13%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
006	0.9	1	0.6	0.7	1	1	0.9	0.8

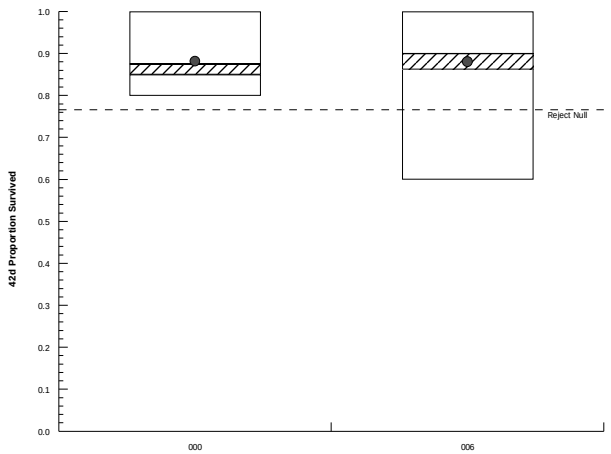
Angular (Corrected) Transformed Detail

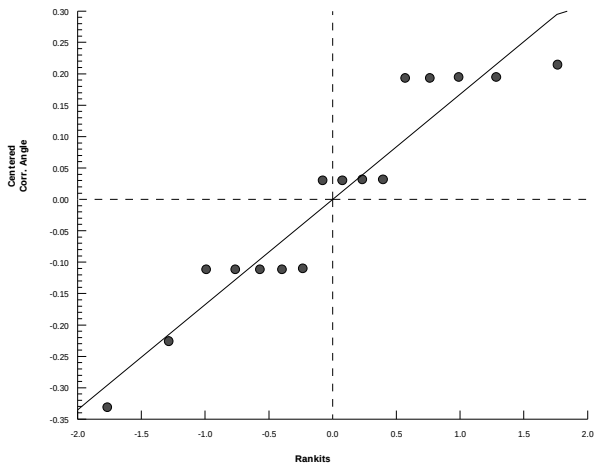
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
006	1.249	1.412	0.8861	0.9912	1.432	1.412	1.249	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-9811-3260	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7854-8655	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	0.7567	1.761	0.161	14	0.2309	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.061	2.586	0.4390	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01916389	0.01916389	1	0.5726	0.4618	Non-Significant Effect
Error	0.4685156	0.0334654	14			
Total	0.4876795		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.708	8.885	0.2121	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.943	0.8408	0.3871	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
005	8	0.8125	0.6681	0.9569	0.85	0.5	1	0.06105	21.25%	7.14%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
005	8	1.15	0.9648	1.334	1.178	0.7854	1.412	0.07817	19.23%	5.68%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
005	1	1	0.9	0.8	0.7	0.7	0.9	0.5

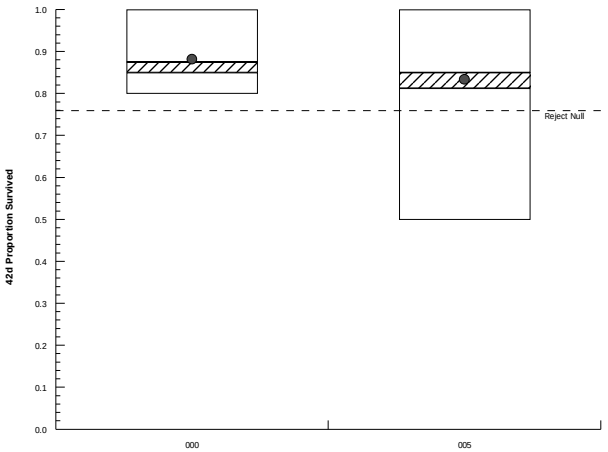
Angular (Corrected) Transformed Detail

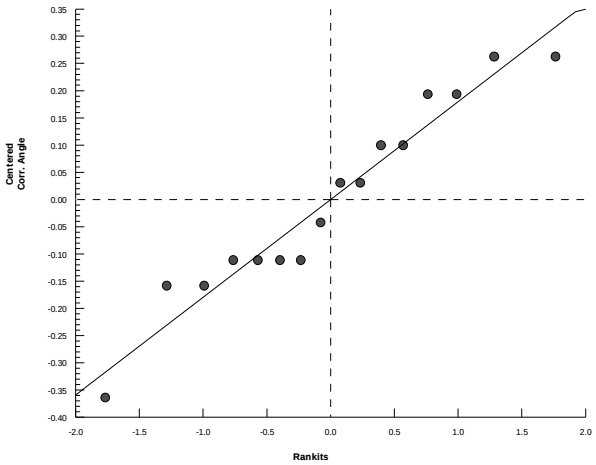
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
005	1.412	1.412	1.249	1.107	0.9912	0.9912	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7854-8655	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-4025-6841	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	14.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	0.6557	1.761	0.172	14	0.2613	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.428	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0163301	0.0163301	1	0.43	0.5226	Non-Significant Effect
Error	0.5317034	0.03797881	14			
Total	0.5480335		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.208	8.885	0.1470	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8962	0.8408	0.0699	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
004	8	0.8125	0.6614	0.9636	0.8	0.6	1	0.06391	22.25%	7.14%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
004	8	1.155	0.9538	1.356	1.12	0.8861	1.412	0.08508	20.84%	5.24%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
004	0.6	1	1	0.9	0.7	1	0.7	0.6

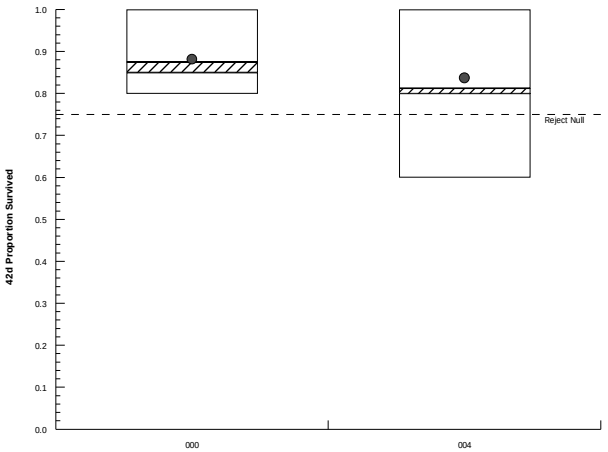
Angular (Corrected) Transformed Detail

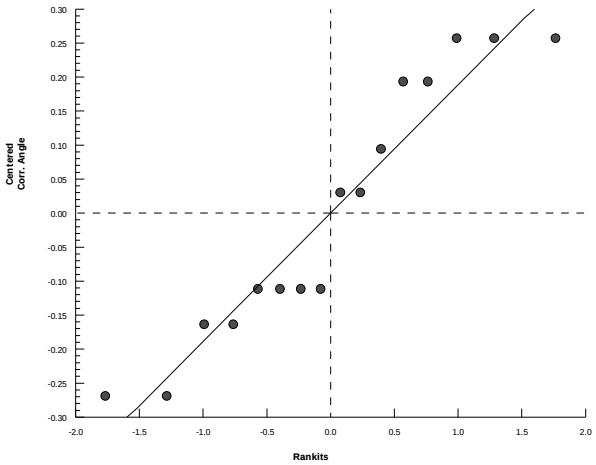
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
004	0.8861	1.412	1.412	1.249	0.9912	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-4025-6841	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-4976-2900	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	11.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	0.4443	1.761	0.141	14	0.3318	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.682	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.005046546	0.005046546	1	0.1974	0.6636	Non-Significant Effect
Error	0.3579069	0.02556478	14			
Total	0.3629535		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.832	8.885	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9257	0.8408	0.2085	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
003	8	0.8432	0.732	0.9543	0.85	0.6364	1	0.04701	15.77%	3.64%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
003	8	1.183	1.031	1.335	1.178	0.9235	1.412	0.0643	15.37%	2.91%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
003	0.8	0.8	1	0.6364	0.7	1	0.9	0.9091

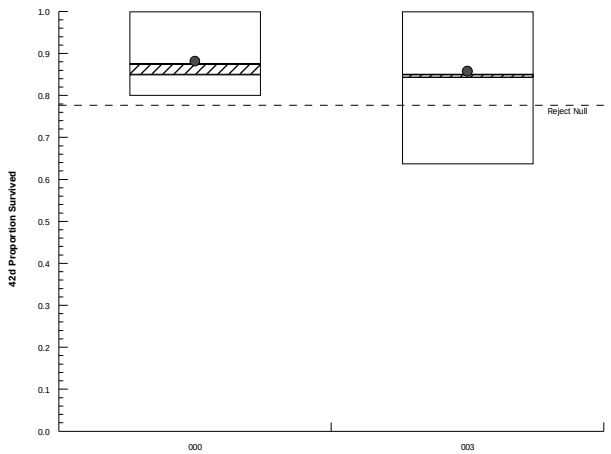
Angular (Corrected) Transformed Detail

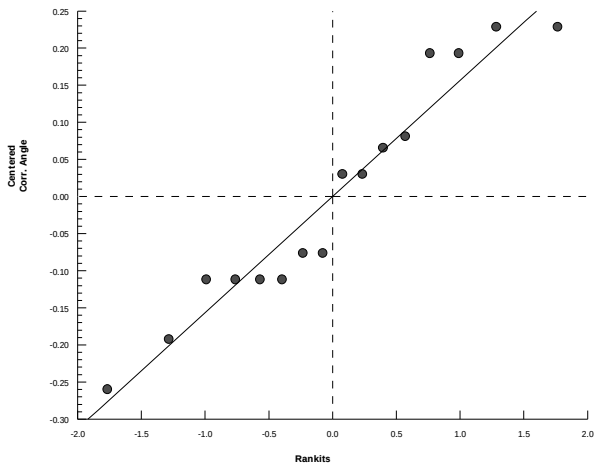
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
003	1.107	1.107	1.412	0.9235	0.9912	1.412	1.249	1.265

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-4976-2900	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-3013-6488	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.45%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-0.3047	1.761	0.121	14	0.6174	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.869	2.586	0.7902	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001759844	0.001759844	1	0.09282	0.7651	Non-Significant Effect
Error	0.2654372	0.0189598	14			
Total	0.267197		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.101	8.885	0.9026	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9119	0.8408	0.1250	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
002	8	0.8875	0.8046	0.9704	0.9	0.7	1	0.03504	11.17%	-1.43%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
002	8	1.24	1.122	1.358	1.249	0.9912	1.412	0.04984	11.37%	-1.72%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
002	0.9	1	0.8	0.9	0.9	0.9	1	0.7

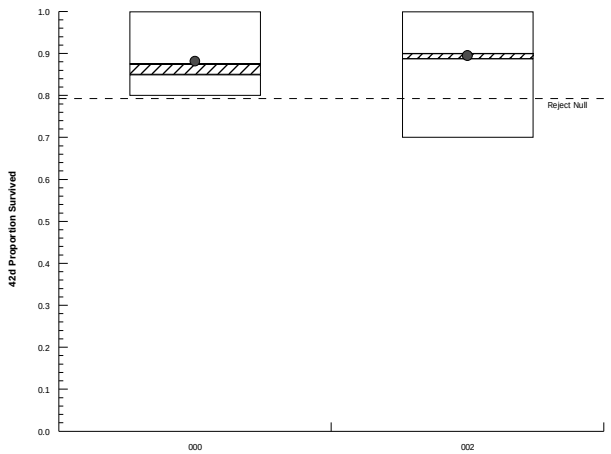
Angular (Corrected) Transformed Detail

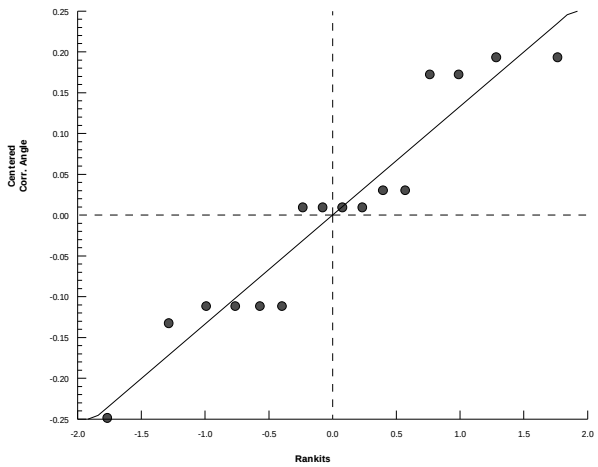
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
002	1.249	1.412	1.107	1.249	1.249	1.249	1.412	0.9912

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-3013-6488	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-4642-1937	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.25%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-0.5387	1.771	0.119	13	0.7004	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004899578	0.004899578	1	0.2902	0.5992	Non-Significant Effect
Error	0.219493	0.01688408	13			
Total	0.2243926		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.163	10.79	0.8700	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8725	0.8328	0.0367	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
001	7	0.9	0.8245	0.9755	0.9	0.8	1	0.03086	9.07%	-2.86%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
001	7	1.255	1.14	1.37	1.249	1.107	1.412	0.04709	9.93%	-2.97%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
001	0.8	1	0.8	Outlier	0.9	0.9	0.9	1

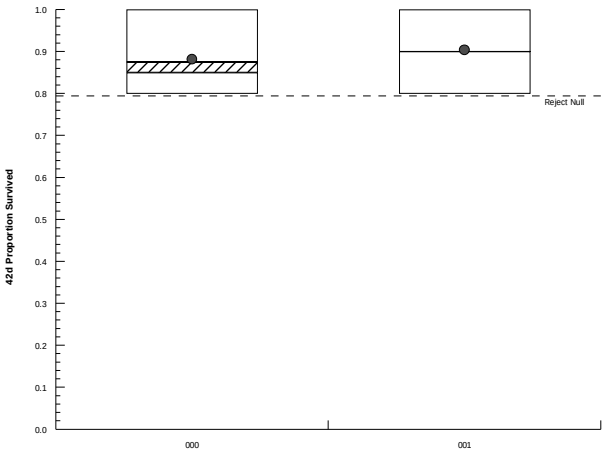
Angular (Corrected) Transformed Detail

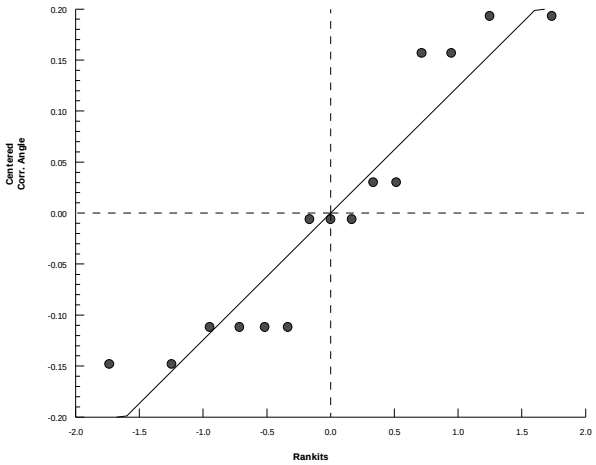
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
001	1.107	1.412	1.107	1.249	1.249	1.249	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-4642-1937	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4050-0150	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	20.6%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		001	69	NA	4	14	0.6010	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	3.192	2.586	0.0005	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02588085	0.02588085	1	0.3691	0.5532	Non-Significant Effect
Error	0.9816872	0.07012051	14			
Total	1.007568		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.769	8.885	0.0219	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.769	0.8408	0.0011	Non-normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
001	8	0.8	0.5552	1	0.9	0.1	1	0.1035	36.6%	8.57%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
001	8	1.138	0.8462	1.431	1.249	0.3218	1.412	0.1236	30.71%	6.6%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
001	0.8	1	0.8	0.1	0.9	0.9	0.9	1

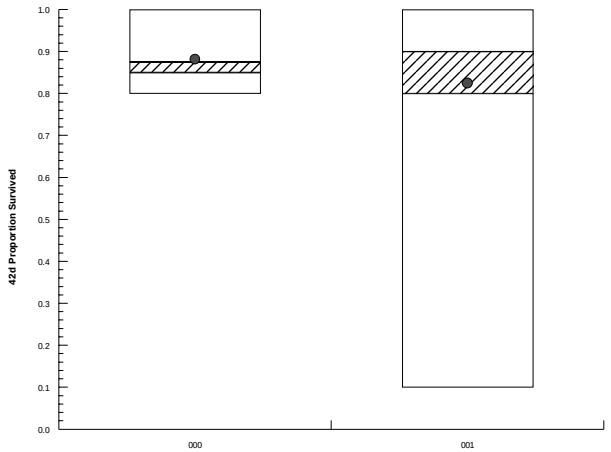
Angular (Corrected) Transformed Detail

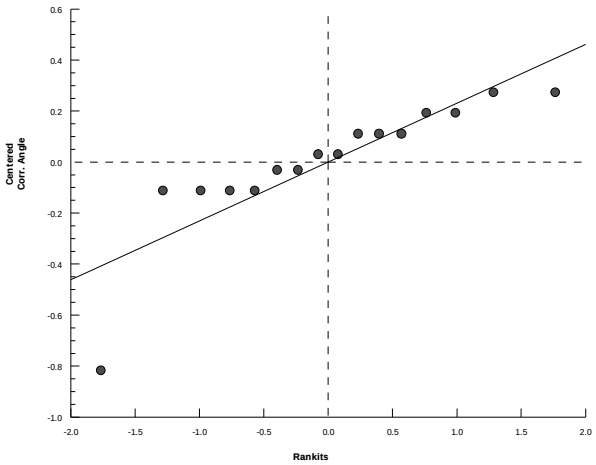
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
001	1.107	1.412	1.107	0.3218	1.249	1.249	1.249	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4050-0150	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-7839-4854	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	-0.5662	1.761	0.137	14	0.7099	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.81	2.586	0.9320	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007737208	0.007737208	1	0.3206	0.5802	Non-Significant Effect
Error	0.3378543	0.02413245	14			
Total	0.3455915		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.674	8.885	0.5130	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8971	0.8408	0.0722	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	-2.86%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	-3.61%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
008	1	0.9	0.8	1	1	0.7	1	0.8

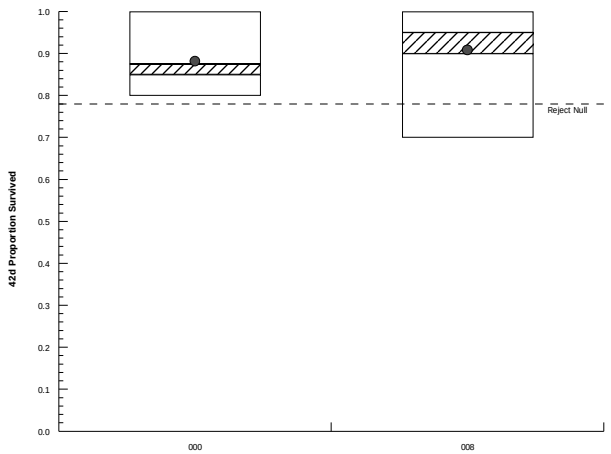
Angular (Corrected) Transformed Detail

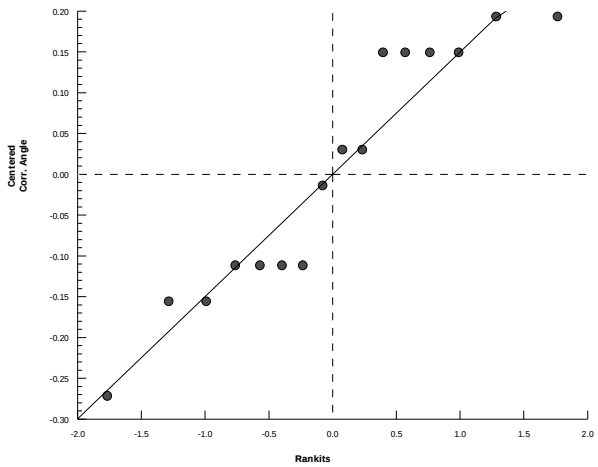
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-7839-4854	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-2597-8769	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.01%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		007	53	NA	4	13	0.4070	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.802	2.548	0.8778	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002843206	0.002843206	1	0.176	0.6817	Non-Significant Effect
Error	0.210069	0.01615916	13			
Total	0.2129122		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.294	10.79	0.7694	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8163	0.8328	0.0060	Non-normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.875	0.8009	0.9491	0.85	0.8	1	0.03134	10.13%	0.0%
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	2.04%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.219	1.107	1.331	1.178	1.107	1.412	0.0475	11.02%	0.0%
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	2.26%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9	1	0.8	0.8	1	0.8	0.8	0.9
007	0.8	0.8	1	0.8	0.9	0.8	0.9	

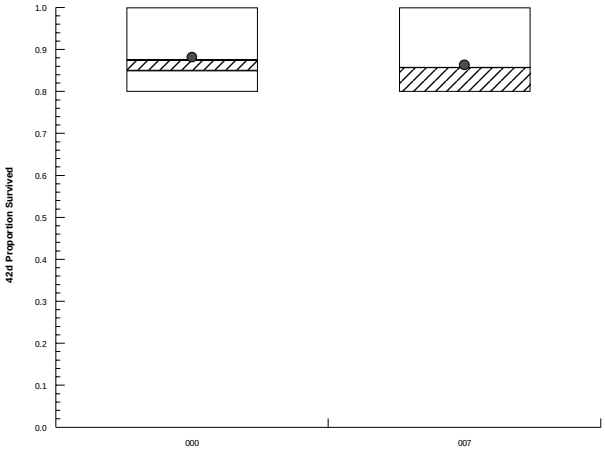
Angular (Corrected) Transformed Detail

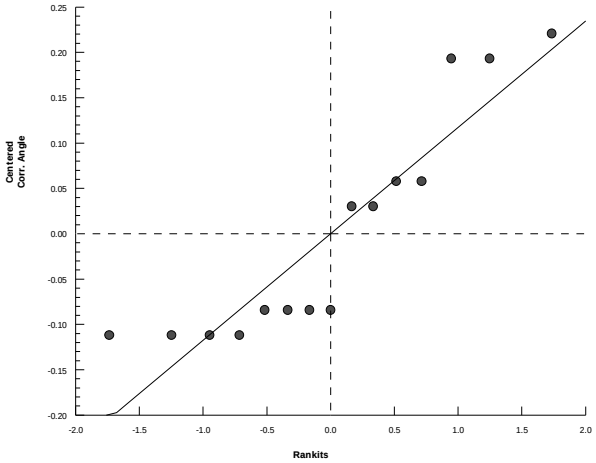
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	1.249	1.412	1.107	1.107	1.412	1.107	1.107	1.249
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-2597-8769	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-6451-4468	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	-0.294	1.771	0.157	13	0.6133	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.009	2.548	0.4720	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002529399	0.002529399	1	0.08642	0.7734	Non-Significant Effect
Error	0.3804933	0.02926871	13			
Total	0.3830227		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.039	10.79	0.1969	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9307	0.8328	0.2794	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
006	8	0.8625	0.7366	0.9884	0.9	0.6	1	0.05324	17.46%	-0.63%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
006	8	1.217	1.045	1.389	1.249	0.8861	1.432	0.0728	16.92%	-2.19%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
006	0.9	1	0.6	0.7	1	1	0.9	0.8

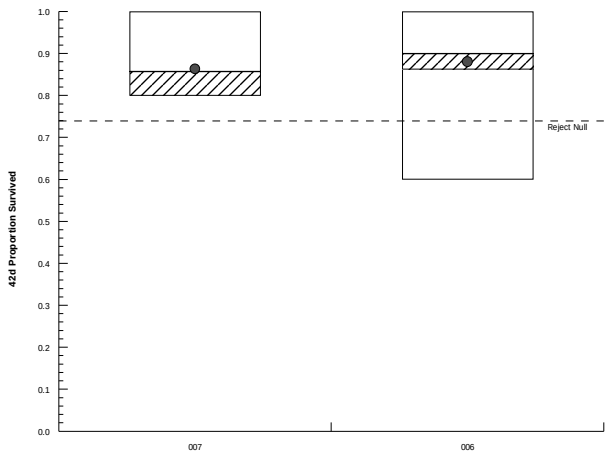
Angular (Corrected) Transformed Detail

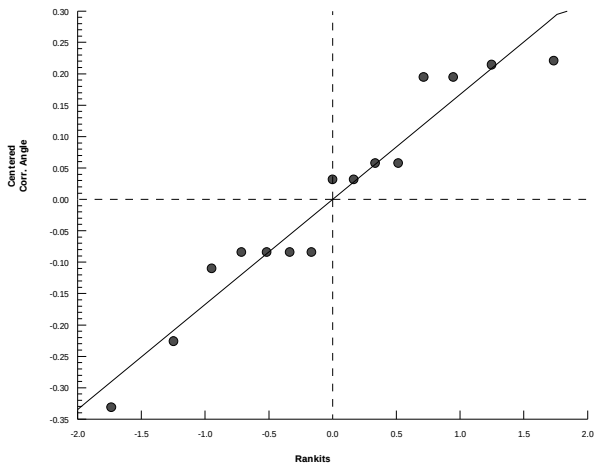
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
006	1.249	1.412	0.8861	0.9912	1.432	1.412	1.249	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-6451-4468	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-7105-9243	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	14.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	0.4443	1.771	0.166	13	0.3321	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.088	2.548	0.3616	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006467046	0.006467046	1	0.1974	0.6641	Non-Significant Effect
Error	0.4258676	0.03275904	13			
Total	0.4323346		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.503	10.79	0.1477	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.945	0.8328	0.4499	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
005	8	0.8125	0.6681	0.9569	0.85	0.5	1	0.06105	21.25%	5.21%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
005	8	1.15	0.9648	1.334	1.178	0.7854	1.412	0.07817	19.23%	3.49%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
005	1	1	0.9	0.8	0.7	0.7	0.9	0.5

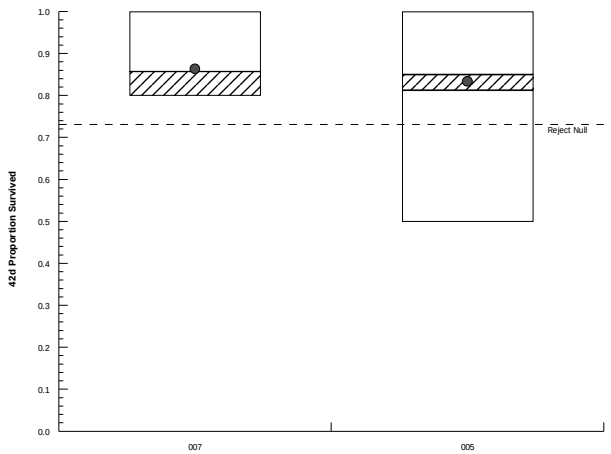
Angular (Corrected) Transformed Detail

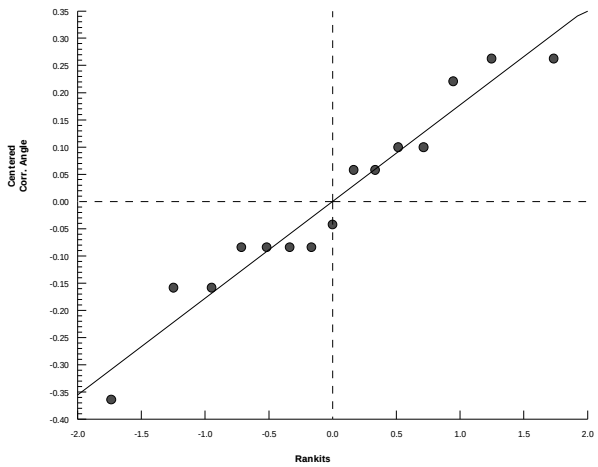
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
005	1.412	1.412	1.249	1.107	0.9912	0.9912	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-7105-9243	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-2599-5938	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	16.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.3616	1.771	0.178	13	0.3617	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.439	2.548	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004918841	0.004918841	1	0.1308	0.7235	Non-Significant Effect
Error	0.4890553	0.03761964	13			
Total	0.4939741		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.15	10.79	0.1030	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9035	0.8328	0.1077	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
004	8	0.8125	0.6614	0.9636	0.8	0.6	1	0.06391	22.25%	5.21%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
004	8	1.155	0.9538	1.356	1.12	0.8861	1.412	0.08508	20.84%	3.05%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
004	0.6	1	1	0.9	0.7	1	0.7	0.6

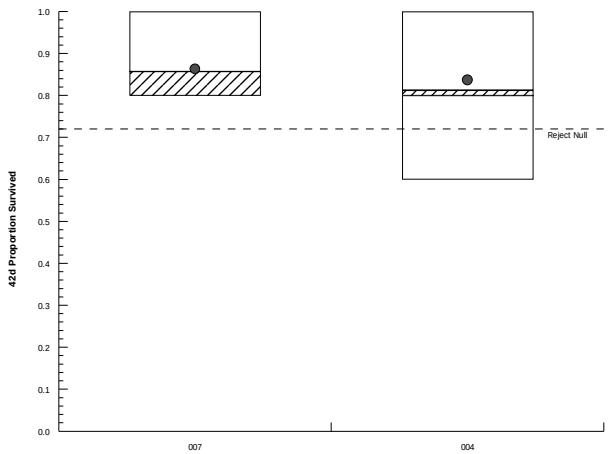
Angular (Corrected) Transformed Detail

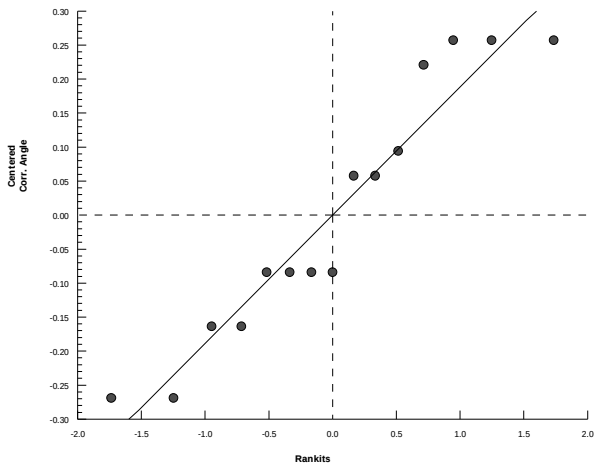
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
004	0.8861	1.412	1.412	1.249	0.9912	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-2599-5938	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-2747-5522	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	12.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	0.0983	1.771	0.143	13	0.4616	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.731	2.548	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002343508	0.0002343508	1	0.009664	0.9232	Non-Significant Effect
Error	0.3152588	0.02425068	13			
Total	0.3154932		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.371	10.79	0.3127	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9127	0.8328	0.1492	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
003	8	0.8432	0.732	0.9543	0.85	0.6364	1	0.04701	15.77%	1.63%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
003	8	1.183	1.031	1.335	1.178	0.9235	1.412	0.0643	15.37%	0.67%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
003	0.8	0.8	1	0.6364	0.7	1	0.9	0.9091

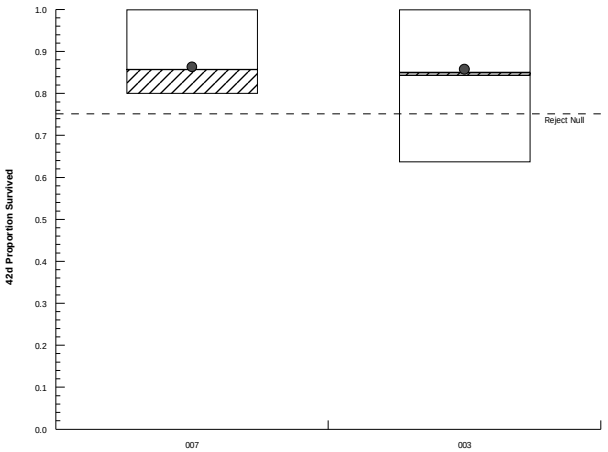
Angular (Corrected) Transformed Detail

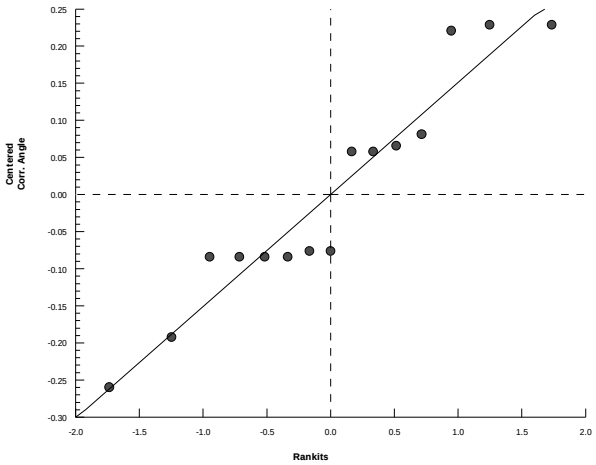
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
003	1.107	1.107	1.412	0.9235	0.9912	1.412	1.249	1.265

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-2747-5522	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-2895-9473	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	10.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.7169	1.771	0.12	13	0.7569	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.971	2.548	0.5328	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.008807776	0.008807776	1	0.5139	0.4861	Non-Significant Effect
Error	0.2227891	0.01713762	13			
Total	0.2315969		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.424	10.79	0.6826	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9521	0.8328	0.5573	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
002	8	0.8875	0.8046	0.9704	0.9	0.7	1	0.03504	11.17%	-3.54%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
002	8	1.24	1.122	1.358	1.249	0.9912	1.412	0.04984	11.37%	-4.08%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
002	0.9	1	0.8	0.9	0.9	0.9	1	0.7

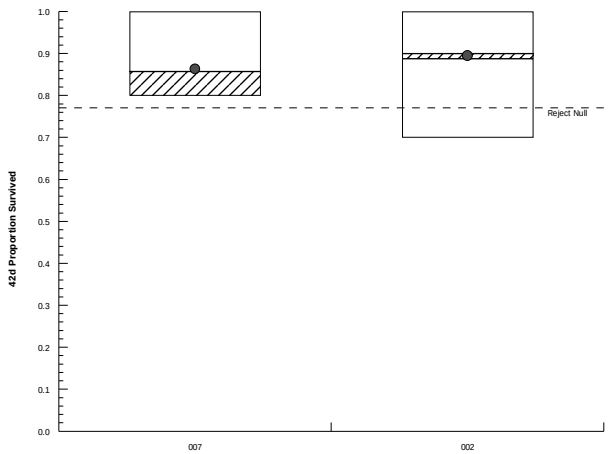
Angular (Corrected) Transformed Detail

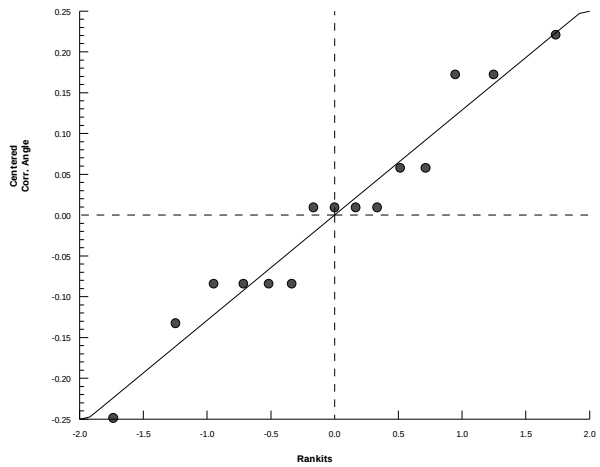
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
002	1.249	1.412	1.107	1.249	1.249	1.249	1.412	0.9912

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-2895-9473	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-3647-1367	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.68%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-0.9836	1.782	0.116	12	0.8276	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01425703	0.01425703	1	0.9674	0.3447	Non-Significant Effect
Error	0.1768449	0.01473708	12			
Total	0.191102		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.113	11.07	0.9003	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9178	0.8239	0.2045	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8571	0.7844	0.9299	0.8	0.8	1	0.02974	9.18%	0.0%
001	7	0.9	0.8245	0.9755	0.9	0.8	1	0.03086	9.07%	-5.0%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.191	1.082	1.3	1.107	1.107	1.412	0.04464	9.92%	0.0%
001	7	1.255	1.14	1.37	1.249	1.107	1.412	0.04709	9.93%	-5.36%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8	0.8	1	0.8	0.9	0.8	0.9	
001	0.8	1	0.8	Outlier	0.9	0.9	0.9	1

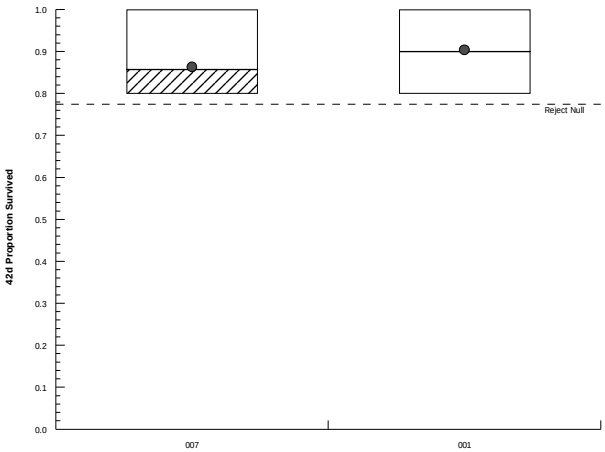
Angular (Corrected) Transformed Detail

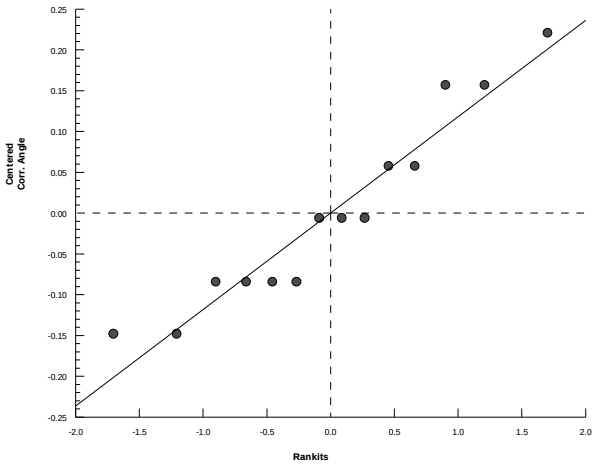
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	1.107	1.107	1.412	1.107	1.249	1.107	1.249	
001	1.107	1.412	1.107	1.249	1.249	1.249	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-3647-1367	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-6660-5928	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	12.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	0.4781	1.761	0.168	14	0.3200	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.799	2.586	0.9602	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.008298533	0.008298533	1	0.2286	0.6400	Non-Significant Effect
Error	0.5082785	0.03630561	14			
Total	0.5165771		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.403	8.885	0.6661	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8948	0.8408	0.0663	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
006	8	0.8625	0.7366	0.9884	0.9	0.6	1	0.05324	17.46%	4.17%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
006	8	1.217	1.045	1.389	1.249	0.8861	1.432	0.0728	16.92%	3.61%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
006	0.9	1	0.6	0.7	1	1	0.9	0.8

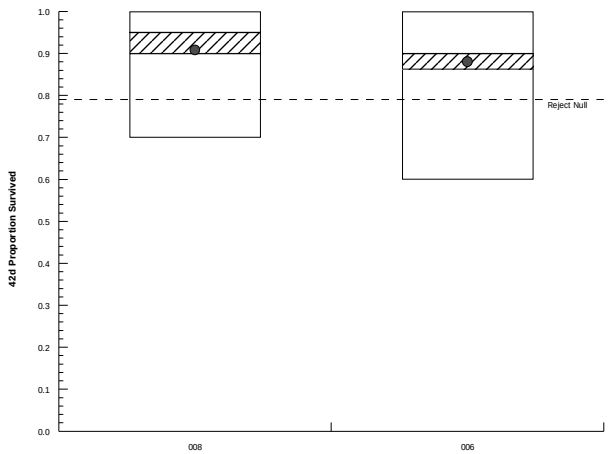
Angular (Corrected) Transformed Detail

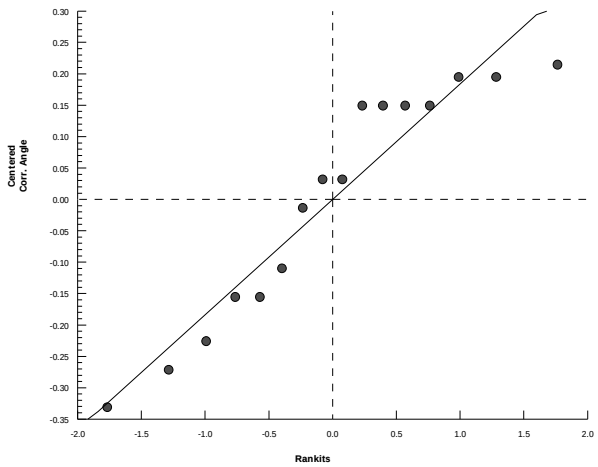
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
006	1.249	1.412	0.8861	0.9912	1.432	1.412	1.249	1.107

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-6660-5928	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-8293-7459	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	12.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	1.138	1.761	0.175	14	0.1370	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.896	2.586	0.7319	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05125474	0.05125474	1	1.296	0.2740	Non-Significant Effect
Error	0.5536528	0.03954663	14			
Total	0.6049076		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.618	8.885	0.5410	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9241	0.8408	0.1961	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
005	8	0.8125	0.6681	0.9569	0.85	0.5	1	0.06105	21.25%	9.72%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
005	8	1.15	0.9648	1.334	1.178	0.7854	1.412	0.07817	19.23%	8.96%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
005	1	1	0.9	0.8	0.7	0.7	0.9	0.5

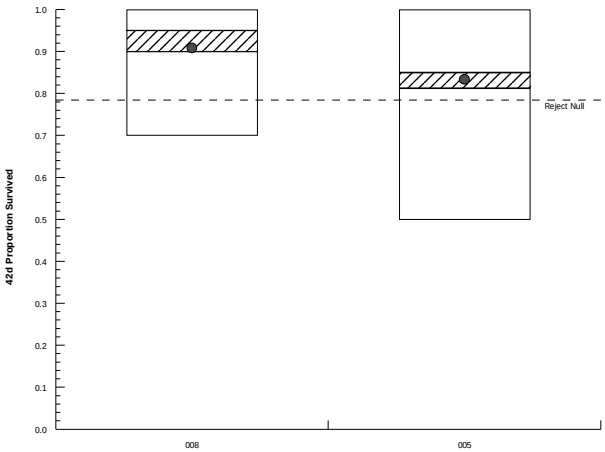
Angular (Corrected) Transformed Detail

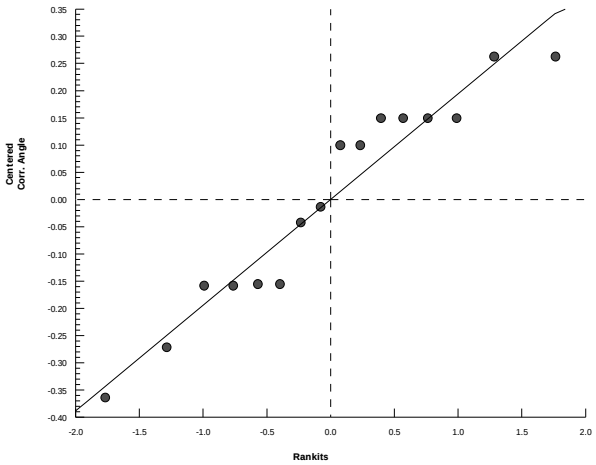
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
005	1.412	1.412	1.249	1.107	0.9912	0.9912	1.249	0.7854

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-8293-7459	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-6539-2189	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	13.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	1.028	1.761	0.185	14	0.1607	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.34	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04654836	0.04654836	1	1.056	0.3215	Non-Significant Effect
Error	0.6168405	0.04406004	14			
Total	0.6633889		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.917	8.885	0.4102	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8634	0.8408	0.0216	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
004	8	0.8125	0.6614	0.9636	0.8	0.6	1	0.06391	22.25%	9.72%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
004	8	1.155	0.9538	1.356	1.12	0.8861	1.412	0.08508	20.84%	8.54%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
004	0.6	1	1	0.9	0.7	1	0.7	0.6

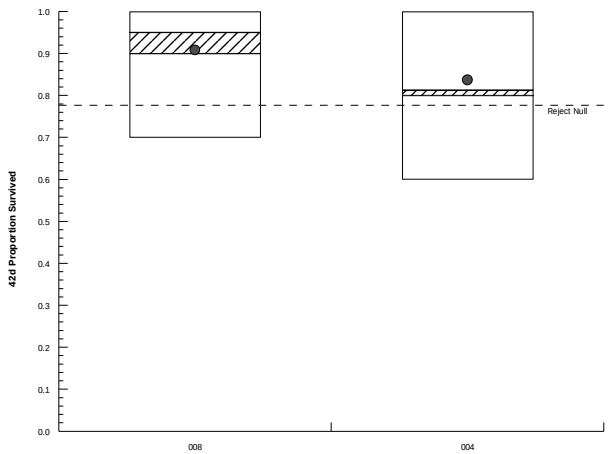
Angular (Corrected) Transformed Detail

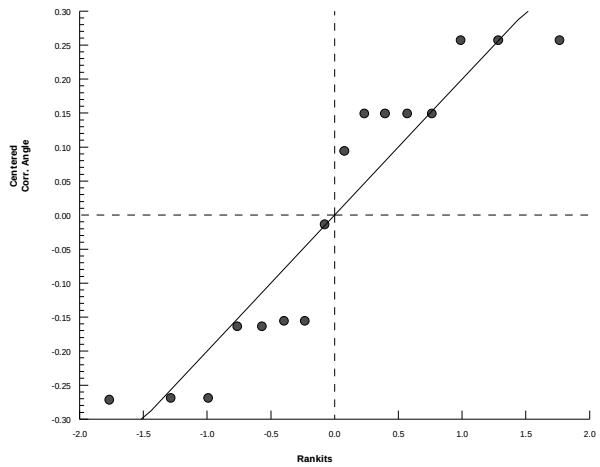
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
004	0.8861	1.412	1.412	1.249	0.9912	1.412	0.9912	0.8861

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-6539-2189	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6818-7885	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	11.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	0.8938	1.761	0.157	14	0.1933	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.581	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02528114	0.02528114	1	0.7989	0.3865	Non-Significant Effect
Error	0.4430441	0.03164601	14			
Total	0.4683252		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.095	8.885	0.9080	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9148	0.8408	0.1389	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
003	8	0.8432	0.732	0.9543	0.85	0.6364	1	0.04701	15.77%	6.31%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
003	8	1.183	1.031	1.335	1.178	0.9235	1.412	0.0643	15.37%	6.3%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
003	0.8	0.8	1	0.6364	0.7	1	0.9	0.9091

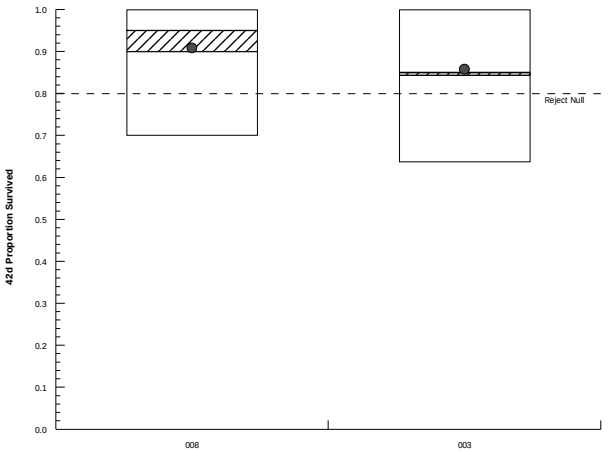
Angular (Corrected) Transformed Detail

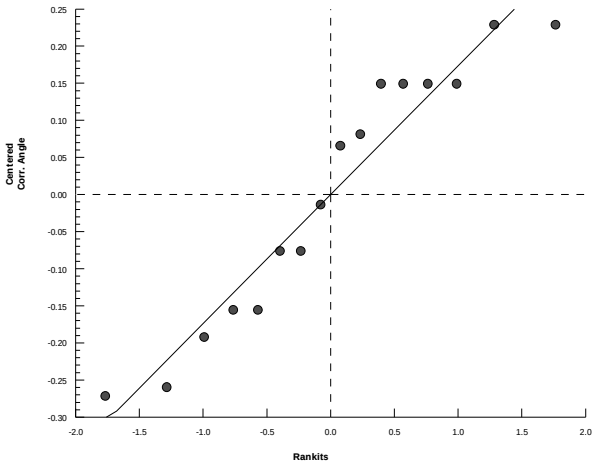
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
003	1.107	1.107	1.412	0.9235	0.9912	1.412	1.249	1.265

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6818-7885	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-8219-8725	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.68%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	0.2908	1.761	0.139	14	0.3877	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.777	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002117004	0.002117004	1	0.08454	0.7755	Non-Significant Effect
Error	0.3505744	0.02504103	14			
Total	0.3526914		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.521	8.885	0.5939	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.882	0.8408	0.0417	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
002	8	0.8875	0.8046	0.9704	0.9	0.7	1	0.03504	11.17%	1.39%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
002	8	1.24	1.122	1.358	1.249	0.9912	1.412	0.04984	11.37%	1.82%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
002	0.9	1	0.8	0.9	0.9	0.9	1	0.7

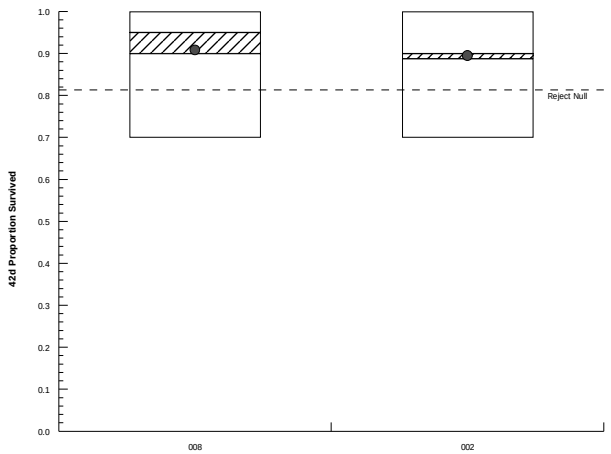
Angular (Corrected) Transformed Detail

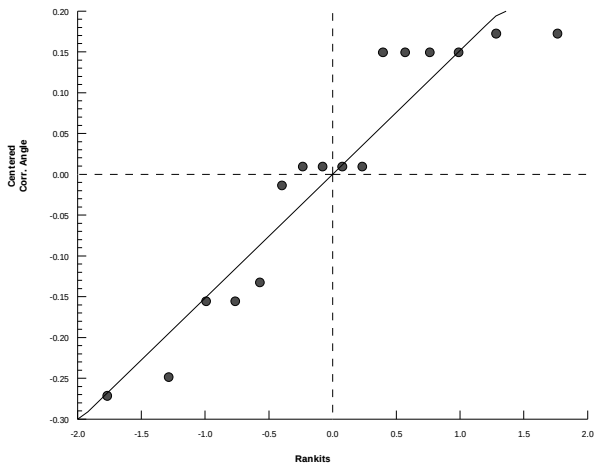
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
002	1.249	1.412	1.107	1.249	1.249	1.249	1.412	0.9912

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-8219-8725	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-4120-1261	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	9.76%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	0.09787	1.771	0.140	13	0.4618	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002244544	0.0002244544	1	0.009579	0.9235	Non-Significant Effect
Error	0.3046302	0.02343309	13			
Total	0.3048546		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.946	10.79	0.4351	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8556	0.8328	0.0209	Normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
001	7	0.9	0.8245	0.9755	0.9	0.8	1	0.03086	9.07%	0.0%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
001	7	1.255	1.14	1.37	1.249	1.107	1.412	0.04709	9.93%	0.61%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
001	0.8	1	0.8	Outlier	0.9	0.9	0.9	1

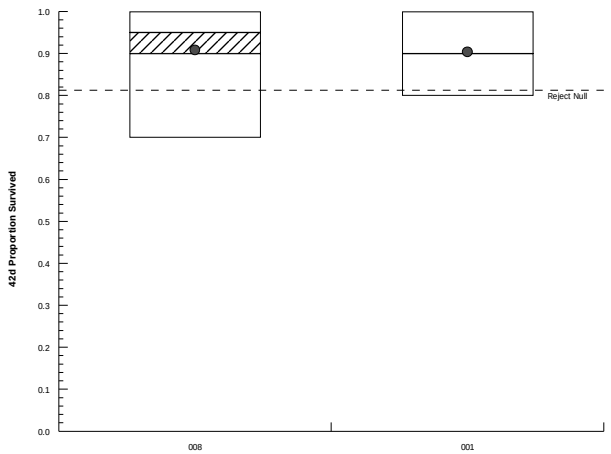
Angular (Corrected) Transformed Detail

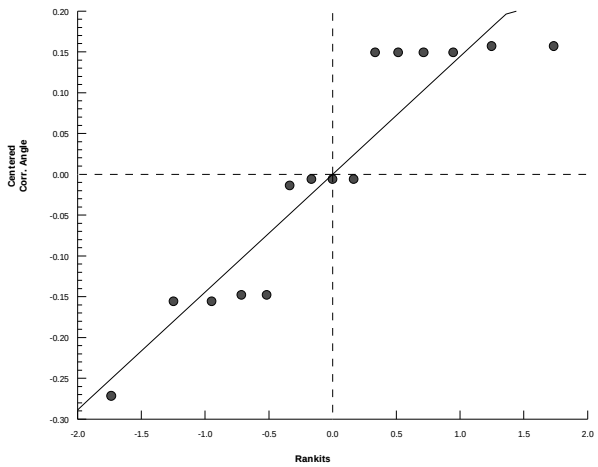
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
001	1.107	1.412	1.107	1.249	1.249	1.249	1.412	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-4120-1261	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7485-1942	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	19.4%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		001	62.5	NA	3	14	0.2867	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	3.062	2.586	0.0018	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06191969	0.06191969	1	0.8126	0.3826	Non-Significant Effect
Error	1.066824	0.07620174	14			
Total	1.128744		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.044	8.885	0.0853	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7905	0.8408	0.0020	Non-normal Distribution

42d Proportion Survived Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.9	0.8001	0.9999	0.95	0.7	1	0.04226	13.28%	0.0%
001	8	0.8	0.5552	1	0.9	0.1	1	0.1035	36.6%	11.11%

Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.263	1.118	1.408	1.331	0.9912	1.412	0.06145	13.76%	0.0%
001	8	1.138	0.8462	1.431	1.249	0.3218	1.412	0.1236	30.71%	9.85%

42d Proportion Survived Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1	0.9	0.8	1	1	0.7	1	0.8
001	0.8	1	0.8	0.1	0.9	0.9	0.9	1

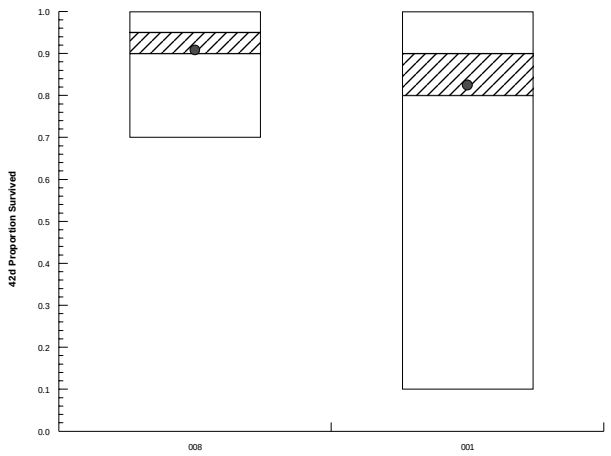
Angular (Corrected) Transformed Detail

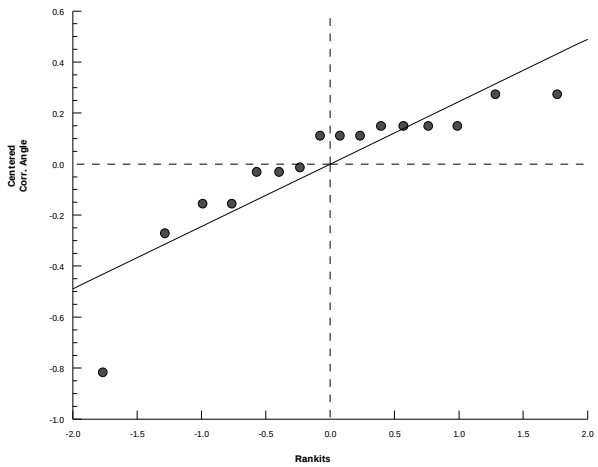
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	1.412	1.249	1.107	1.412	1.412	0.9912	1.412	1.107
001	1.107	1.412	1.107	0.3218	1.249	1.249	1.249	1.412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7485-1942	**Endpoint:**	42d Proportion Survived	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 28 Dry Weight Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date:	08 Jan-13 15:51 (p 1 of 1)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.6333	0.872	0.1193	0.1688	22.42%	0.0%
007	4	0.5865	0.4784	0.6946	0.52	0.671	0.03396	0.06791	11.58%	22.08%
008	4	0.5536	0.45	0.6572	0.49	0.6444	0.03255	0.06511	11.76%	26.45%
001	3	0.537	0.5025	0.5715	0.5289	0.553	0.008019	0.01389	2.59%	28.66%
002	3	0.7563	0.5017	1.011	0.659	0.8633	0.05918	0.1025	13.55%	-0.49%
003	4	0.4671	0.3345	0.5996	0.3763	0.566	0.04164	0.08328	17.83%	37.95%
004	4	0.5065	0.3076	0.7054	0.376	0.667	0.06249	0.125	24.67%	32.71%
005	4	0.7115	0.5859	0.837	0.6271	0.8067	0.03946	0.07892	11.09%	5.48%
006	4	0.5631	0.4318	0.6943	0.444	0.625	0.04125	0.08249	14.65%	25.19%

28d Mean Dry Weight Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
007	0.545	0.671	0.61	0.52						
008	0.6444	0.535	0.49	0.545						
001	0.5289	0.553	0.529							
002	0.659	0.8633	0.7467							
003	0.3763	0.426	0.566	0.5						
004	0.534	0.376	0.667	0.449						
005	0.671	0.6271	0.8067	0.741						
006	0.625	0.6112	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-5106-3547	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	1.98	2.132	0.204	4	0.0594	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.207	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04793351	0.04793351	1	3.921	0.1188	Non-Significant Effect
Error	0.04889493	0.01222373	4			
Total	0.09682845		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.185	55.55	0.2666	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8825	0.43	0.2809	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
006	4	0.5631	0.4318	0.6943	0.5916	0.444	0.625	0.04125	14.65%	25.19%

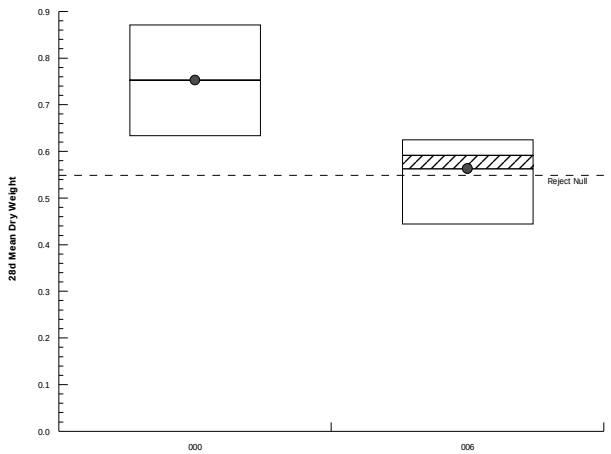
28d Mean Dry Weight Detail

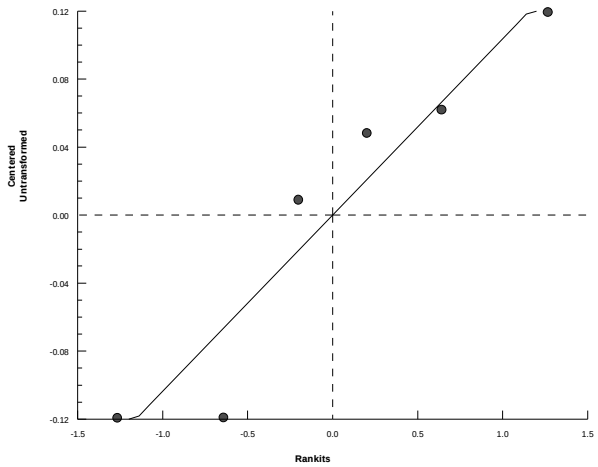
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
006	0.625	0.6112	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-5106-3547	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-9251-8974	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	26.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	0.4383	2.132	0.201	4	0.3419	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.229	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002264894	0.002264894	1	0.1921	0.6838	Non-Significant Effect
Error	0.04716377	0.01179094	4			
Total	0.04942866		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.573	55.55	0.2441	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9353	0.43	0.6215	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
005	4	0.7115	0.5859	0.837	0.706	0.6271	0.8067	0.03946	11.09%	5.48%

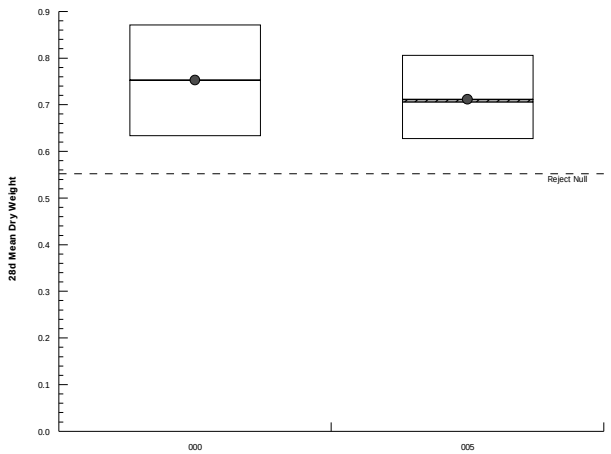
28d Mean Dry Weight Detail

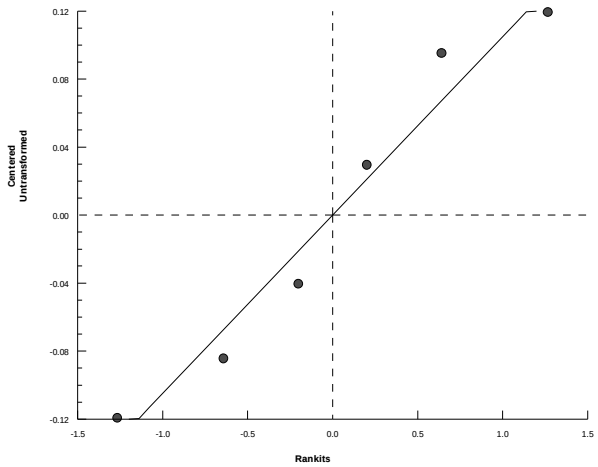
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
005	0.671	0.6271	0.8067	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-9251-8974	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-8019-8832	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	33.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	2.071	2.132	0.253	4	0.0535	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.308	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.08079819	0.08079819	1	4.29	0.1071	Non-Significant Effect
Error	0.07533377	0.01883344	4			
Total	0.156132		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.824	55.55	0.5394	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9084	0.43	0.4262	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	32.71%

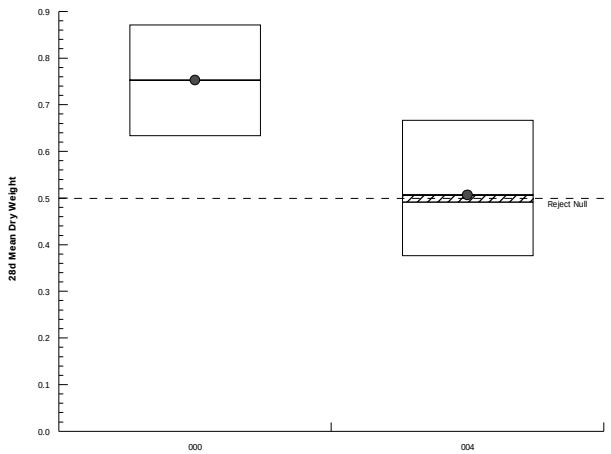
28d Mean Dry Weight Detail

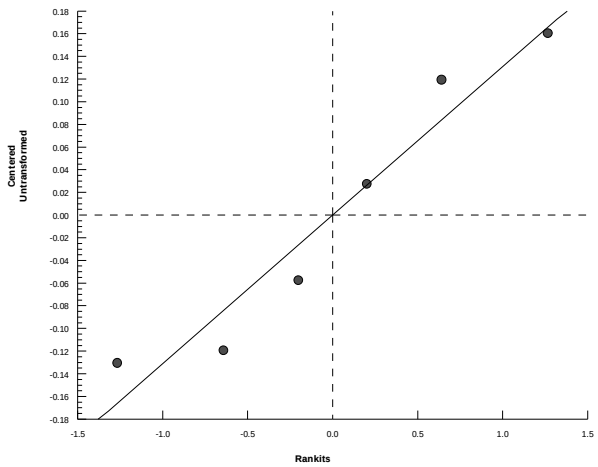
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-8019-8832	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-1192-8277	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	2.971	2.132	0.205	4	0.0206	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.202	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.10876	0.10876	1	8.827	0.0411	Significant Effect
Error	0.04928702	0.01232176	4			
Total	0.158047		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.107	55.55	0.2716	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9227	0.43	0.5248	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
003	4	0.4671	0.3345	0.5996	0.463	0.3763	0.566	0.04164	17.83%	37.95%

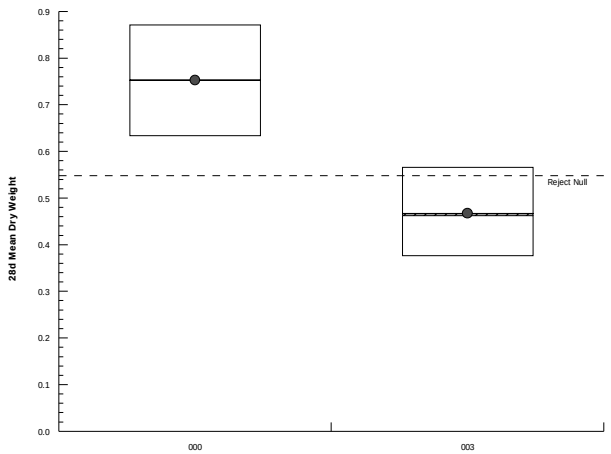
28d Mean Dry Weight Detail

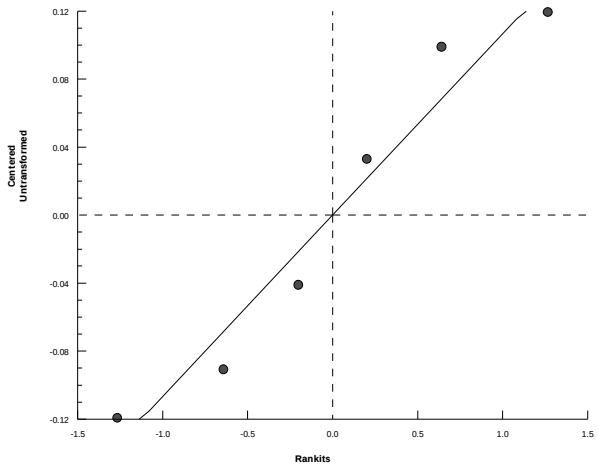
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
003	0.3763	0.426	0.566	0.5						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-1192-8277	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-6547-1659	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	36.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-0.03126	2.353	0.276	3	0.5115	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.073	1.715	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.612252E-05	1.612252E-05	1	0.000977	0.9770	Non-Significant Effect
Error	0.04949661	0.01649887	3			
Total	0.04951274		4			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.71	198.5	0.4829	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8736	0.1883	0.2814	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
002	3	0.7563	0.5017	1.011	0.7467	0.659	0.8633	0.05918	13.55%	-0.49%

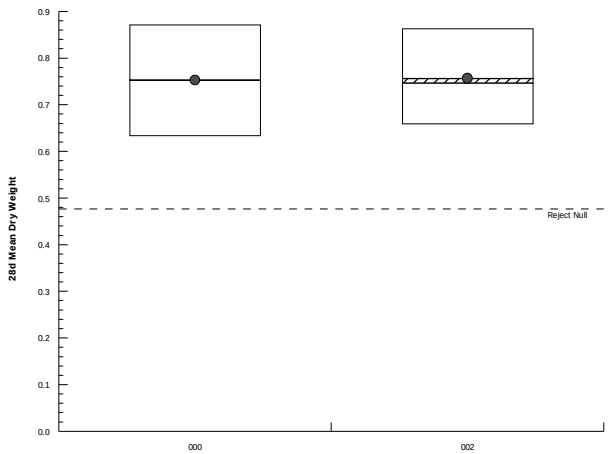
28d Mean Dry Weight Detail

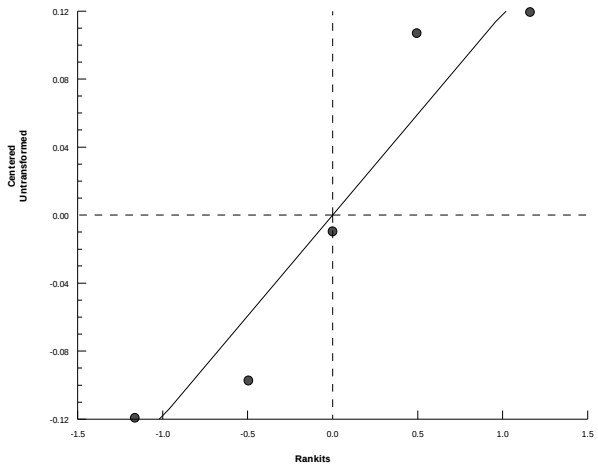
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
002	0.659	0.8633	0.7467							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-6547-1659	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-4044-4144	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	28.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	2.409	2.353	0.211	3	0.0476	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.405	1.715	0.5776	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05583406	0.05583406	1	5.803	0.0951	Non-Significant Effect
Error	0.02886644	0.009622146	3			
Total	0.0847005		4			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	147.6	198.5	0.0134	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9368	0.1883	0.6435	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
001	3	0.537	0.5025	0.5715	0.529	0.5289	0.553	0.008019	2.59%	28.66%

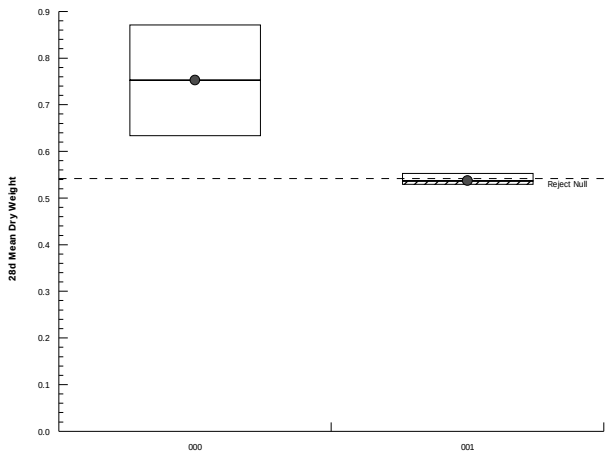
28d Mean Dry Weight Detail

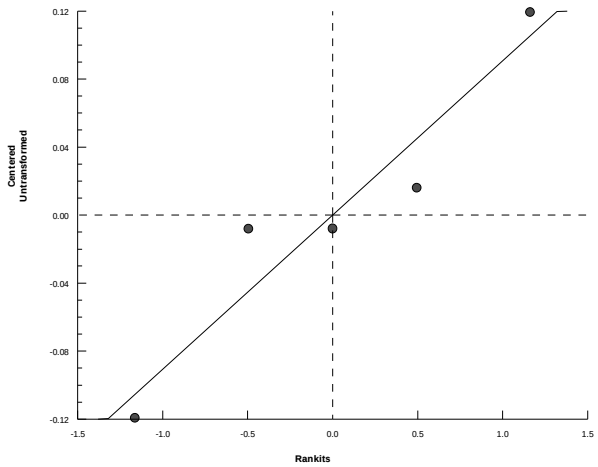
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
001	0.5289	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-4044-4144	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-5368-4034	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	24.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	2.265	2.132	0.187	4	0.0431	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.315	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05283087	0.05283087	1	5.129	0.0862	Non-Significant Effect
Error	0.04119814	0.01029954	4			
Total	0.09402901		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.718	55.55	0.1619	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9486	0.43	0.7292	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	26.45%

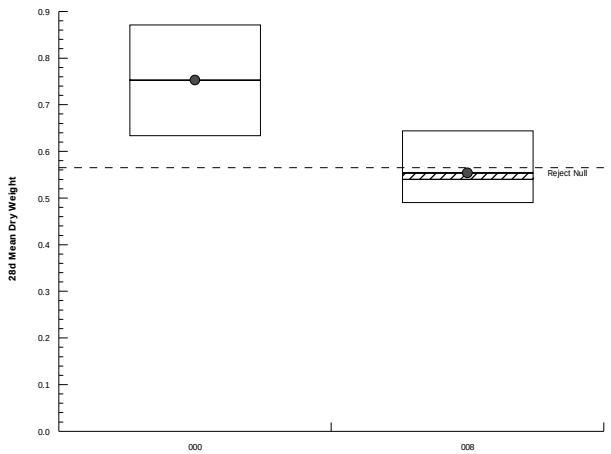
28d Mean Dry Weight Detail

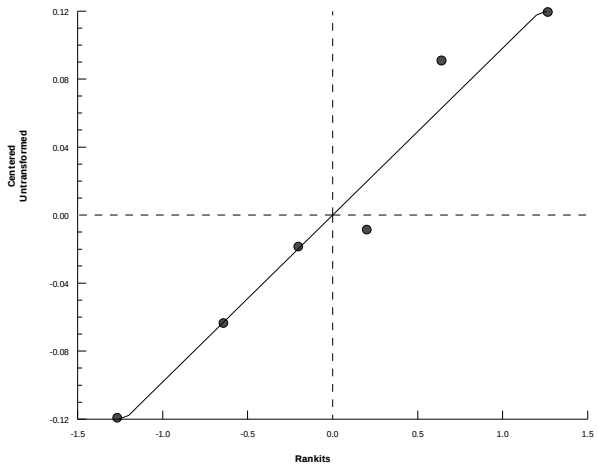
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
008	0.6444	0.535	0.49	0.545						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-5368-4034	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-1295-1613	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	25.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	1.865	2.132	0.19	4	0.0678	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.297	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03681539	0.03681539	1	3.48	0.1355	Non-Significant Effect
Error	0.04231735	0.01057934	4			
Total	0.07913274		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.175	55.55	0.1778	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9602	0.43	0.8214	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.7527	-0.7636	2.269	0.7527	0.6333	0.872	0.1193	22.42%	0.0%
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	22.08%

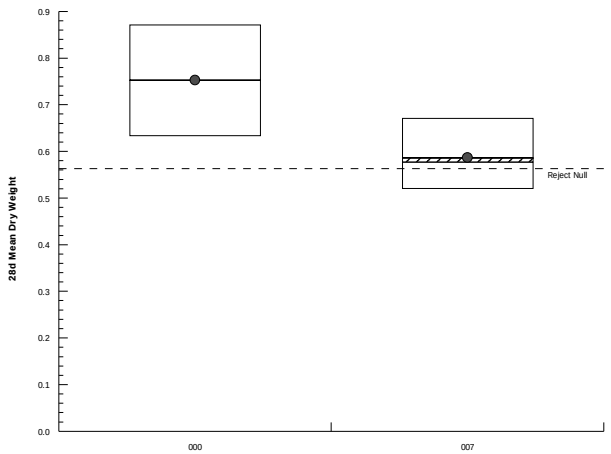
28d Mean Dry Weight Detail

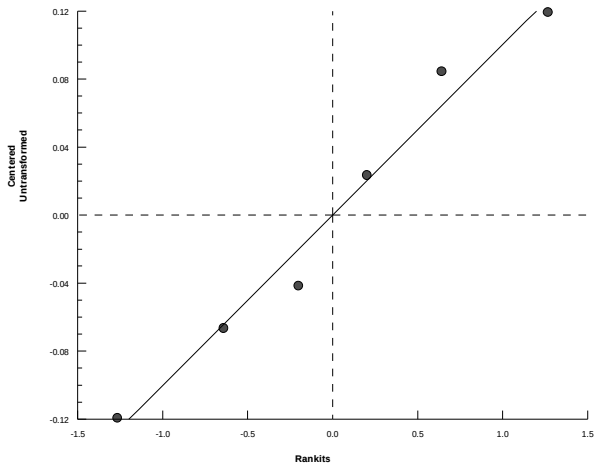
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.6333								
007	0.545	0.671	0.61	0.52						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-1295-1613	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8641-6886	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.4387	1.943	0.104	6	0.3381	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.702	2.127	0.4752	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001098678	0.001098678	1	0.1925	0.6762	Non-Significant Effect
Error	0.03425111	0.005708518	6			
Total	0.03534979		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.475	47.47	0.7570	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9493	0.6451	0.7044	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
006	4	0.5631	0.4318	0.6943	0.5916	0.444	0.625	0.04125	14.65%	4.0%

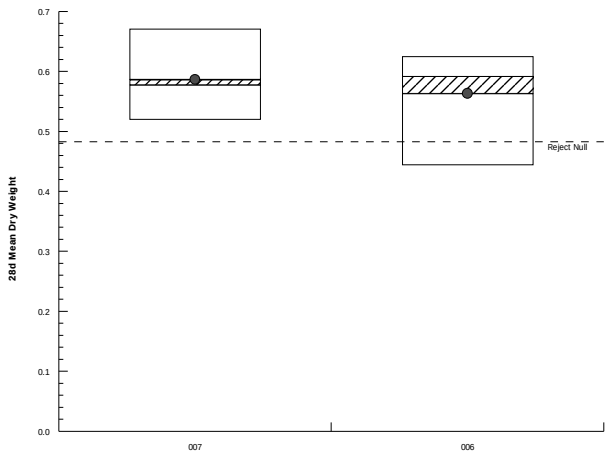
28d Mean Dry Weight Detail

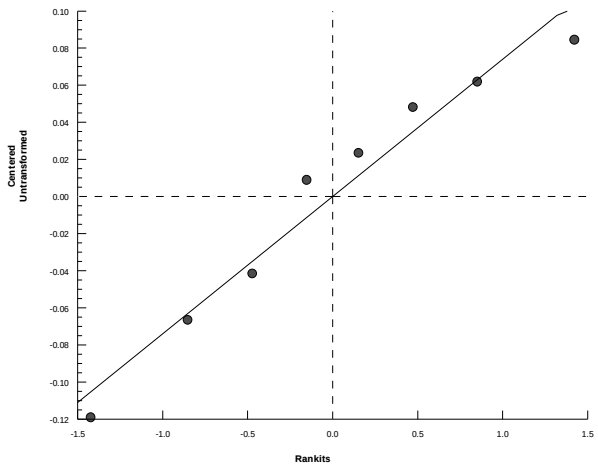
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
006	0.625	0.6112	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8641-6886	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7239-2763	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-2.4	1.943	0.101	6	0.9734	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.397	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03122615	0.03122615	1	5.761	0.0533	Non-Significant Effect
Error	0.03251994	0.005419991	6			
Total	0.06374609		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.35	47.47	0.8110	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9143	0.6451	0.3857	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
005	4	0.7115	0.5859	0.837	0.706	0.6271	0.8067	0.03946	11.09%	-21.3%

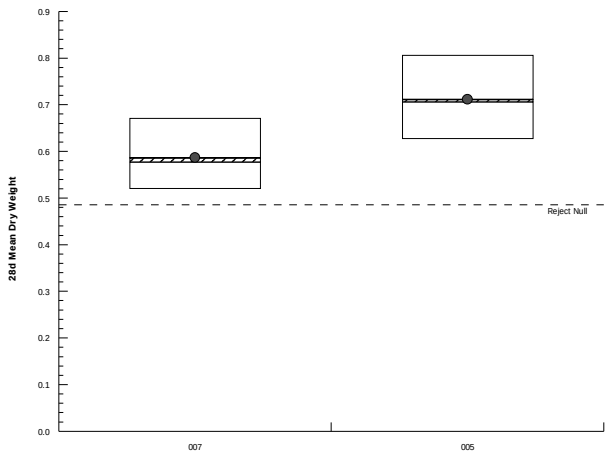
28d Mean Dry Weight Detail

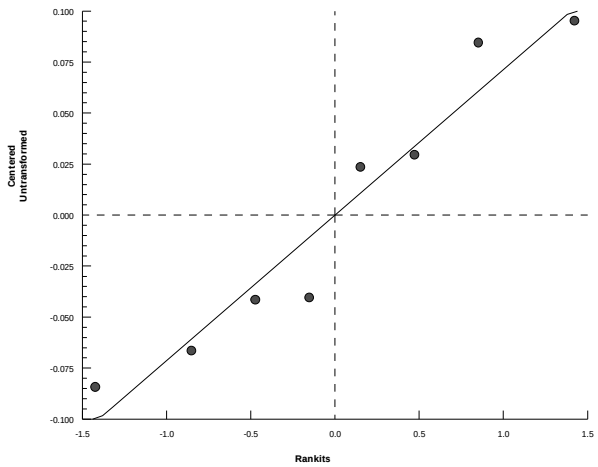
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
005	0.671	0.6271	0.8067	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7239-2763	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2120-2427	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	23.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	1.125	1.943	0.138	6	0.1518	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.724	2.127	0.4396	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01280023	0.01280023	1	1.265	0.3036	Non-Significant Effect
Error	0.06068994	0.01011499	6			
Total	0.07349017		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.386	47.47	0.3432	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9681	0.6451	0.8826	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	13.64%

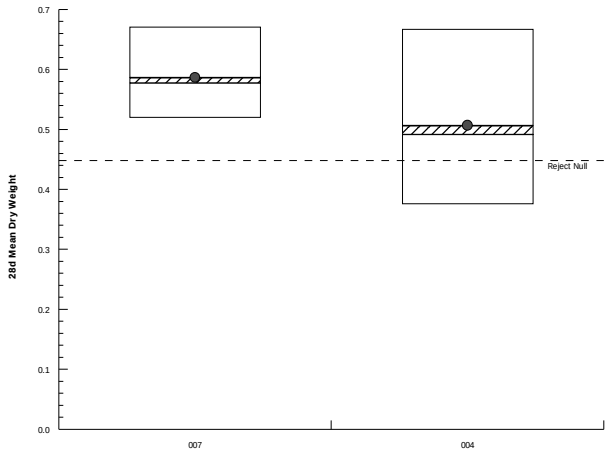
28d Mean Dry Weight Detail

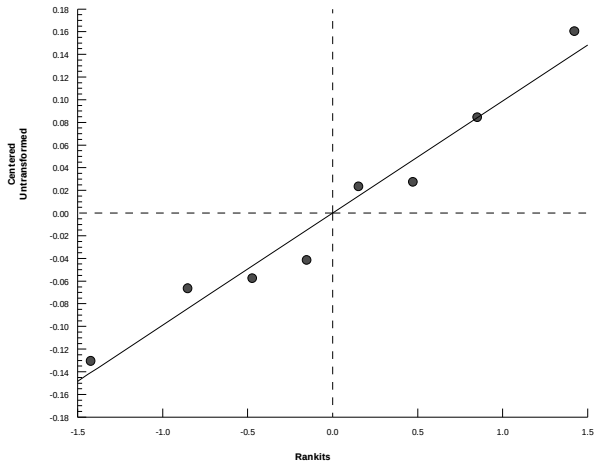
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2120-2427	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-5257-9583	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	2.223	1.943	0.104	6	0.0340	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.406	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0285306	0.0285306	1	4.941	0.0679	Non-Significant Effect
Error	0.0346432	0.005773867	6			
Total	0.0631738		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.504	47.47	0.7456	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9275	0.6451	0.4936	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
003	4	0.4671	0.3345	0.5996	0.463	0.3763	0.566	0.04164	17.83%	20.36%

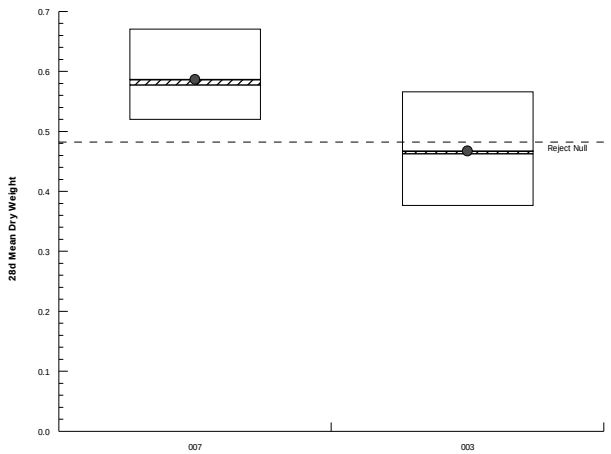
28d Mean Dry Weight Detail

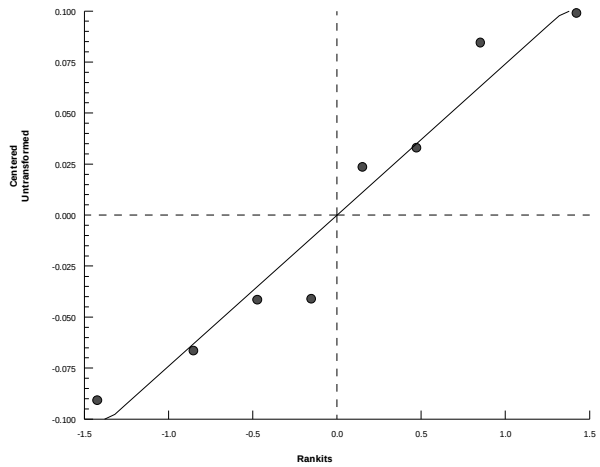
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
003	0.3763	0.426	0.566	0.5						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-5257-9583	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-3323-1846	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	21.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-2.663	2.015	0.129	5	0.9776	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.404	2.02	0.9678	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04944536	0.04944536	1	7.093	0.0447	Significant Effect
Error	0.0348528	0.006970559	5			
Total	0.08429816		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.278	49.8	0.5003	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.953	0.5629	0.7570	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
002	3	0.7563	0.5017	1.011	0.7467	0.659	0.8633	0.05918	13.55%	-28.96%

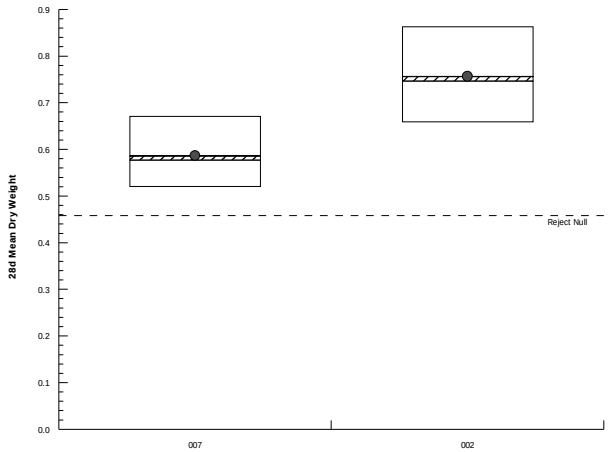
28d Mean Dry Weight Detail

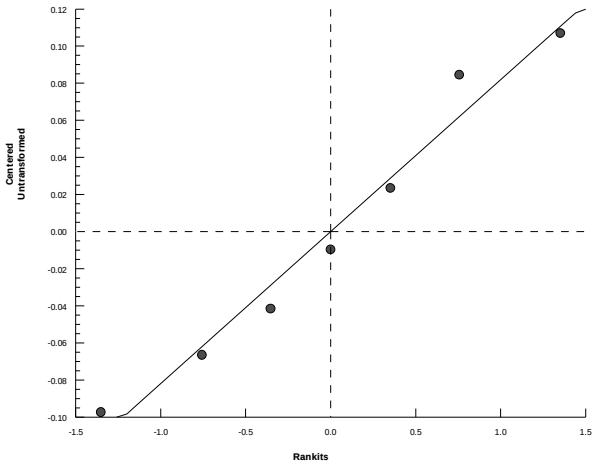
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
002	0.659	0.8633	0.7467							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-3323-1846	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-5373-5307	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	14.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	1.216	2.015	0.082	5	0.1391	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.736	2.02	0.3147	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00420674	0.00420674	1	1.479	0.2782	Non-Significant Effect
Error	0.01422262	0.002844523	5			
Total	0.01842936		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	23.91	199.2	0.0808	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9656	0.5629	0.8648	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.5865	0.4784	0.6946	0.5775	0.52	0.671	0.03396	11.58%	0.0%
001	3	0.537	0.5025	0.5715	0.529	0.5289	0.553	0.008019	2.59%	8.45%

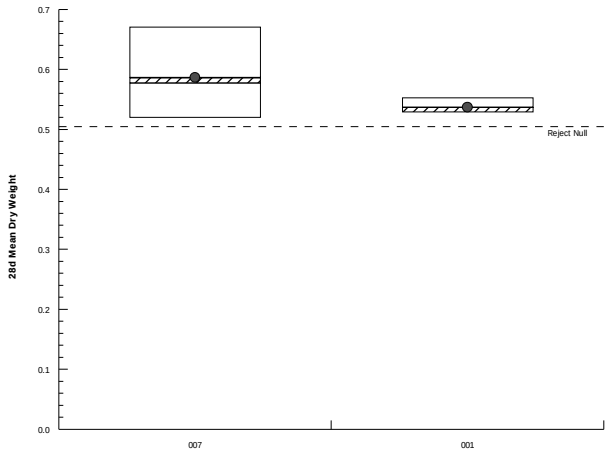
28d Mean Dry Weight Detail

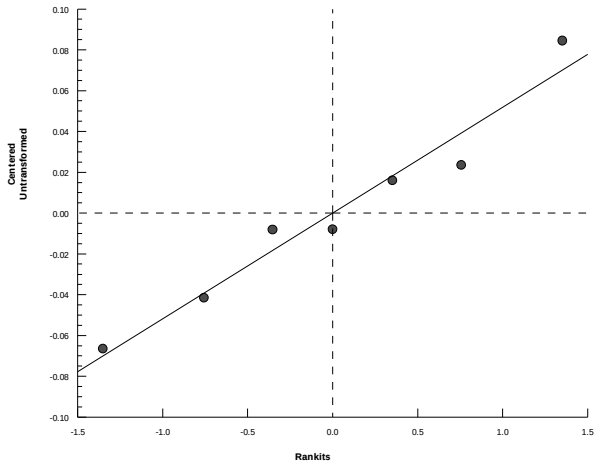
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.545	0.671	0.61	0.52						
001	0.5289	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-5373-5307	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-0814-9915	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	-0.1799	1.943	0.102	6	0.5684	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.731	2.127	0.4286	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000178622	0.000178622	1	0.03235	0.8632	Non-Significant Effect
Error	0.0331319	0.005521984	6			
Total	0.03331052		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.605	47.47	0.7069	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9714	0.6451	0.9088	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
006	4	0.5631	0.4318	0.6943	0.5916	0.444	0.625	0.04125	14.65%	-1.71%

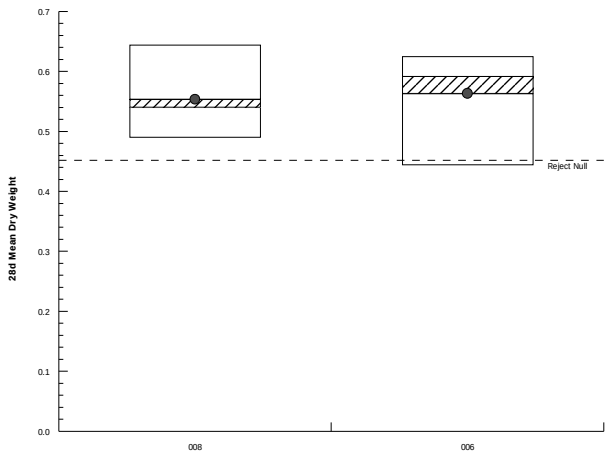
28d Mean Dry Weight Detail

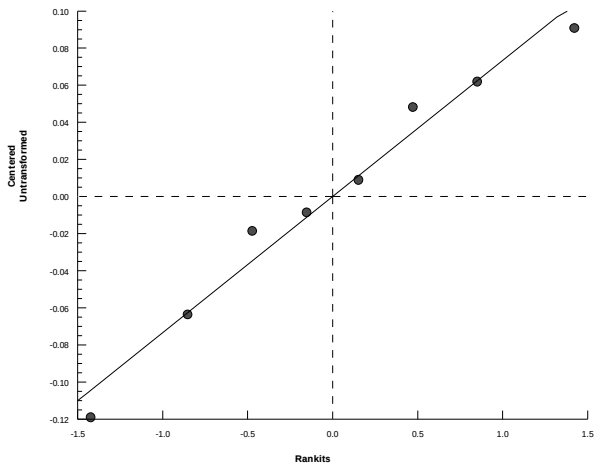
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
006	0.625	0.6112	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-0814-9915	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-1699-6265	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-3.086	1.943	0.099	6	0.9892	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.422	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04982739	0.04982739	1	9.521	0.0215	Significant Effect
Error	0.03140074	0.005233456	6			
Total	0.08122812		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.469	47.47	0.7596	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9236	0.6451	0.4595	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
005	4	0.7115	0.5859	0.837	0.706	0.6271	0.8067	0.03946	11.09%	-28.51%

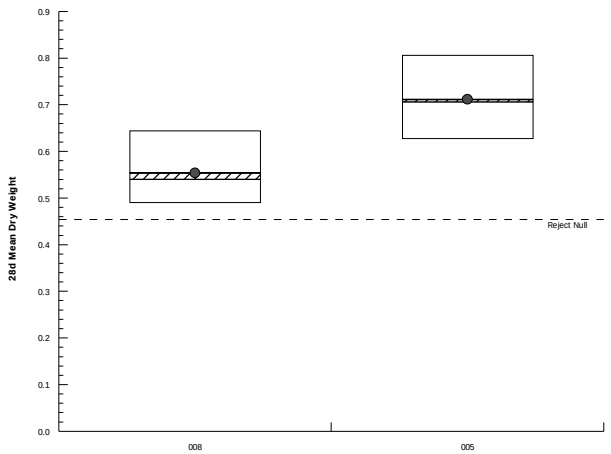
28d Mean Dry Weight Detail

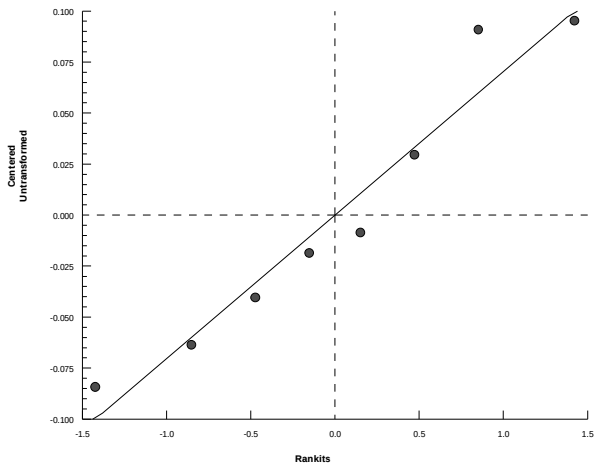
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
005	0.671	0.6271	0.8067	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-1699-6265	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7905-0148	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	24.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	0.6687	1.943	0.137	6	0.2643	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.74	2.127	0.4142	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004439132	0.004439132	1	0.4471	0.5286	Non-Significant Effect
Error	0.05957073	0.009928456	6			
Total	0.06400987		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.684	47.47	0.3126	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9699	0.6451	0.8975	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	8.51%

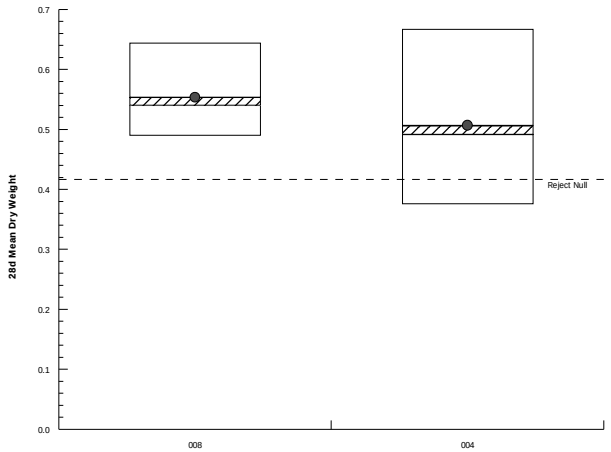
28d Mean Dry Weight Detail

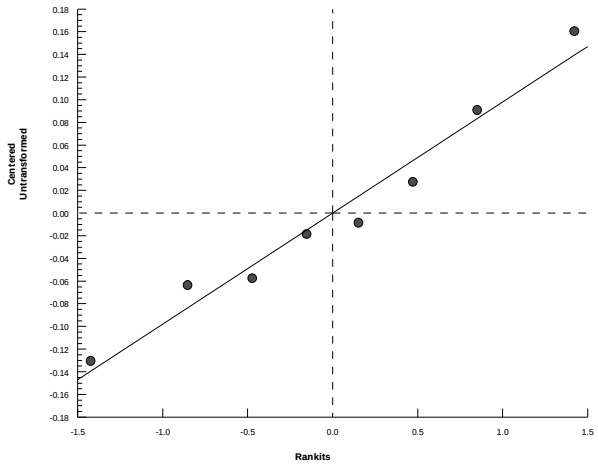
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7905-0148	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-2242-3864	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	1.637	1.943	0.103	6	0.0763	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.43	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01498146	0.01498146	1	2.681	0.1526	Non-Significant Effect
Error	0.03352399	0.005587332	6			
Total	0.04850545		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.636	47.47	0.6958	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9365	0.6451	0.5767	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
003	4	0.4671	0.3345	0.5996	0.463	0.3763	0.566	0.04164	17.83%	15.63%

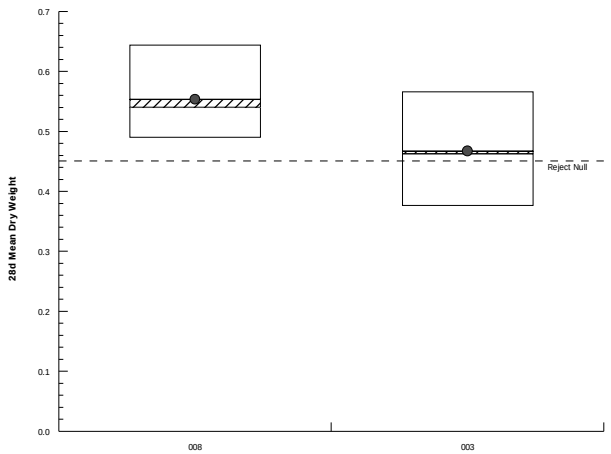
28d Mean Dry Weight Detail

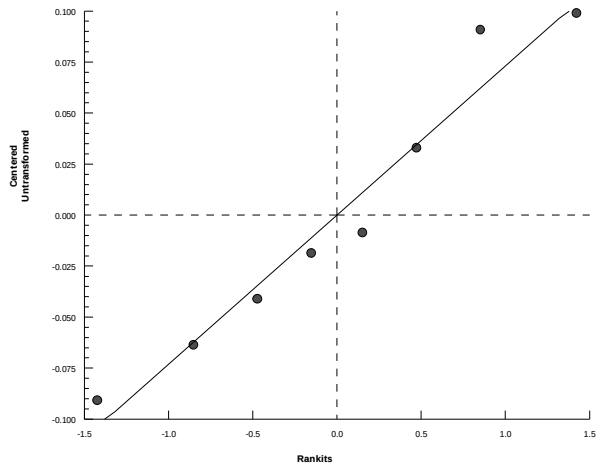
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
003	0.3763	0.426	0.566	0.5						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-2242-3864	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-5114-2926	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	-3.231	2.015	0.126	5	0.9884	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.427	2.02	0.9100	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.07045001	0.07045001	1	10.44	0.0232	Significant Effect
Error	0.03373358	0.006746717	5			
Total	0.1041836		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.479	49.8	0.4630	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9134	0.5629	0.4198	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
002	3	0.7563	0.5017	1.011	0.7467	0.659	0.8633	0.05918	13.55%	-36.62%

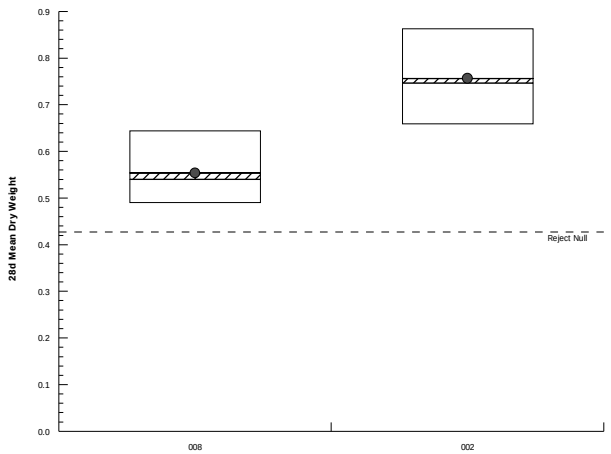
28d Mean Dry Weight Detail

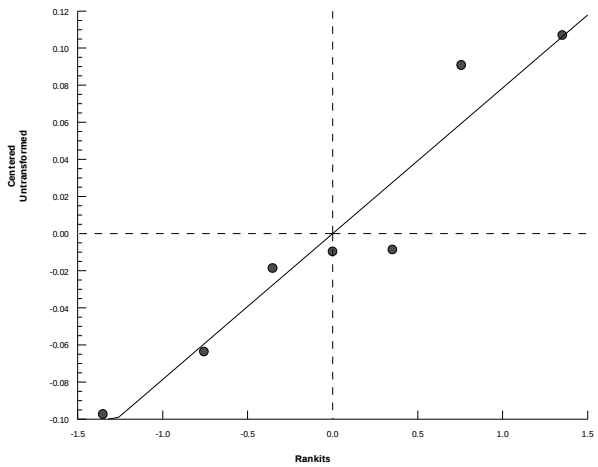
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
002	0.659	0.8633	0.7467							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-5114-2926	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-2210-7845	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	14.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	0.4258	2.015	0.079	5	0.3440	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.944	2.02	0.0960	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004751668	0.0004751668	1	0.1813	0.6880	Non-Significant Effect
Error	0.01310341	0.002620681	5			
Total	0.01357857		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	21.97	199.2	0.0877	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8709	0.5629	0.1890	Normal Distribution

28d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5536	0.45	0.6572	0.54	0.49	0.6444	0.03255	11.76%	0.0%
001	3	0.537	0.5025	0.5715	0.529	0.5289	0.553	0.008019	2.59%	3.01%

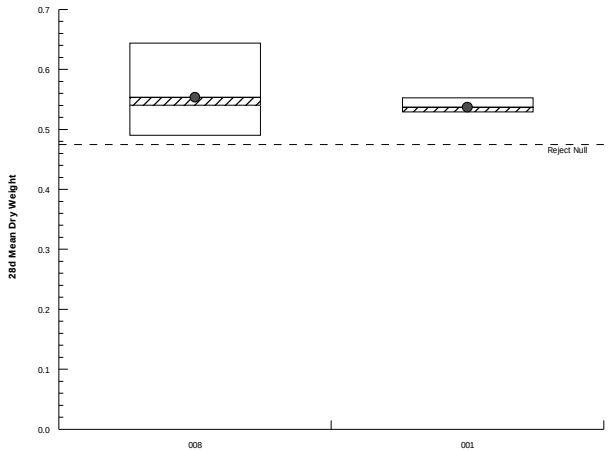
28d Mean Dry Weight Detail

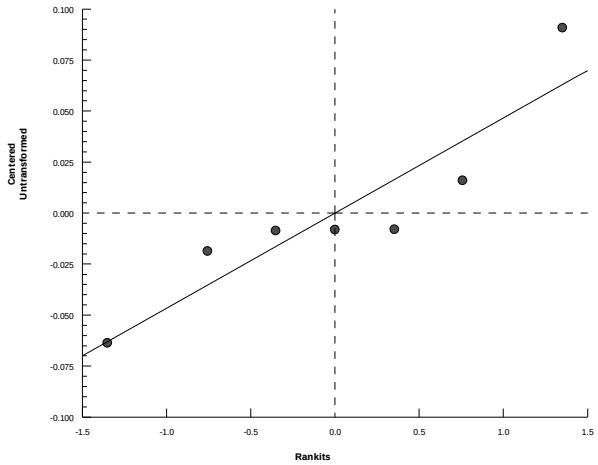
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.6444	0.535	0.49	0.545						
001	0.5289	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-2210-7845	**Endpoint:**	28d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 28 Dry Biomass Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	2	0.721	-1.198	2.64	0.57	0.872	0.151	0.2135	29.62%	0.0%
007	4	0.531	0.3643	0.6977	0.436	0.671	0.05237	0.1047	19.73%	26.35%
008	4	0.5253	0.4308	0.6198	0.441	0.58	0.02969	0.05939	11.31%	27.15%
001	3	0.5193	0.4215	0.6172	0.476	0.553	0.02275	0.0394	7.59%	27.97%
002	3	0.7027	0.5419	0.8634	0.659	0.777	0.03736	0.0647	9.21%	2.54%
003	4	0.4358	0.2628	0.6087	0.301	0.566	0.05433	0.1087	24.94%	39.56%
004	4	0.5065	0.3076	0.7054	0.376	0.667	0.06249	0.125	24.67%	29.75%
005	4	0.6443	0.4213	0.8672	0.439	0.741	0.07005	0.1401	21.75%	10.65%
006	4	0.5325	0.4031	0.6619	0.444	0.625	0.04066	0.08132	15.27%	26.14%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

28d Mean Dry Biomass Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000									0.872	0.57
007								0.436	0.671	0.549
	0.468									
008									0.58	0.535
	0.441	0.545								
001									0.476	0.553
	0.529									
002									0.659	0.777
	0.672									
003									0.301	0.426
	0.566	0.45								
004									0.534	0.376
	0.667	0.449								
005									0.671	0.439
	0.726	0.741								
006									0.625	0.489
	0.444	0.572								

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5102-2105	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	32.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	1.702	2.132	0.236	4	0.0820	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.32	1.887	0.9916	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04737682	0.04737682	1	2.896	0.1640	Non-Significant Effect
Error	0.0654429	0.01636072	4			
Total	0.1128197		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.895	55.55	0.1572	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9728	0.43	0.9105	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
006	4	0.5325	0.4031	0.6619	0.5305	0.444	0.625	0.04066	15.27%	26.14%

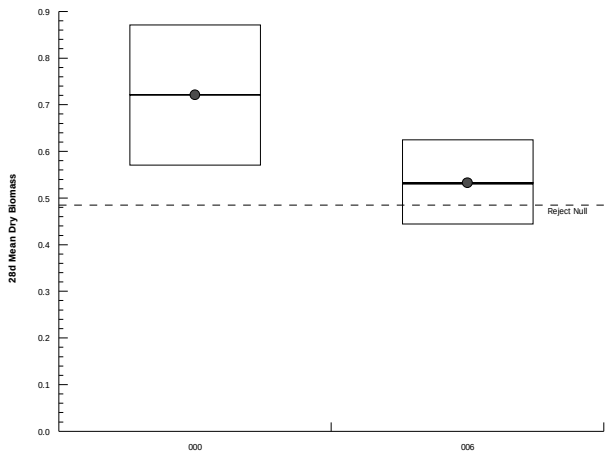
28d Mean Dry Biomass Detail

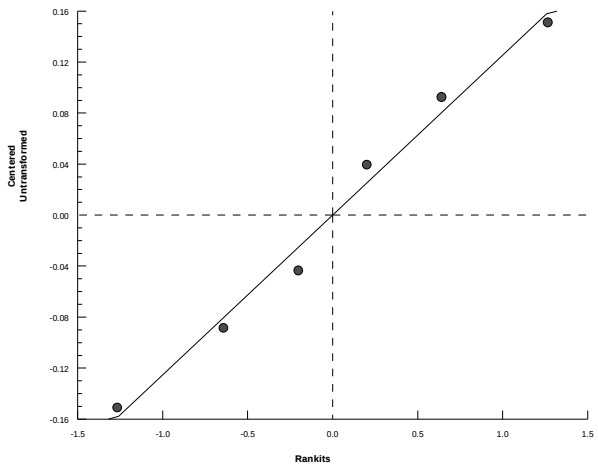
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
006	0.625	0.489	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5102-2105	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-9435-6530	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	41.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	0.5483	2.132	0.298	4	0.3063	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.42	1.887	0.7495	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007854198	0.007854198	1	0.3007	0.6126	Non-Significant Effect
Error	0.1044884	0.02612211	4			
Total	0.1123426		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.323	55.55	0.4497	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8813	0.43	0.2751	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
005	4	0.6443	0.4213	0.8672	0.6985	0.439	0.741	0.07005	21.75%	10.65%

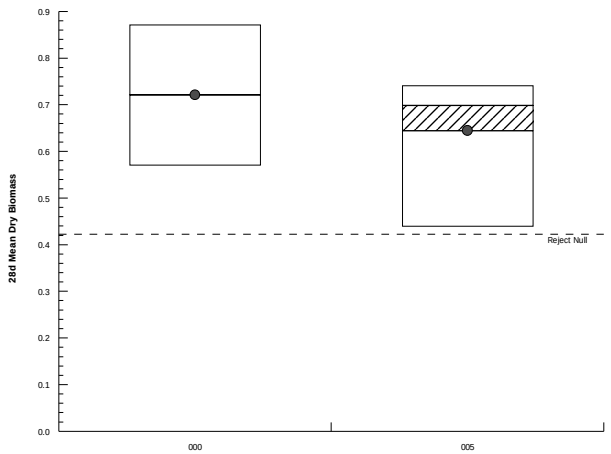
28d Mean Dry Biomass Detail

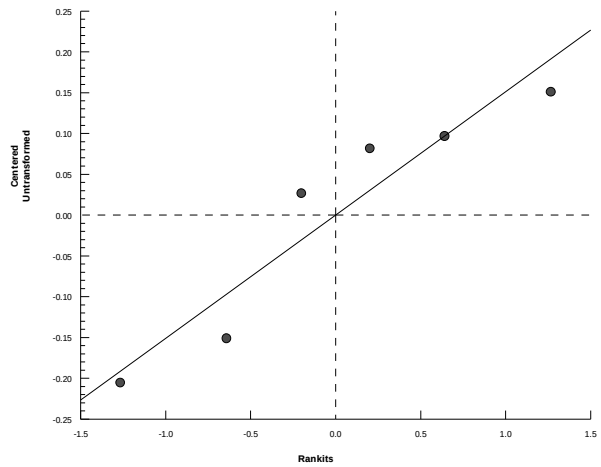
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
005	0.671	0.439	0.726	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-9435-6530	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-6728-0298	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	1.629	2.132	0.281	4	0.0893	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.18	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06134768	0.06134768	1	2.654	0.1786	Non-Significant Effect
Error	0.09245483	0.02311371	4			
Total	0.1538025		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.92	55.55	0.3721	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8897	0.43	0.3167	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	29.75%

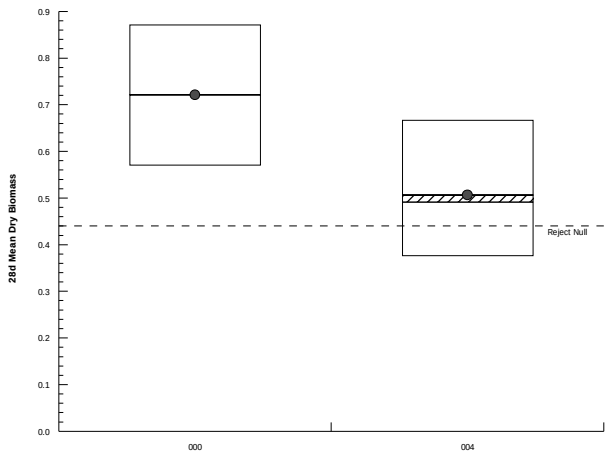
28d Mean Dry Biomass Detail

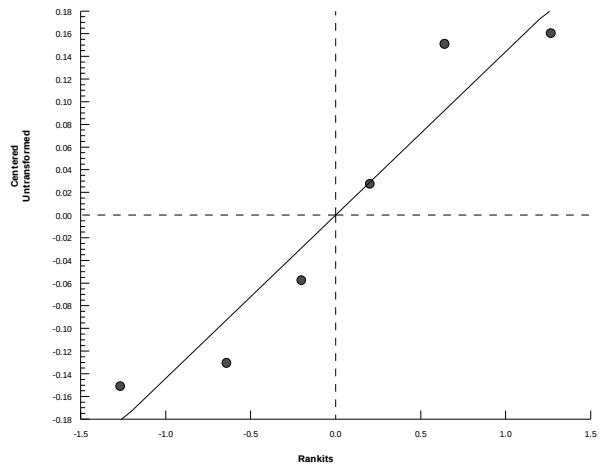
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-6728-0298	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1140-9615	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	36.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	2.314	2.132	0.263	4	0.0408	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.186	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1084904	0.1084904	1	5.356	0.0816	Non-Significant Effect
Error	0.08102224	0.02025556	4			
Total	0.1895127		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.862	55.55	0.2882	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9043	0.43	0.4001	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
003	4	0.4358	0.2628	0.6087	0.438	0.301	0.566	0.05433	24.94%	39.56%

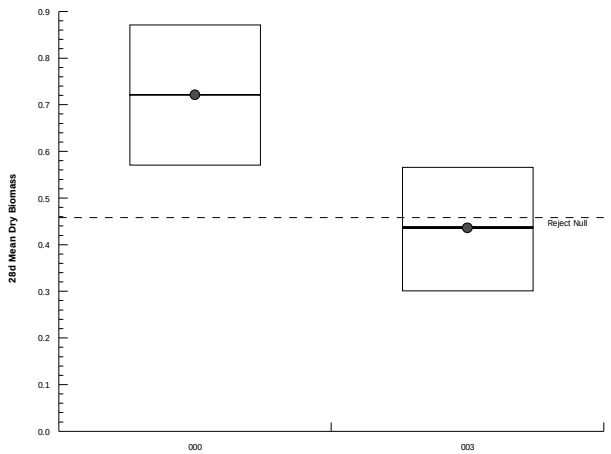
28d Mean Dry Biomass Detail

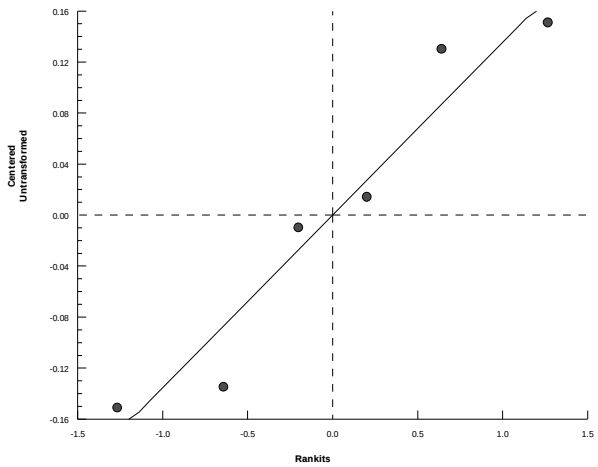
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
003	0.301	0.426	0.566	0.45						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1140-9615	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-2113-1223	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	40.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	0.1497	2.353	0.288	3	0.4452	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.3	1.715	0.8216	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004033833	0.0004033833	1	0.02242	0.8905	Non-Significant Effect
Error	0.05397418	0.01799139	3			
Total	0.05437756		4			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	10.89	198.5	0.1617	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9733	0.1883	0.8960	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
002	3	0.7027	0.5419	0.8634	0.672	0.659	0.777	0.03736	9.21%	2.54%

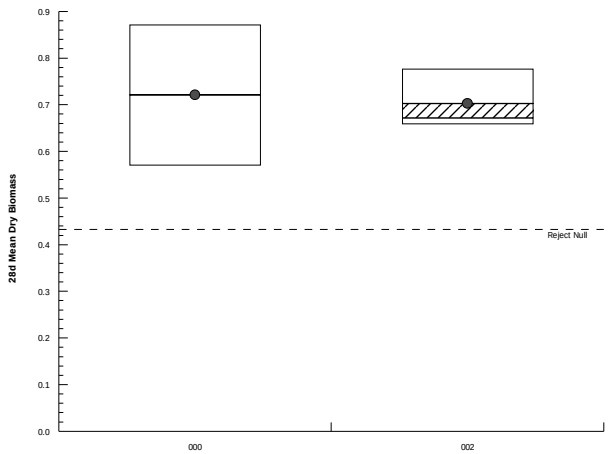
28d Mean Dry Biomass Detail

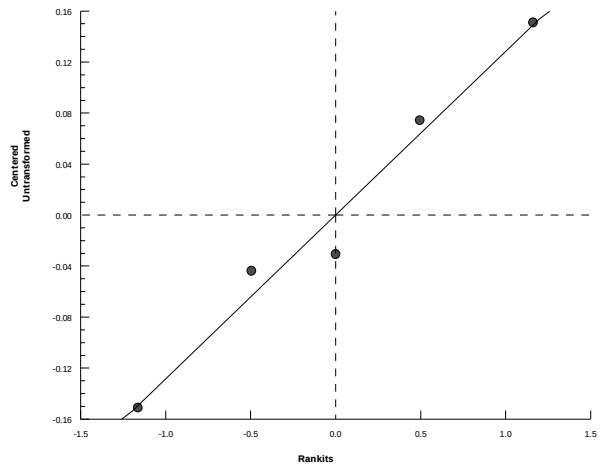
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
002	0.659	0.777	0.672							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-2113-1223	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-8751-9732	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	1.734	2.353	0.274	3	0.0907	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.368	1.715	0.6593	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04880363	0.04880363	1	3.006	0.1814	Non-Significant Effect
Error	0.04870645	0.01623548	3			
Total	0.09751008		4			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	29.37	198.5	0.0648	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9874	0.1883	0.9700	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
001	3	0.5193	0.4215	0.6172	0.529	0.476	0.553	0.02275	7.59%	27.97%

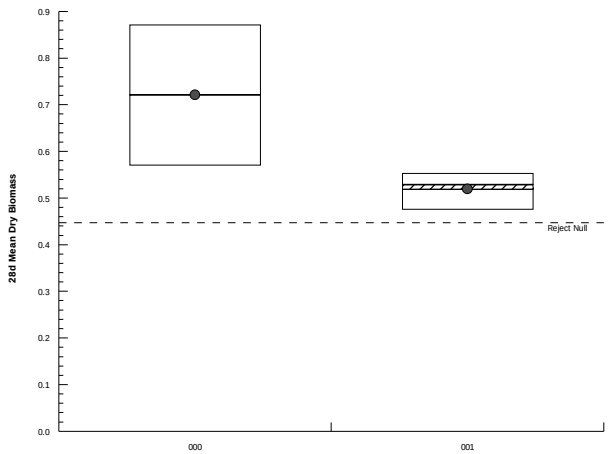
28d Mean Dry Biomass Detail

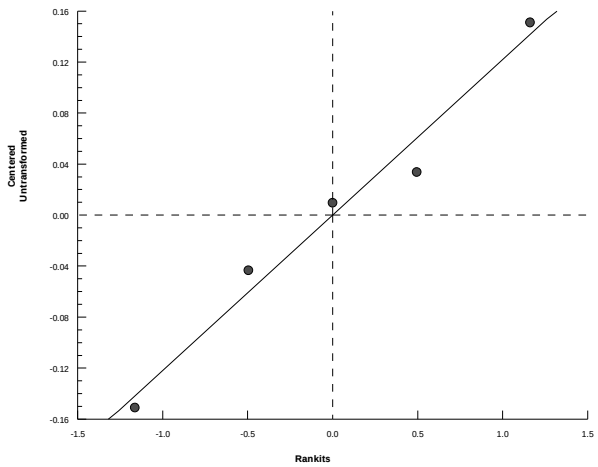
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
001	0.476	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-8751-9732	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4112-8358	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	30.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	1.907	2.132	0.219	4	0.0646	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.424	1.887	0.7389	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05109078	0.05109078	1	3.637	0.1292	Non-Significant Effect
Error	0.05618243	0.01404561	4			
Total	0.1072732		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	12.93	55.55	0.0737	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9753	0.43	0.9257	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	27.15%

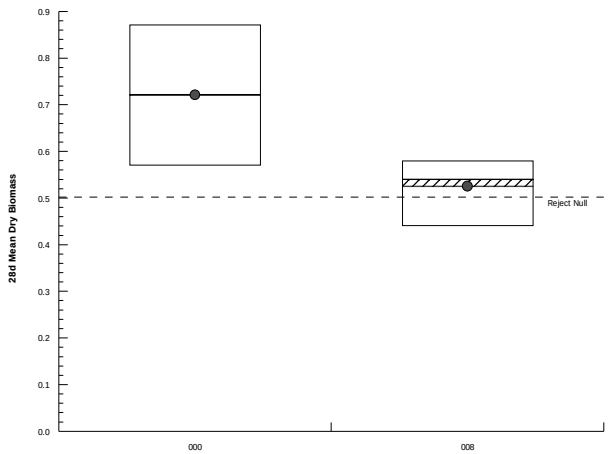
28d Mean Dry Biomass Detail

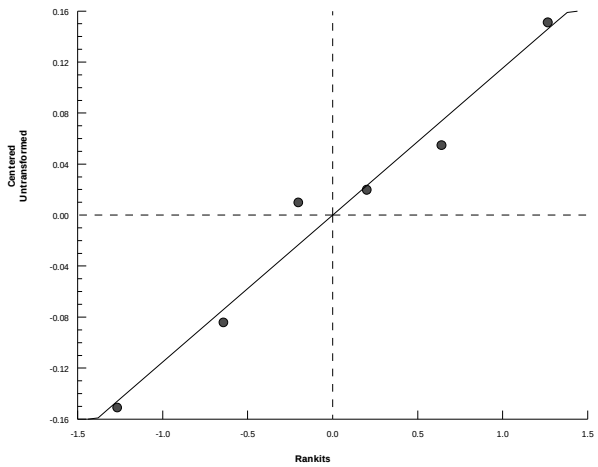
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
008	0.58	0.535	0.441	0.545						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4112-8358	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-7029-7123	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	35.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	1.566	2.132	0.259	4	0.0962	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.205	1.887	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0481336	0.0481336	1	2.452	0.1924	Non-Significant Effect
Error	0.07851933	0.01962983	4			
Total	0.1266529		5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.156	55.55	0.2684	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9099	0.43	0.4358	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	2	0.721	-1.198	2.64	0.721	0.57	0.872	0.151	29.62%	0.0%
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	26.35%

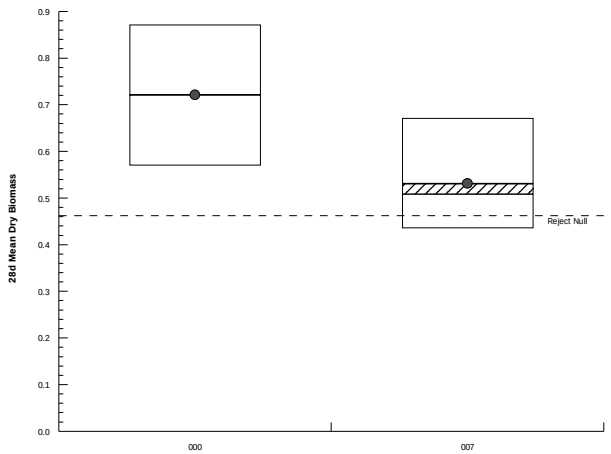
28d Mean Dry Biomass Detail

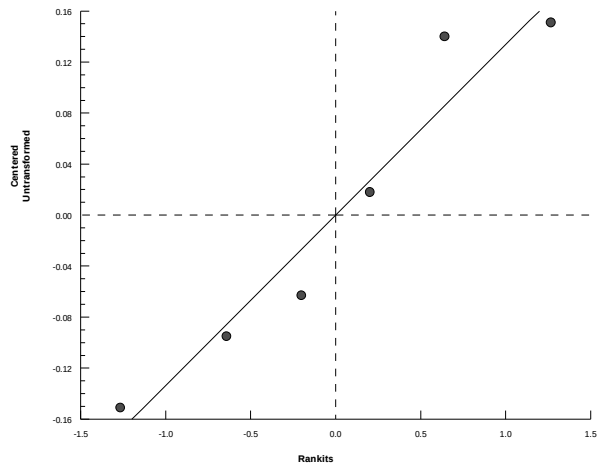
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.872	0.57								
007	0.436	0.671	0.549	0.468						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-7029-7123	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5242-8630	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	24.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	-0.02262	1.943	0.129	6	0.5087	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.613	2.127	0.6402	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.497336E-06	4.497336E-06	1	0.000512	0.9827	Non-Significant Effect
Error	0.05275892	0.008793154	6			
Total	0.05276342		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.659	47.47	0.6877	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9246	0.6451	0.4682	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
006	4	0.5325	0.4031	0.6619	0.5305	0.444	0.625	0.04066	15.27%	-0.28%

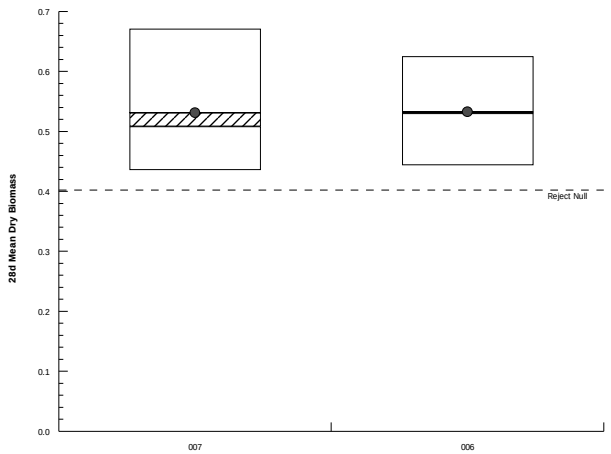
28d Mean Dry Biomass Detail

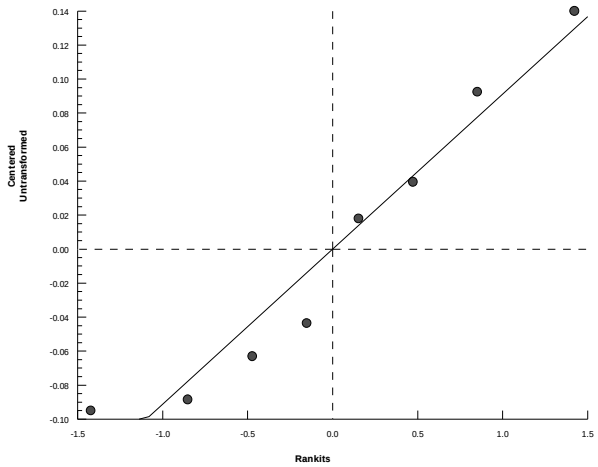
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
006	0.625	0.489	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5242-8630	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3186-9491	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	32.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-1.295	1.943	0.17	6	0.8785	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.792	2.127	0.3376	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02565111	0.02565111	1	1.676	0.2430	Non-Significant Effect
Error	0.09180447	0.01530074	6			
Total	0.1174556		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.789	47.47	0.6447	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9504	0.6451	0.7157	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
005	4	0.6443	0.4213	0.8672	0.6985	0.439	0.741	0.07005	21.75%	-21.33%

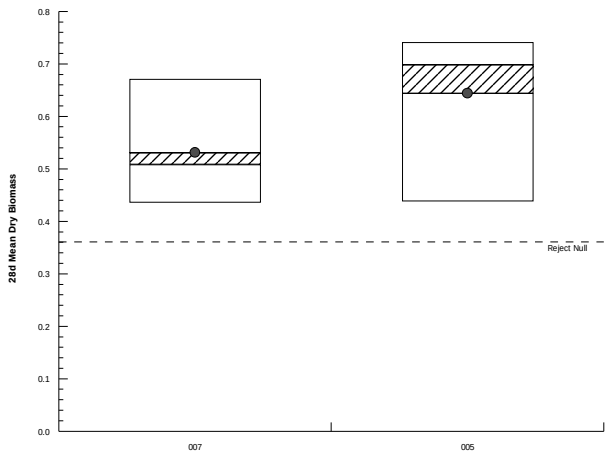
28d Mean Dry Biomass Detail

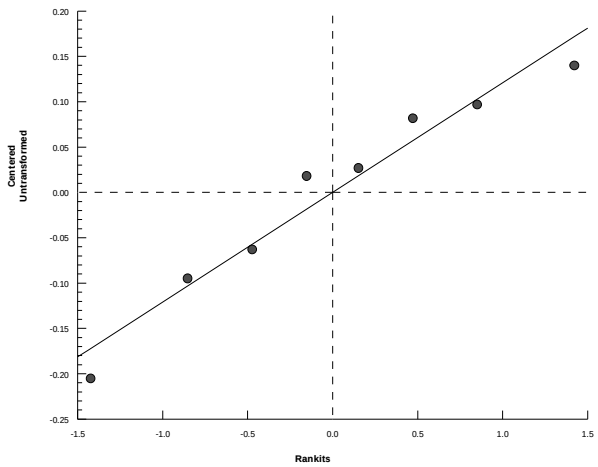
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
005	0.671	0.439	0.726	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3186-9491	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7696-3566	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	29.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.3005	1.943	0.158	6	0.3870	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.503	2.127	0.8813	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001200565	0.001200565	1	0.0903	0.7739	Non-Significant Effect
Error	0.07977086	0.01329514	6			
Total	0.08097142		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.423	47.47	0.7787	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9174	0.6451	0.4088	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	4.61%

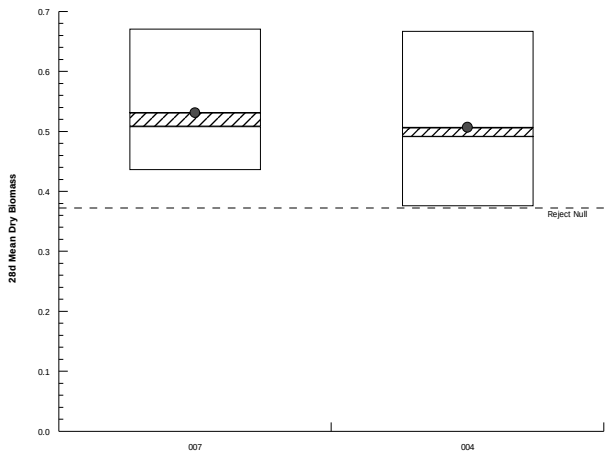
28d Mean Dry Biomass Detail

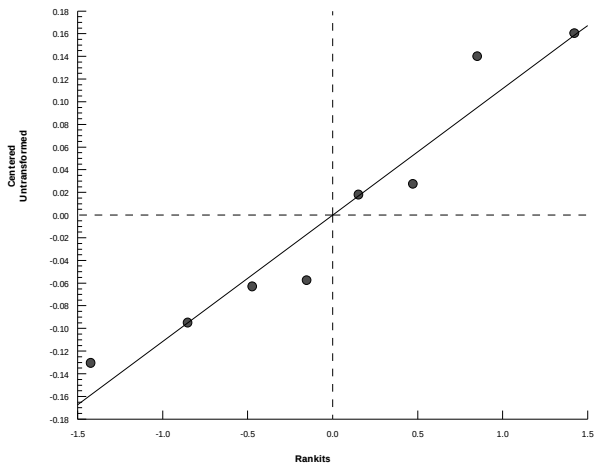
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7696-3566	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5846-0335	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	1.262	1.943	0.147	6	0.1269	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.417	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01814511	0.01814511	1	1.593	0.2537	Non-Significant Effect
Error	0.06833826	0.01138971	6			
Total	0.08648337		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.076	47.47	0.9534	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9368	0.6451	0.5803	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
003	4	0.4358	0.2628	0.6087	0.438	0.301	0.566	0.05433	24.94%	17.94%

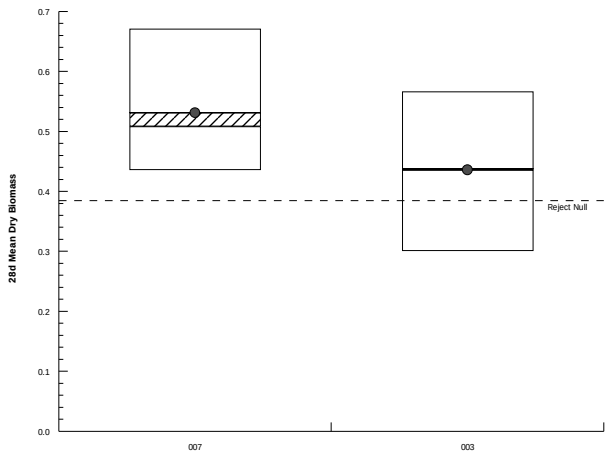
28d Mean Dry Biomass Detail

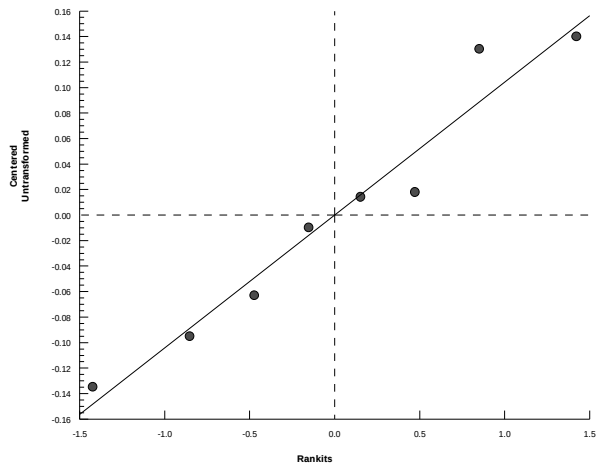
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
003	0.301	0.426	0.566	0.45						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5846-0335	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9057-4506	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	26.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-2.473	2.015	0.14	5	0.9719	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.688	2.02	0.3856	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05051869	0.05051869	1	6.118	0.0563	Non-Significant Effect
Error	0.0412902	0.008258041	5			
Total	0.09180889		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.621	199.2	0.5764	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9375	0.5629	0.6163	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
002	3	0.7027	0.5419	0.8634	0.672	0.659	0.777	0.03736	9.21%	-32.33%

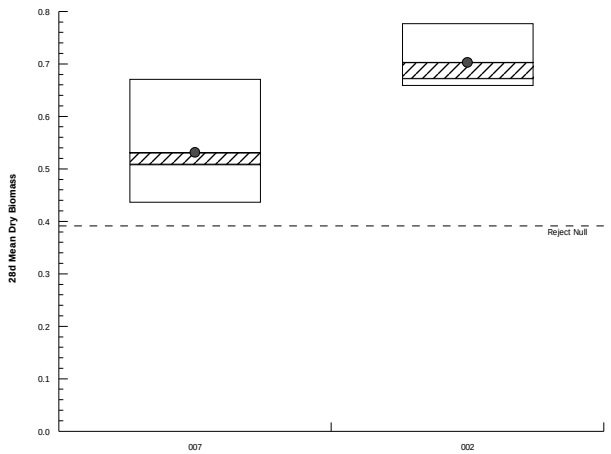
28d Mean Dry Biomass Detail

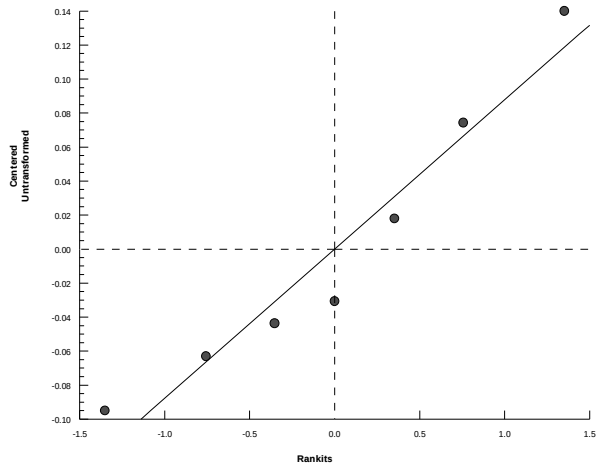
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
002	0.659	0.777	0.672							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9057-4506	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2536-8931	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	24.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	0.18	2.015	0.131	5	0.4321	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.807	2.02	0.2237	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002333368	0.0002333368	1	0.03239	0.8642	Non-Significant Effect
Error	0.03602247	0.007204495	5			
Total	0.03625581		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	7.068	199.2	0.2529	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9437	0.5629	0.6724	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	4	0.531	0.3643	0.6977	0.5085	0.436	0.671	0.05237	19.73%	0.0%
001	3	0.5193	0.4215	0.6172	0.529	0.476	0.553	0.02275	7.59%	2.2%

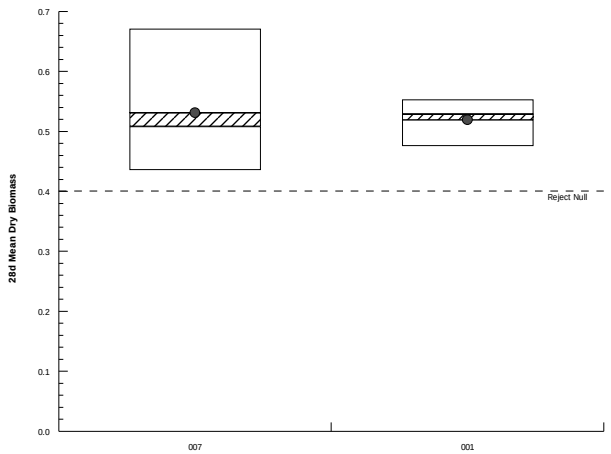
28d Mean Dry Biomass Detail

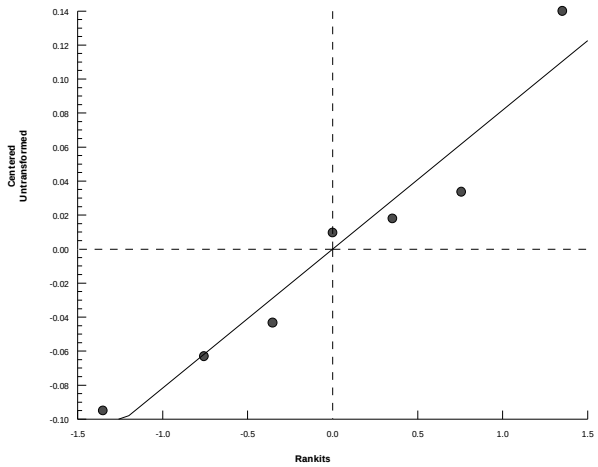
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
007	0.436	0.671	0.549	0.468						
001	0.476	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2536-8931	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-5772-6922	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	-0.144	1.943	0.098	6	0.5549	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.403	2.127	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001050983	0.0001050983	1	0.02073	0.8902	Non-Significant Effect
Error	0.03042202	0.005070337	6			
Total	0.03052712		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.875	47.47	0.6185	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9342	0.6451	0.5549	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
006	4	0.5325	0.4031	0.6619	0.5305	0.444	0.625	0.04066	15.27%	-1.38%

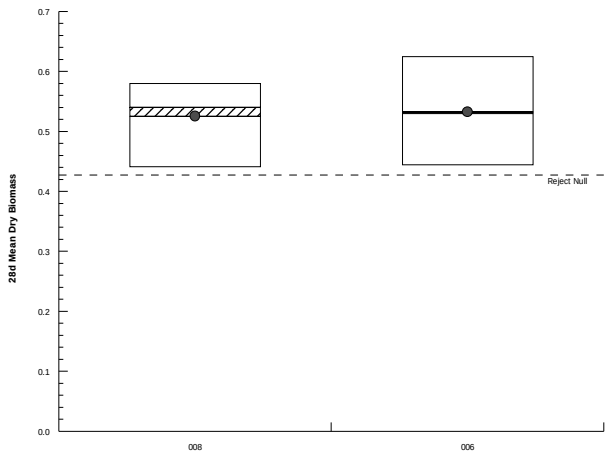
28d Mean Dry Biomass Detail

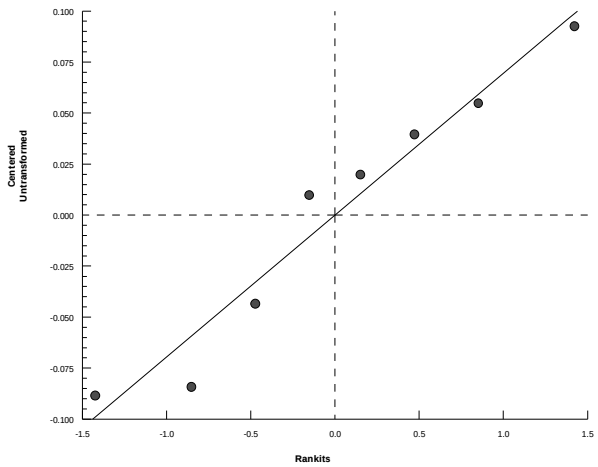
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
006	0.625	0.489	0.444	0.572						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-5772-6922	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4307-6550	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	28.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-1.564	1.943	0.148	6	0.9156	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.06	2.127	0.0826	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02832176	0.02832176	1	2.446	0.1688	Non-Significant Effect
Error	0.06946757	0.01157793	6			
Total	0.09778932		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	5.565	47.47	0.1923	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8536	0.6451	0.1036	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
005	4	0.6443	0.4213	0.8672	0.6985	0.439	0.741	0.07005	21.75%	-22.66%

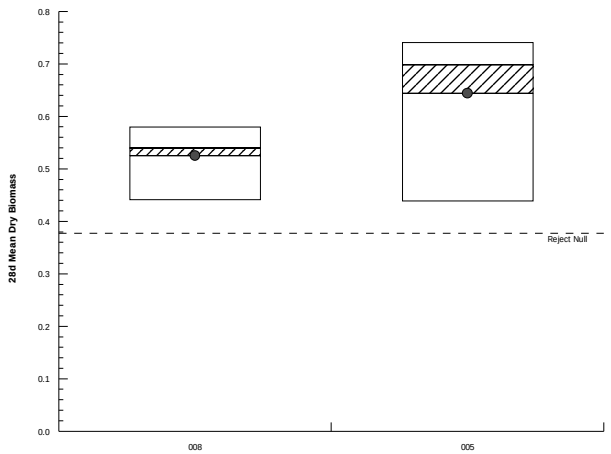
28d Mean Dry Biomass Detail

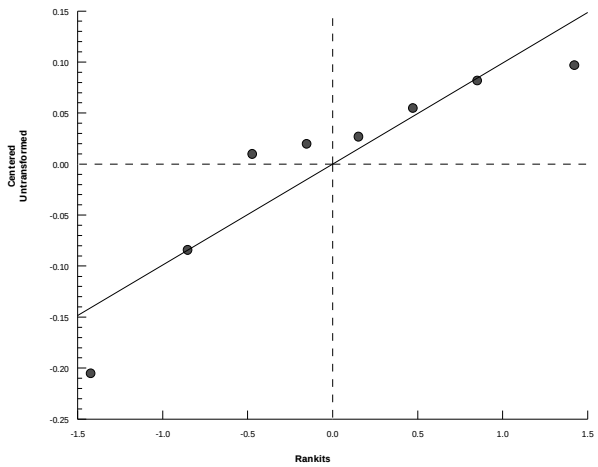
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
005	0.671	0.439	0.726	0.741						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4307-6550	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-1717-2096	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	25.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	0.271	1.943	0.134	6	0.3977	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.772	2.127	0.3662	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007032108	0.0007032108	1	0.07346	0.7954	Non-Significant Effect
Error	0.05743396	0.009572326	6			
Total	0.05813717		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.428	47.47	0.2531	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9655	0.6451	0.8609	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
004	4	0.5065	0.3076	0.7054	0.4915	0.376	0.667	0.06249	24.67%	3.57%

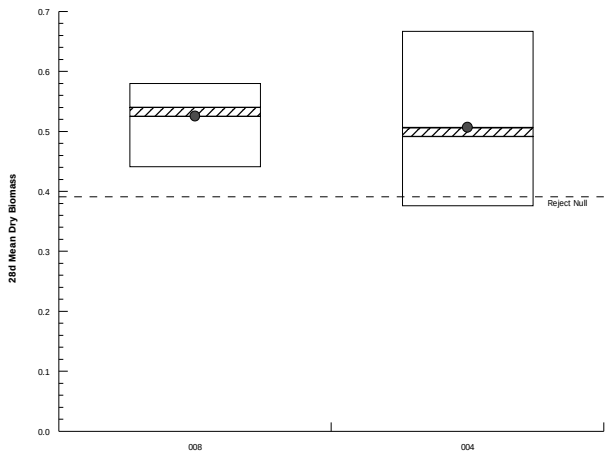
28d Mean Dry Biomass Detail

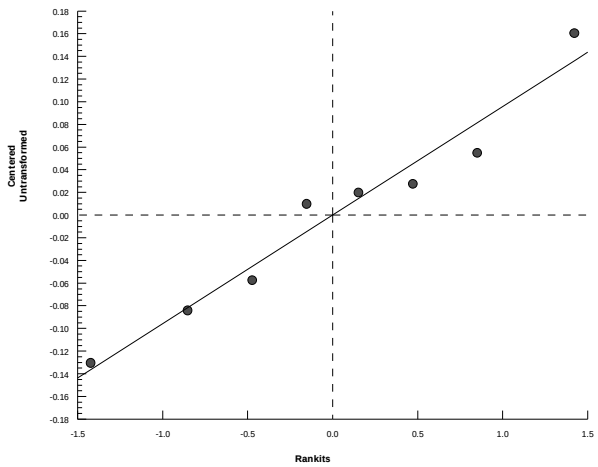
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
004	0.534	0.376	0.667	0.449						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-1717-2096	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-9032-9732	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	1.446	1.943	0.120	6	0.0992	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.662	2.127	0.5451	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01602065	0.01602065	1	2.09	0.1984	Non-Significant Effect
Error	0.04600136	0.007666894	6			
Total	0.06202202		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.348	47.47	0.3475	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9562	0.6451	0.7730	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
003	4	0.4358	0.2628	0.6087	0.438	0.301	0.566	0.05433	24.94%	17.04%

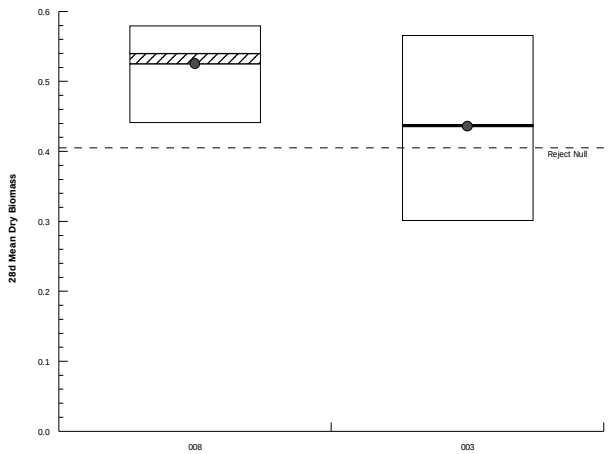
28d Mean Dry Biomass Detail

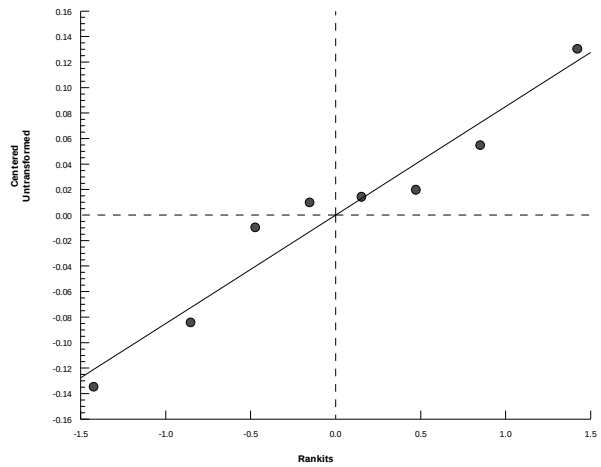
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
003	0.301	0.426	0.566	0.45						

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-9032-9732	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-6299-1685	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	-3.773	2.015	0.095	5	0.9935	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.499	2.02	0.7417	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05395935	0.05395935	1	14.23	0.0130	Significant Effect
Error	0.0189533	0.003790661	5			
Total	0.07291266		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.187	49.8	0.8342	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9723	0.5629	0.9146	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
002	3	0.7027	0.5419	0.8634	0.672	0.659	0.777	0.03736	9.21%	-33.78%

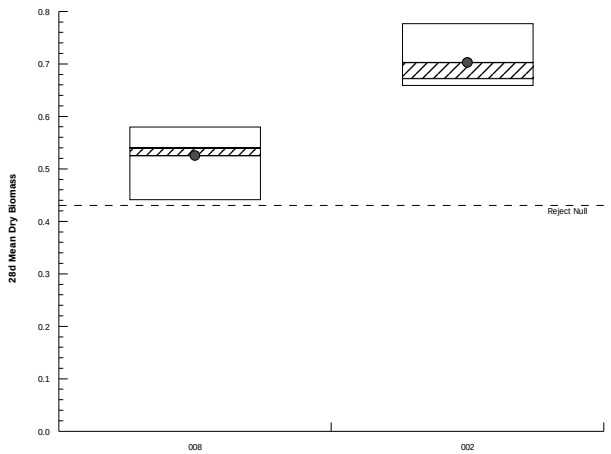
28d Mean Dry Biomass Detail

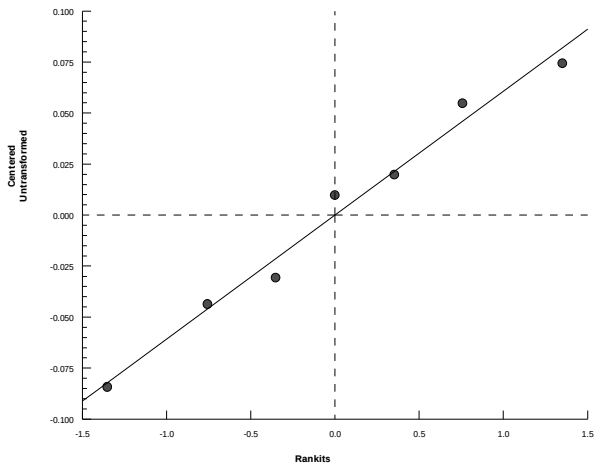
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
002	0.659	0.777	0.672							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-6299-1685	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-9434-8291	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	15.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	0.1481	2.015	0.081	5	0.4440	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.764	2.02	0.2762	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.002331E-05	6.002331E-05	1	0.02193	0.8881	Non-Significant Effect
Error	0.01368557	0.002737115	5			
Total	0.0137456		6			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.272	199.2	0.6404	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9063	0.5629	0.3707	Normal Distribution

28d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	4	0.5253	0.4308	0.6198	0.54	0.441	0.58	0.02969	11.31%	0.0%
001	3	0.5193	0.4215	0.6172	0.529	0.476	0.553	0.02275	7.59%	1.13%

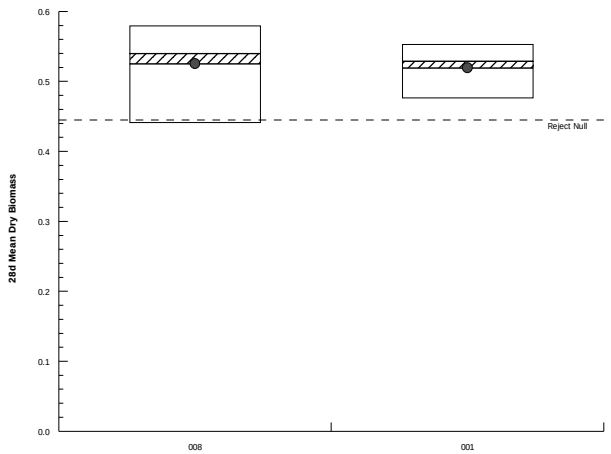
28d Mean Dry Biomass Detail

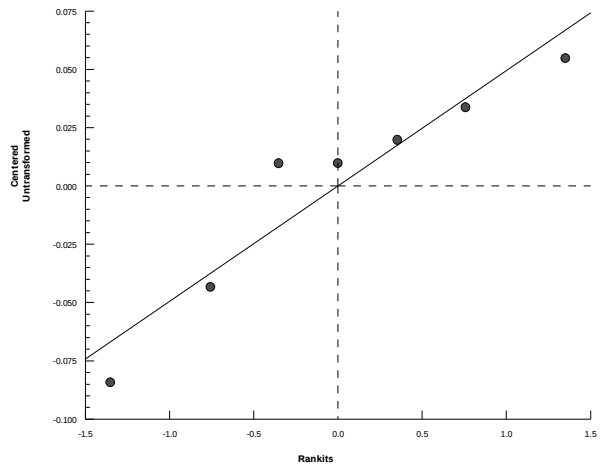
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
008	0.58	0.535	0.441	0.545						
001	0.476	0.553	0.529							

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-9434-8291	**Endpoint:**	28d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 42 Dry Weight Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date: 08 Jan-13 16:08 (p 1 of 1)
Test Code: 22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.6533	1.172	0.07418	0.2098	23.37%	0.0%
007	7	0.8779	0.794	0.9617	0.73	0.9775	0.03425	0.09063	10.32%	2.22%
008	8	0.8869	0.7485	1.025	0.5514	1.065	0.05853	0.1656	18.67%	1.21%
001	8	0.9421	0.8217	1.063	0.7278	1.111	0.05092	0.144	15.29%	-4.94%
002	8	0.8628	0.777	0.9487	0.74	1.05	0.0363	0.1027	11.9%	3.89%
003	8	0.8144	0.6322	0.9966	0.5275	1.242	0.07705	0.2179	26.76%	9.29%
004	8	0.8538	0.7843	0.9232	0.76	0.98	0.02937	0.08307	9.73%	4.9%
005	8	1.059	0.9529	1.165	0.81	1.194	0.04478	0.1267	11.96%	-17.93%
006	8	0.8662	0.7748	0.9576	0.6931	1.024	0.03865	0.1093	12.62%	3.52%

42d Mean Dry Weight Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
001	1.111	1.1	1.031	1.01	0.9233	0.8422	0.7278	0.791
002	1.05	0.878	0.9438	0.74	0.8011	0.7789	0.801	0.91
003	1.242	0.5275	0.93	0.8629	0.85	0.735	0.7522	0.615
004	0.9333	0.772	0.826	0.7844	0.85	0.76	0.9243	0.98
005	1.194	0.955	1.066	1.156	1.116	0.81	1.028	1.146
006	0.8689	0.954	0.9	1.024	0.6931	0.78	0.7767	0.9325

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-7883-6402	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	16.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	0.3779	1.761	0.147	14	0.3556	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.7	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00399527	0.00399527	1	0.1428	0.7112	Non-Significant Effect
Error	0.3917731	0.0279838	14			
Total	0.3957684		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.683	8.885	0.1069	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9603	0.8408	0.6671	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
006	8	0.8662	0.7748	0.9576	0.8844	0.6931	1.024	0.03865	12.62%	3.52%

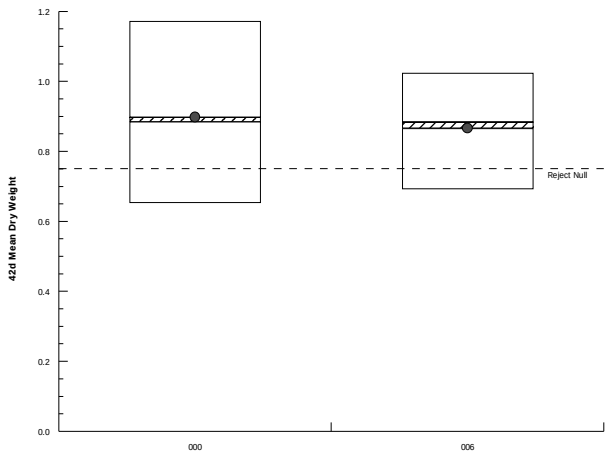
42d Mean Dry Weight Detail

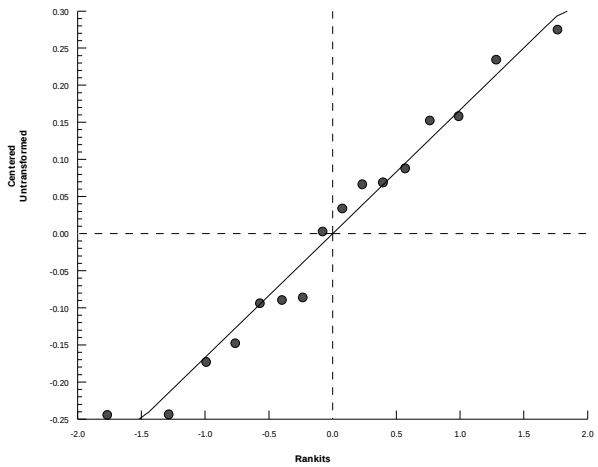
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
006	0.8689	0.954	0.9	1.024	0.6931	0.78	0.7767	0.9325

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-7883-6402	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-5592-6283	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	-1.858	1.761	0.153	14	0.9579	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.641	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1036913	0.1036913	1	3.453	0.0843	Non-Significant Effect
Error	0.4204116	0.0300294	14			
Total	0.524103		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.744	8.885	0.2064	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9475	0.8408	0.4507	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
005	8	1.059	0.9529	1.165	1.091	0.81	1.194	0.04478	11.96%	-17.93%

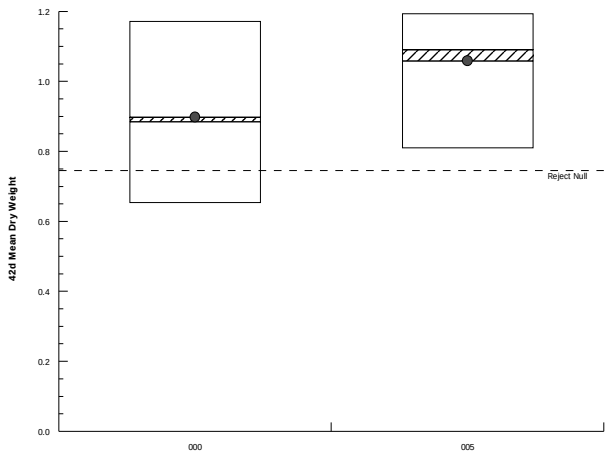
42d Mean Dry Weight Detail

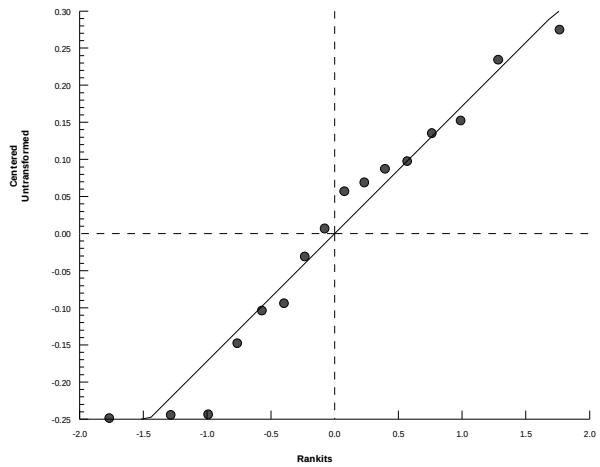
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
005	1.194	0.955	1.066	1.156	1.116	0.81	1.028	1.146

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-5592-6283	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9034-6574	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	15.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	0.5518	1.761	0.141	14	0.2949	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.782	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007752355	0.007752355	1	0.3045	0.5898	Non-Significant Effect
Error	0.3564166	0.02545832	14			
Total	0.3641689		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.378	8.885	0.0259	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9675	0.8408	0.7965	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
004	8	0.8538	0.7843	0.9232	0.838	0.76	0.98	0.02937	9.73%	4.9%

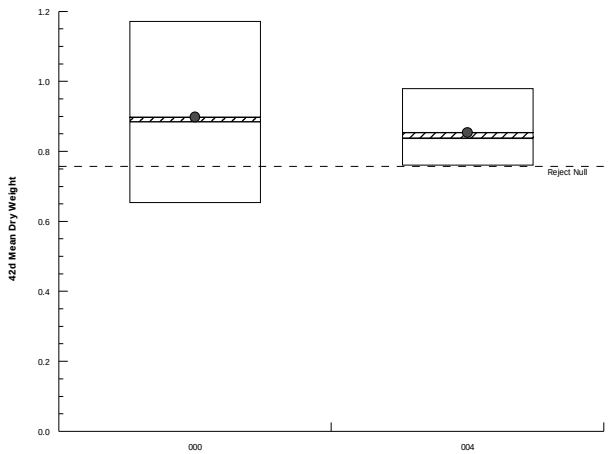
42d Mean Dry Weight Detail

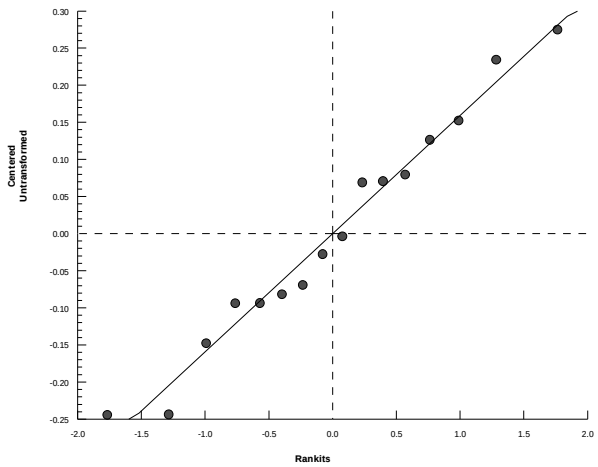
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
004	0.9333	0.772	0.826	0.7844	0.85	0.76	0.9243	0.98

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9034-6574	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-4840-1700	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	21.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	0.7797	1.761	0.188	14	0.2243	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.072	2.586	0.4237	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02782002	0.02782002	1	0.608	0.4485	Non-Significant Effect
Error	0.6405986	0.04575704	14			
Total	0.6684186		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.079	8.885	0.9226	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9619	0.8408	0.6956	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
003	8	0.8144	0.6322	0.9966	0.8011	0.5275	1.242	0.07705	26.76%	9.29%

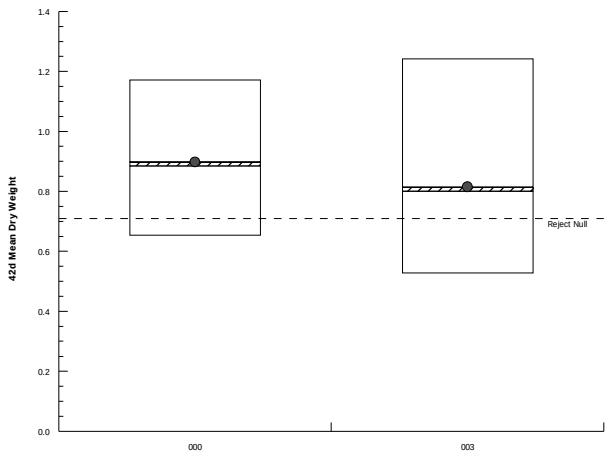
42d Mean Dry Weight Detail

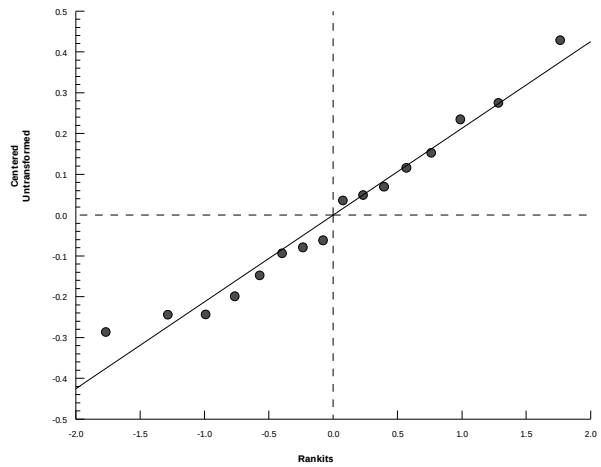
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
003	1.242	0.5275	0.93	0.8629	0.85	0.735	0.7522	0.615

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-4840-1700	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-1821-2669	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	16.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	0.4231	1.761	0.146	14	0.3393	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.722	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004882453	0.004882453	1	0.179	0.6787	Non-Significant Effect
Error	0.3819101	0.02727929	14			
Total	0.3867925		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.175	8.885	0.0789	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9623	0.8408	0.7033	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
002	8	0.8628	0.777	0.9487	0.8396	0.74	1.05	0.0363	11.9%	3.89%

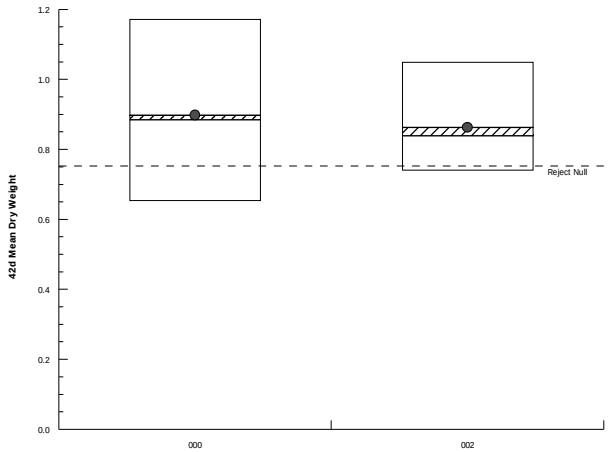
42d Mean Dry Weight Detail

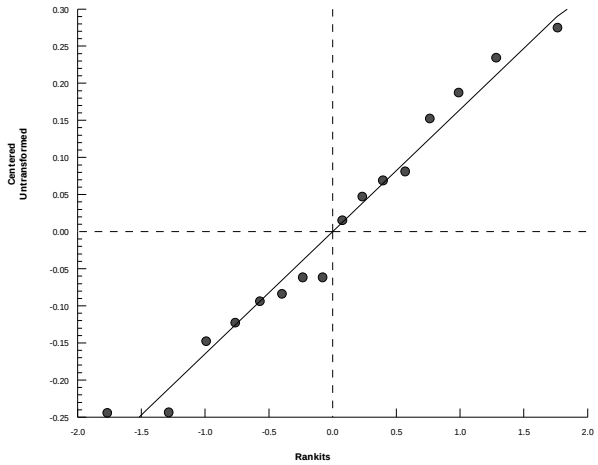
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
002	1.05	0.878	0.9438	0.74	0.8011	0.7789	0.801	0.91

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-1821-2669	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-8994-7343	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-0.4926	1.761	0.159	14	0.6850	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.58	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007857911	0.007857911	1	0.2427	0.6299	Non-Significant Effect
Error	0.4533033	0.03237881	14			
Total	0.4611612		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.122	8.885	0.3421	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9325	0.8408	0.2670	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
001	8	0.9421	0.8217	1.063	0.9667	0.7278	1.111	0.05092	15.29%	-4.94%

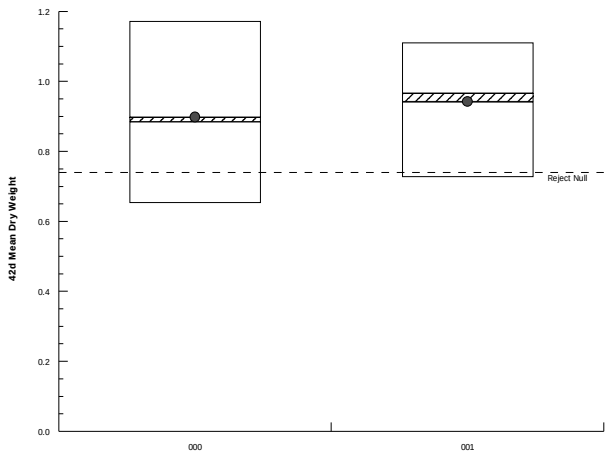
42d Mean Dry Weight Detail

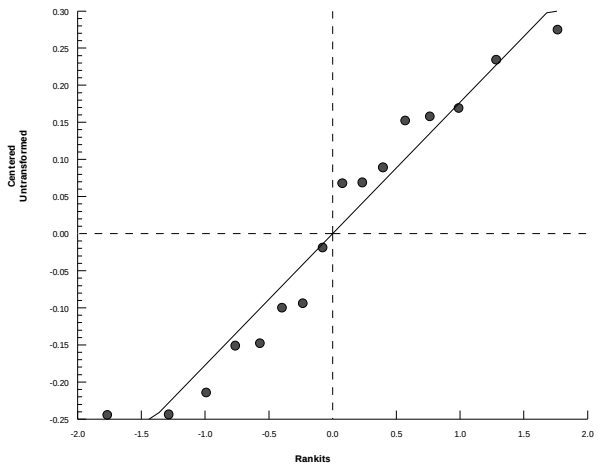
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
001	1.111	1.1	1.031	1.01	0.9233	0.8422	0.7278	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-8994-7343	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-2966-1112	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	0.1148	1.761	0.166	14	0.4551	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.838	2.586	0.8638	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004708658	0.0004708658	1	0.01318	0.9102	Non-Significant Effect
Error	0.4999819	0.03571299	14			
Total	0.5004528		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.606	8.885	0.5472	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9573	0.8408	0.6134	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	1.21%

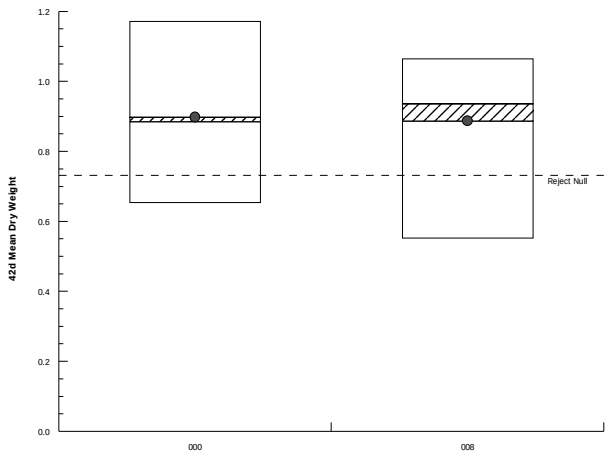
42d Mean Dry Weight Detail

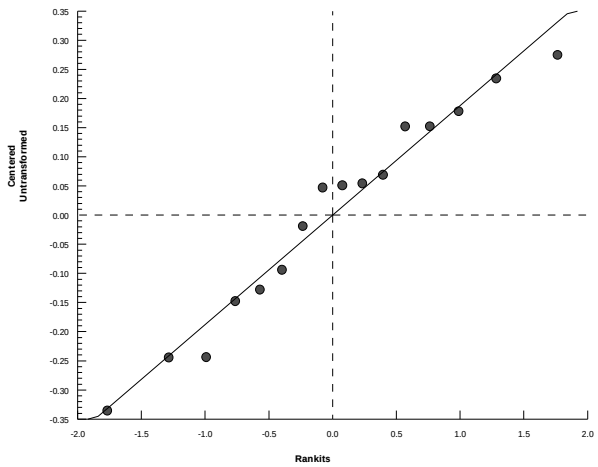
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-2966-1112	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-2845-0289	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	16.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	0.2321	1.771	0.152	13	0.4100	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.719	2.548	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001481415	0.001481415	1	0.05389	0.8200	Non-Significant Effect
Error	0.3573871	0.02749131	13			
Total	0.3588685		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	5.359	10.79	0.0577	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9638	0.8328	0.7582	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.8978	0.7224	1.073	0.8852	0.6533	1.172	0.07418	23.37%	0.0%
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	2.22%

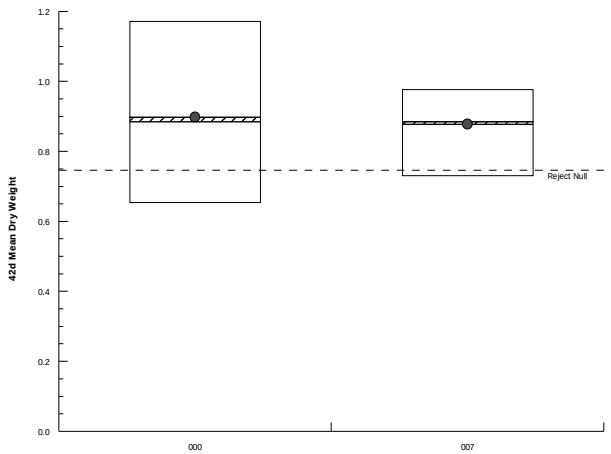
42d Mean Dry Weight Detail

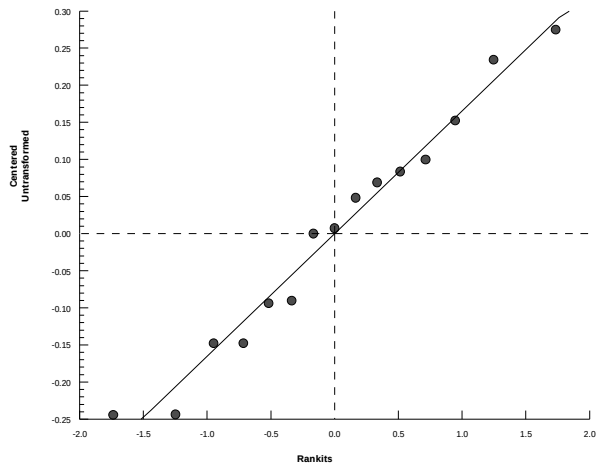
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.9667	0.654	1.172	1.05	1.132	0.75	0.8037	0.6533
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-2845-0289	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-0735-0427	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.2232	1.771	0.093	13	0.4134	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.776	2.548	0.9425	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000509663	0.000509663	1	0.04984	0.8268	Non-Significant Effect
Error	0.1329418	0.01022629	13			
Total	0.1334515		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.455	10.79	0.6636	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9511	0.8328	0.5414	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
006	8	0.8662	0.7748	0.9576	0.8844	0.6931	1.024	0.03865	12.62%	1.33%

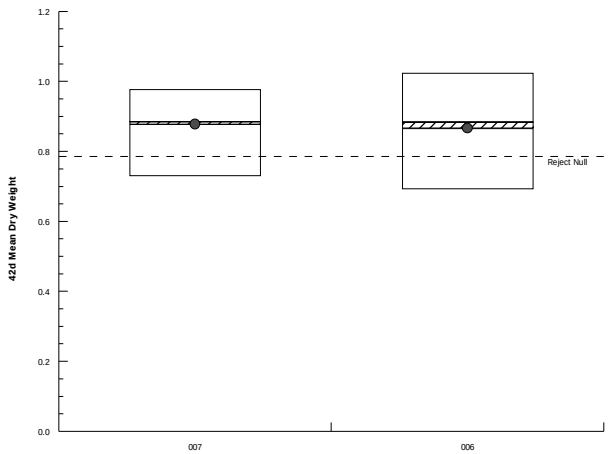
42d Mean Dry Weight Detail

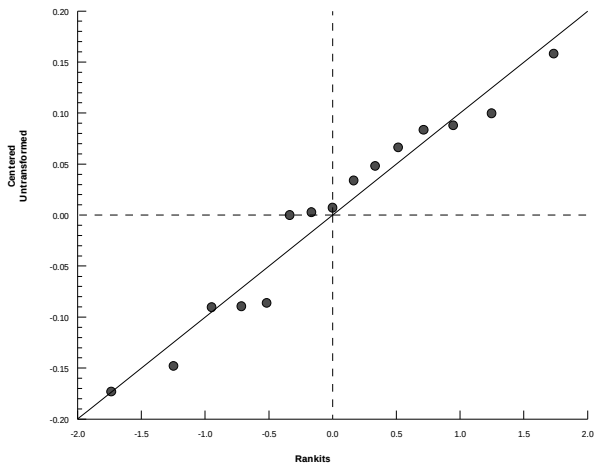
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
006	0.8689	0.954	0.9	1.024	0.6931	0.78	0.7767	0.9325

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-0735-0427	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-1343-2852	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	11.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-3.136	1.771	0.102	13	0.9961	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.316	2.548	0.1512	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1222074	0.1222074	1	9.832	0.0079	Significant Effect
Error	0.1615803	0.01242926	13			
Total	0.2837877		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.953	10.79	0.4326	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9194	0.8328	0.1889	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
005	8	1.059	0.9529	1.165	1.091	0.81	1.194	0.04478	11.96%	-20.61%

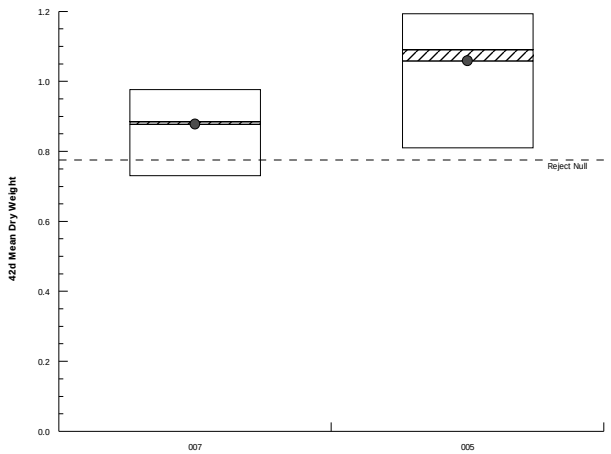
42d Mean Dry Weight Detail

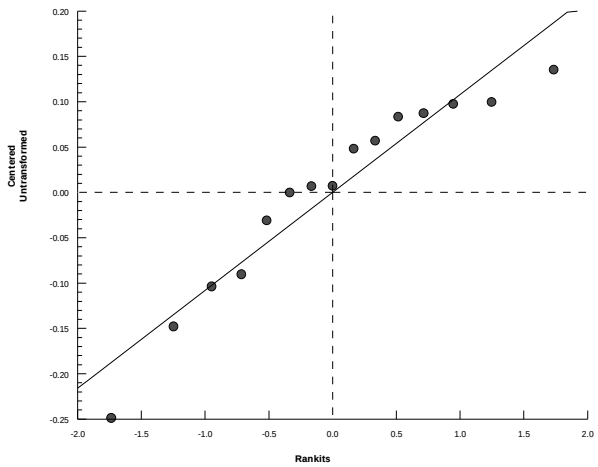
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
005	1.194	0.955	1.066	1.156	1.116	0.81	1.028	1.146

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-1343-2852	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9941-2993	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	9.05%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.5375	1.771	0.079	13	0.3000	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.771	2.548	0.9563	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002169023	0.002169023	1	0.289	0.6000	Non-Significant Effect
Error	0.0975852	0.007506554	13			
Total	0.09975422		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.19	9.155	0.8152	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9522	0.8328	0.5604	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
004	8	0.8538	0.7843	0.9232	0.838	0.76	0.98	0.02937	9.73%	2.75%

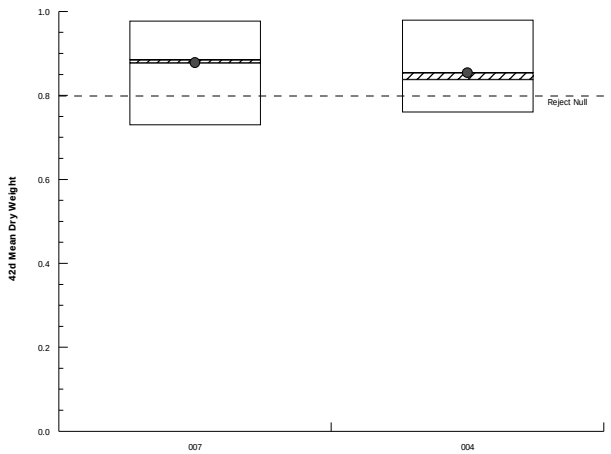
42d Mean Dry Weight Detail

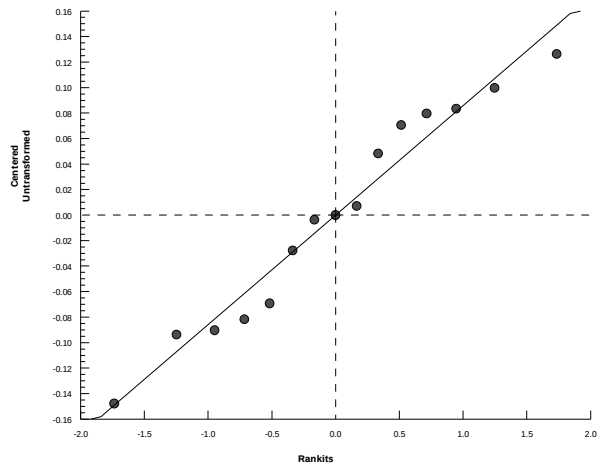
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
004	0.9333	0.772	0.826	0.7844	0.85	0.76	0.9243	0.98

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9941-2993	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9542-1179	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	0.7157	1.771	0.157	13	0.2434	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.593	2.548	0.0392	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01504266	0.01504266	1	0.5122	0.4868	Non-Significant Effect
Error	0.3817672	0.02936671	13			
Total	0.3968099		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	5.783	10.79	0.0482	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9283	0.8328	0.2571	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
003	8	0.8144	0.6322	0.9966	0.8011	0.5275	1.242	0.07705	26.76%	7.23%

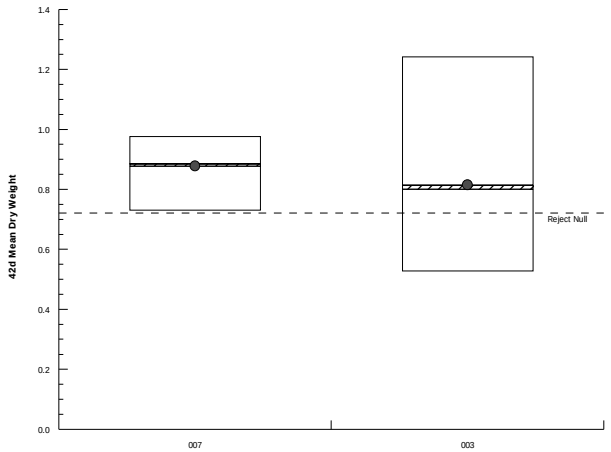
42d Mean Dry Weight Detail

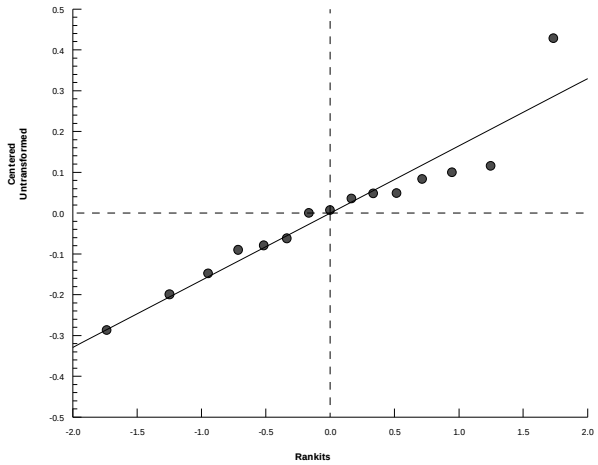
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
003	1.242	0.5275	0.93	0.8629	0.85	0.735	0.7522	0.615

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9542-1179	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-0628-7129	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	0.2982	1.771	0.089	13	0.3851	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.996	2.548	0.4921	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0008419328	0.0008419328	1	0.08893	0.7703	Non-Significant Effect
Error	0.1230788	0.009467597	13			
Total	0.1239207		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.284	10.79	0.7767	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9701	0.8328	0.8595	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
002	8	0.8628	0.777	0.9487	0.8396	0.74	1.05	0.0363	11.9%	1.71%

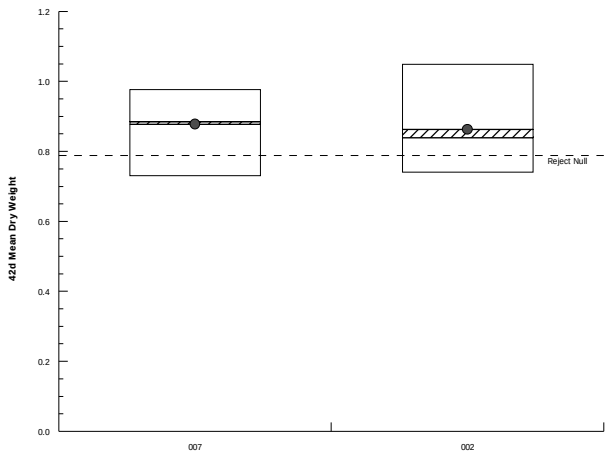
42d Mean Dry Weight Detail

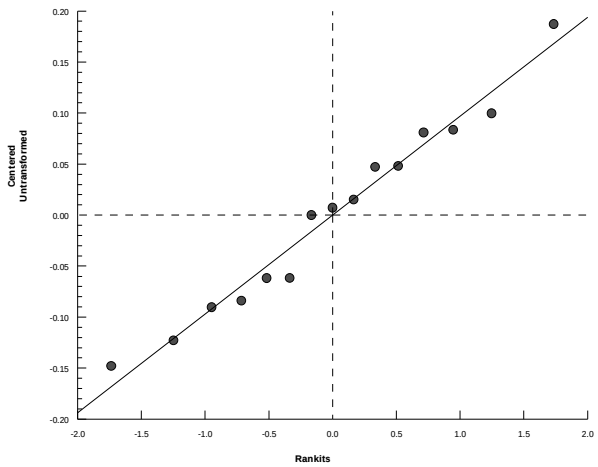
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
002	1.05	0.878	0.9438	0.74	0.8011	0.7789	0.801	0.91

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-0628-7129	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-4125-1427	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	13.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	0.2959	1.761	0.124	14	0.3858	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.475	2.586	0.0862	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001722972	0.001722972	1	0.08754	0.7717	Non-Significant Effect
Error	0.2755367	0.01968119	14			
Total	0.2772596		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.293	8.885	0.2958	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9297	0.8408	0.2415	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
006	8	0.8662	0.7748	0.9576	0.8844	0.6931	1.024	0.03865	12.62%	2.34%

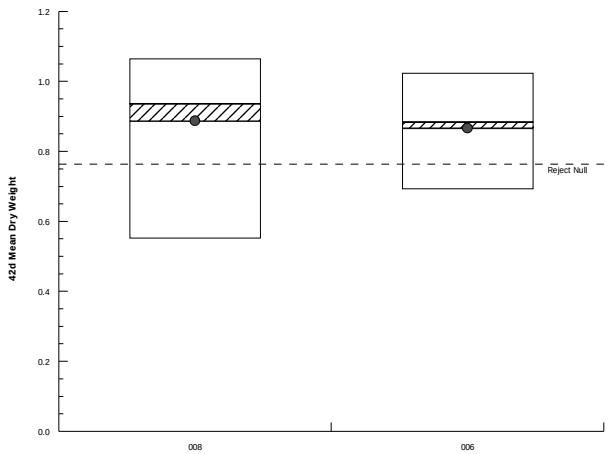
42d Mean Dry Weight Detail

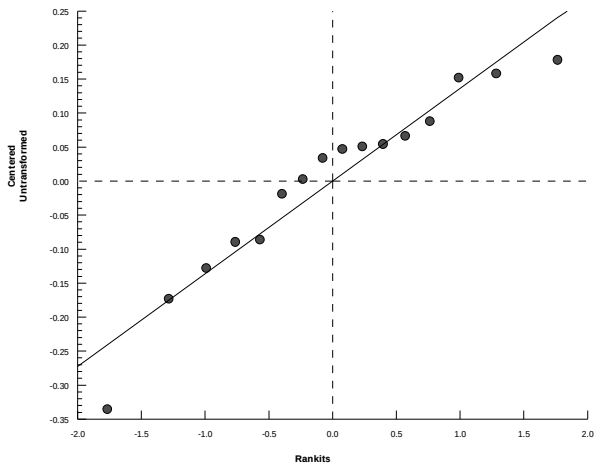
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
006	0.8689	0.954	0.9	1.024	0.6931	0.78	0.7767	0.9325

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-4125-1427	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4541-0746	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	14.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-2.332	1.761	0.13	14	0.9824	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.356	2.586	0.1464	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1181371	0.1181371	1	5.437	0.0352	Significant Effect
Error	0.3041752	0.0217268	14			
Total	0.4223123		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.709	8.885	0.4965	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9046	0.8408	0.0954	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
005	8	1.059	0.9529	1.165	1.091	0.81	1.194	0.04478	11.96%	-19.38%

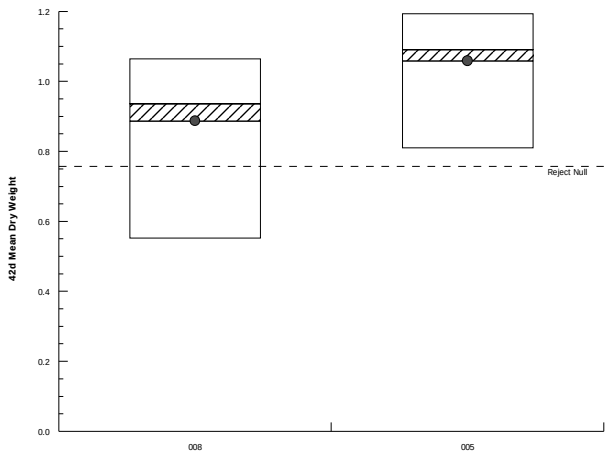
42d Mean Dry Weight Detail

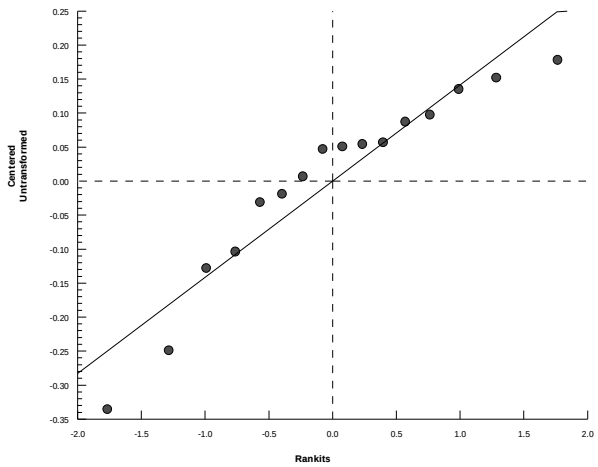
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
005	1.194	0.955	1.066	1.156	1.116	0.81	1.028	1.146

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4541-0746	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-9451-8313	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	9.08%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	1.692	1.771	0.085	13	0.0572	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02455693	0.02455693	1	2.862	0.1145	Non-Significant Effect
Error	0.1115358	0.00857968	13			
Total	0.1360928		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.527	9.155	0.5897	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9561	0.8328	0.6248	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	7	0.9349	0.8399	1.03	0.9378	0.759	1.065	0.0388	10.98%	0.0%
004	8	0.8538	0.7843	0.9232	0.838	0.76	0.98	0.02937	9.73%	8.68%

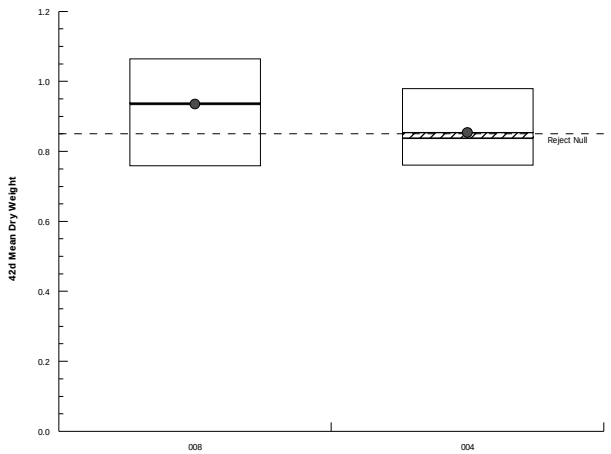
42d Mean Dry Weight Detail

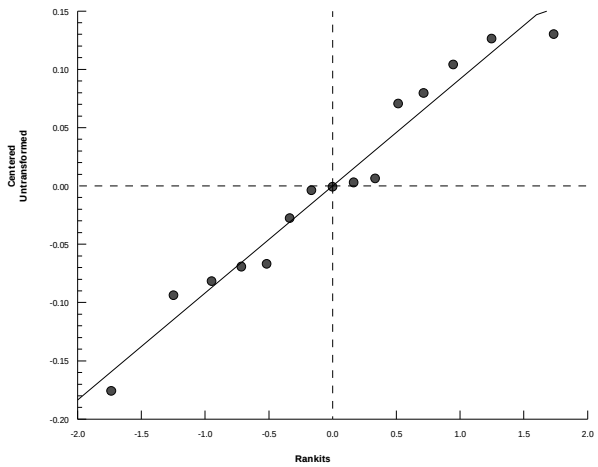
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	Outlier	0.868	0.9412
004	0.9333	0.772	0.826	0.7844	0.85	0.76	0.9243	0.98

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-9451-8313	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-8514-4940	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	13.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	0.5066	1.761	0.115	14	0.3102	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.651	2.586	0.0351	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004402059	0.004402059	1	0.2566	0.6204	Non-Significant Effect
Error	0.2401801	0.01715572	14			
Total	0.2445821		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.972	8.885	0.0891	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9282	0.8408	0.2283	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
004	8	0.8538	0.7843	0.9232	0.838	0.76	0.98	0.02937	9.73%	3.74%

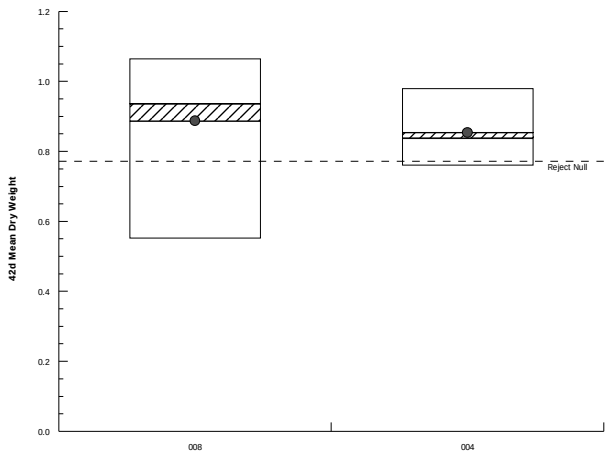
42d Mean Dry Weight Detail

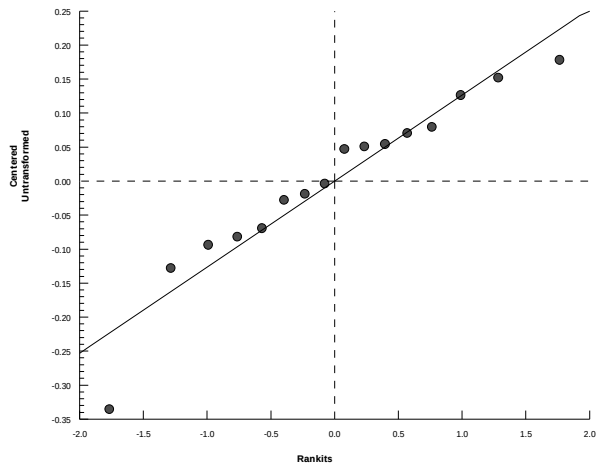
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
004	0.9333	0.772	0.826	0.7844	0.85	0.76	0.9243	0.98

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-8514-4940	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-6456-0695	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	19.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	0.7497	1.761	0.170	14	0.2329	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.29	2.586	0.1919	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02105224	0.02105224	1	0.5621	0.4658	Non-Significant Effect
Error	0.5243621	0.03745444	14			
Total	0.5454144		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.733	8.885	0.4854	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9609	0.8408	0.6775	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
003	8	0.8144	0.6322	0.9966	0.8011	0.5275	1.242	0.07705	26.76%	8.18%

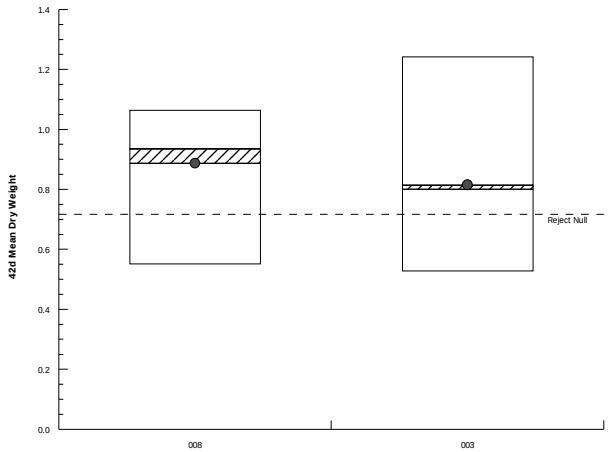
42d Mean Dry Weight Detail

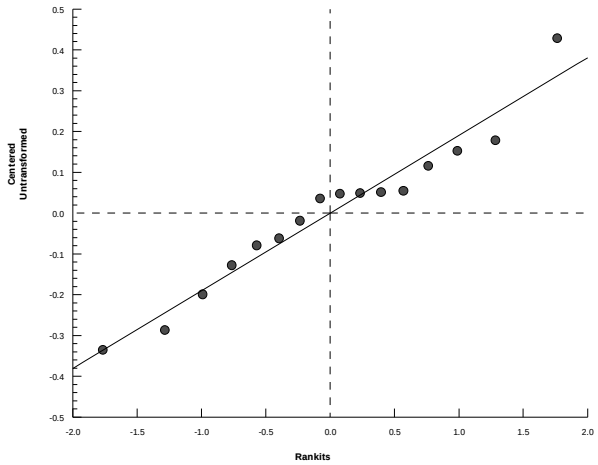
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
003	1.242	0.5275	0.93	0.8629	0.85	0.735	0.7522	0.615

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-6456-0695	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8673-7966	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	13.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	0.3497	1.761	0.121	14	0.3659	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.521	2.586	0.0693	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.002320841	0.002320841	1	0.1223	0.7318	Non-Significant Effect
Error	0.2656736	0.01897669	14			
Total	0.2679945		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.6	8.885	0.2307	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9367	0.8408	0.3109	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
002	8	0.8628	0.777	0.9487	0.8396	0.74	1.05	0.0363	11.9%	2.72%

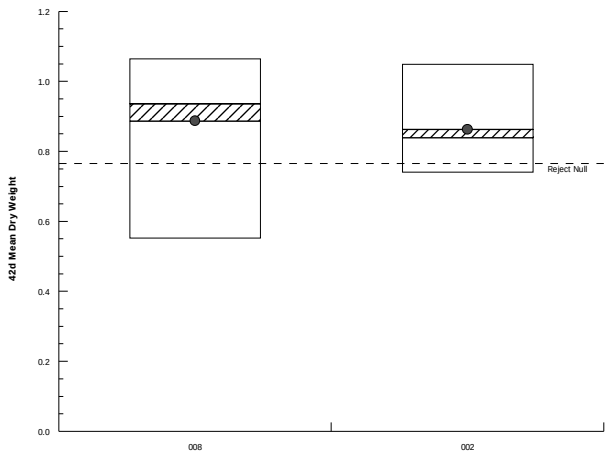
42d Mean Dry Weight Detail

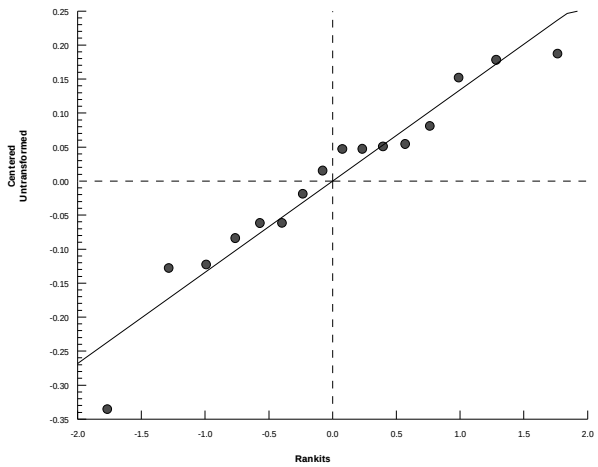
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
002	1.05	0.878	0.9438	0.74	0.8011	0.7789	0.801	0.91

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8673-7966	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8361-9012	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	15.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-0.7111	1.761	0.137	14	0.7557	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.238	2.586	0.2345	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01217587	0.01217587	1	0.5057	0.4887	Non-Significant Effect
Error	0.3370669	0.0240762	14			
Total	0.3492427		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.321	8.885	0.7224	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9254	0.8408	0.2062	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8869	0.7485	1.025	0.9359	0.5514	1.065	0.05853	18.67%	0.0%
001	8	0.9421	0.8217	1.063	0.9667	0.7278	1.111	0.05092	15.29%	-6.22%

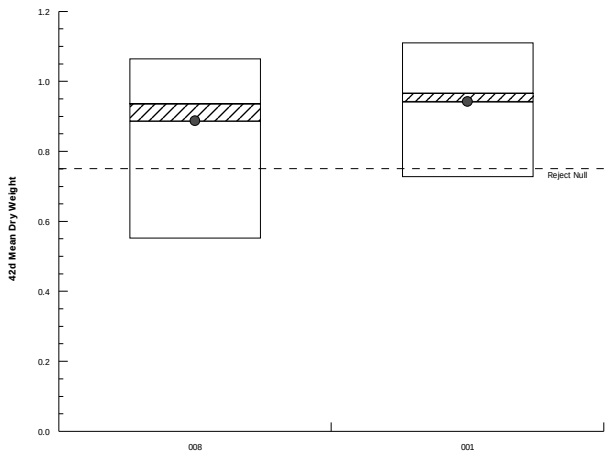
42d Mean Dry Weight Detail

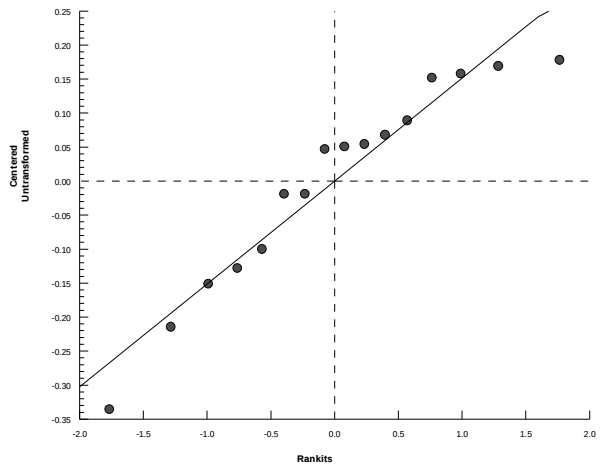
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.9378	1.065	0.759	1.039	0.5514	0.868	0.9412
001	1.111	1.1	1.031	1.01	0.9233	0.8422	0.7278	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-8361-9012	**Endpoint:**	42d Mean Dry Weight	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 08 Jan-13 16:28 (p 1 of 1)
Test Code: 22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID: 17-8034-4678 **Endpoint:** 42d Mean Dry Weight **CETIS Version:** CETISv1.8.6
Analyzed: 08 Jan-13 16:25 **Analysis:** Parametric-Two Sample **Official Results:** Yes

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	12.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-1.015	1.771	0.112	13	0.8357	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.818	2.548	0.8391	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01540782	0.01540782	1	1.03	0.3287	Non-Significant Effect
Error	0.194472	0.01495938	13			
Total	0.2098798		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.526	10.79	0.2793	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9514	0.8328	0.5469	Normal Distribution

42d Mean Dry Weight Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.8779	0.794	0.9617	0.885	0.73	0.9775	0.03425	10.32%	0.0%
001	8	0.9421	0.8217	1.063	0.9667	0.7278	1.111	0.05092	15.29%	-7.32%

42d Mean Dry Weight Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.9775	0.9613	0.926	0.885	0.73	0.7875	0.8778	
001	1.111	1.1	1.031	1.01	0.9233	0.8422	0.7278	0.791

CETIS Analytical Reports
Day 42 Dry Biomass Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date: 08 Jan-13 16:06 (p 1 of 2)
Test Code: 22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.588	1.132	0.06871	0.1943	24.82%	0.0%
007	7	0.7517	0.6602	0.8432	0.63	0.926	0.0374	0.09896	13.16%	4.01%
008	8	0.8044	0.6434	0.9653	0.386	1.039	0.06807	0.1925	23.94%	-2.71%
001	8	0.7438	0.5019	0.9856	0.101	1.1	0.1023	0.2893	38.89%	5.03%
002	8	0.763	0.6743	0.8517	0.637	0.945	0.0375	0.1061	13.9%	2.57%
003	8	0.6826	0.5186	0.8467	0.422	0.994	0.06939	0.1963	28.75%	12.83%
004	8	0.6817	0.5993	0.7642	0.56	0.826	0.03485	0.09857	14.46%	12.94%
005	8	0.8599	0.683	1.037	0.567	1.194	0.0748	0.2116	24.6%	-9.8%
006	8	0.7389	0.6422	0.8356	0.54	0.954	0.04088	0.1156	15.65%	5.65%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

42d Mean Dry Biomass Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588		
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79			
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753		
001	0.889	1.1	0.825	0.101	0.831	0.758	0.655	0.791		
002	0.945	0.878	0.755	0.666	0.721	0.701	0.801	0.637		
003	0.994	0.422	0.93	0.5491	0.595	0.735	0.677	0.5591		
004	0.56	0.772	0.826	0.706	0.595	0.76	0.647	0.588		
005	1.194	0.955	0.959	0.925	0.781	0.567	0.925	0.573		
006	0.782	0.954	0.54	0.717	0.6931	0.78	0.699	0.746		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-5104-6183	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	0.5533	1.761	0.141	14	0.2944	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.258	2.586	0.2171	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007828874	0.007828874	1	0.3062	0.5888	Non-Significant Effect
Error	0.3579975	0.02557125	14			
Total	0.3658264		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.825	8.885	0.1941	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9474	0.8408	0.4491	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
006	8	0.7389	0.6422	0.8356	0.7315	0.54	0.954	0.04088	15.65%	5.65%

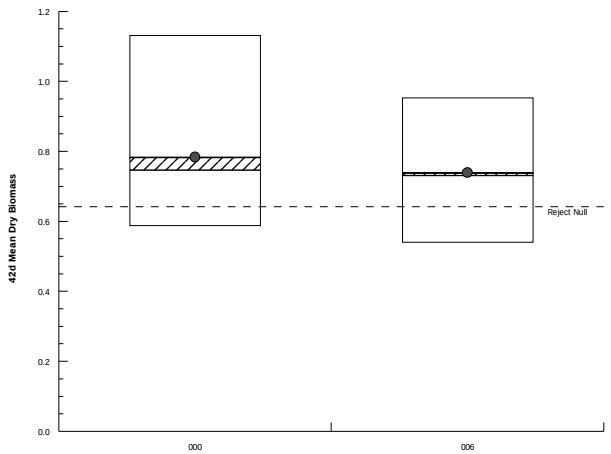
42d Mean Dry Biomass Detail

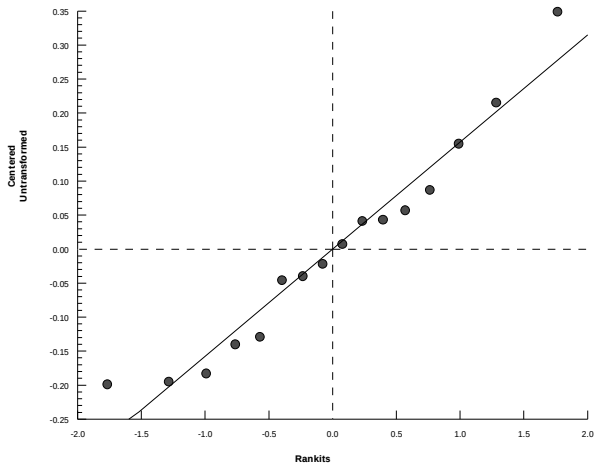
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
006	0.782	0.954	0.54	0.717	0.6931	0.78	0.699	0.746

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-5104-6183	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-0726-5408	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	1.316	1.761	0.136	14	0.1047	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.344	2.586	0.1542	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04110788	0.04110788	1	1.731	0.2094	Non-Significant Effect
Error	0.3324082	0.02374344	14			
Total	0.3735161		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.888	8.885	0.0939	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9355	0.8408	0.2979	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
004	8	0.6817	0.5993	0.7642	0.6765	0.56	0.826	0.03485	14.46%	12.94%

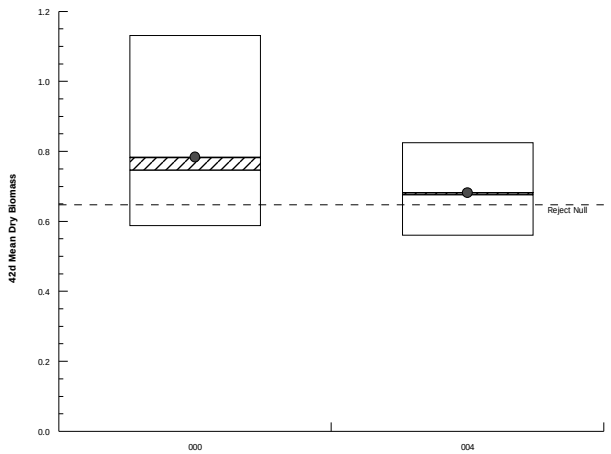
42d Mean Dry Biomass Detail

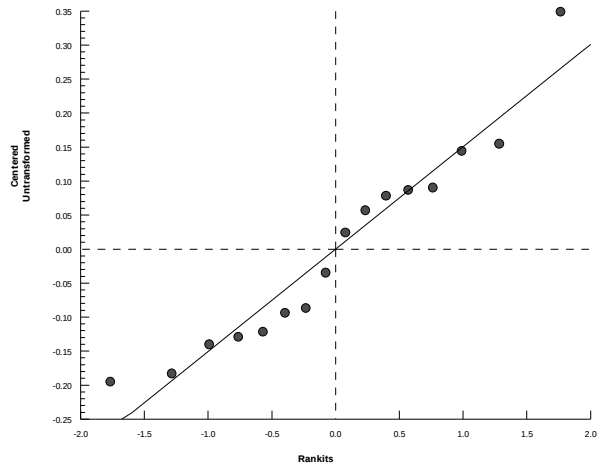
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
004	0.56	0.772	0.826	0.706	0.595	0.76	0.647	0.588

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-0726-5408	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6769-7286	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	1.029	1.761	0.172	14	0.1605	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.849	2.586	0.8368	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04038296	0.04038296	1	1.059	0.3210	Non-Significant Effect
Error	0.5340177	0.03814412	14			
Total	0.5744007		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.02	8.885	0.9801	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9259	0.8408	0.2100	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
003	8	0.6826	0.5186	0.8467	0.636	0.422	0.994	0.06939	28.75%	12.83%

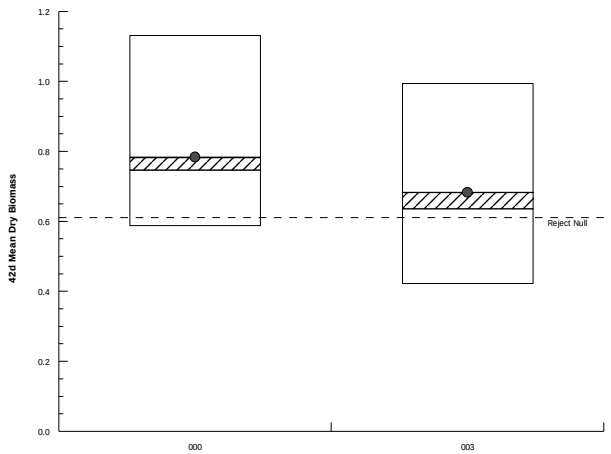
42d Mean Dry Biomass Detail

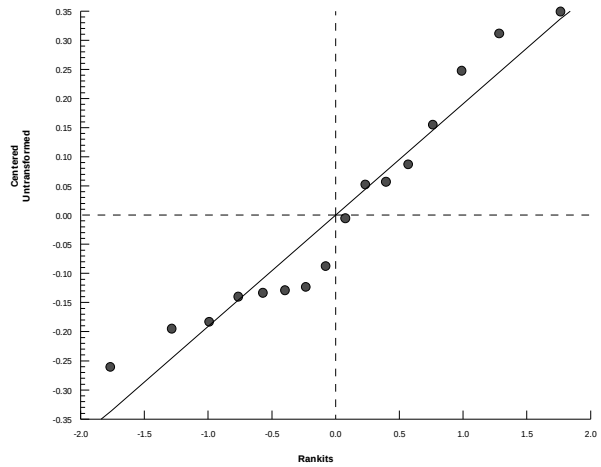
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
003	0.994	0.422	0.93	0.5491	0.595	0.735	0.677	0.5591

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6769-7286	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-7793-9996	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	0.2571	1.761	0.138	14	0.4004	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.307	2.586	0.1794	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001620034	0.001620034	1	0.0661	0.8008	Non-Significant Effect
Error	0.3431489	0.02451064	14			
Total	0.3447689		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.357	8.885	0.1325	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9461	0.8408	0.4299	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
002	8	0.763	0.6743	0.8517	0.738	0.637	0.945	0.0375	13.9%	2.57%

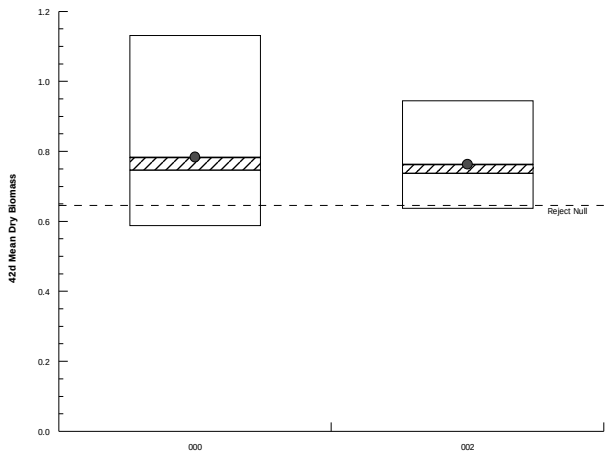
42d Mean Dry Biomass Detail

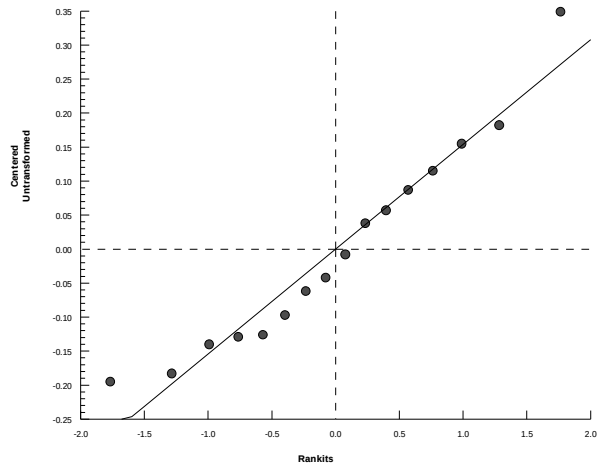
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
002	0.945	0.878	0.755	0.666	0.721	0.701	0.801	0.637

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-7793-9996	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-8487-8773	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	20.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-0.5943	1.771	0.156	13	0.7188	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01026908	0.01026908	1	0.3532	0.5625	Non-Significant Effect
Error	0.3779184	0.02907065	13			
Total	0.3881875		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.996	10.79	0.4178	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9302	0.8328	0.2745	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
001	7	0.8356	0.7084	0.9628	0.825	0.655	1.1	0.05199	16.46%	-6.7%

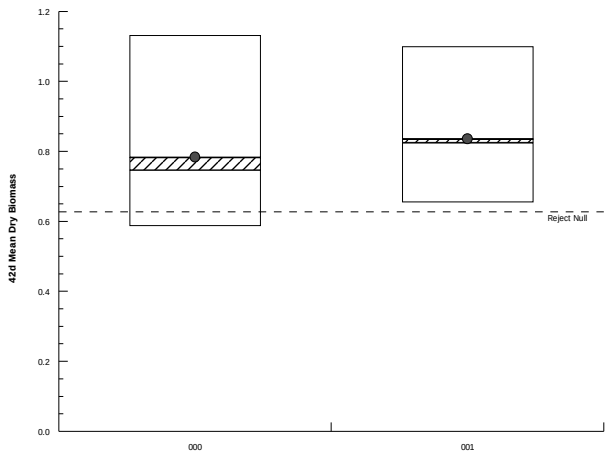
42d Mean Dry Biomass Detail

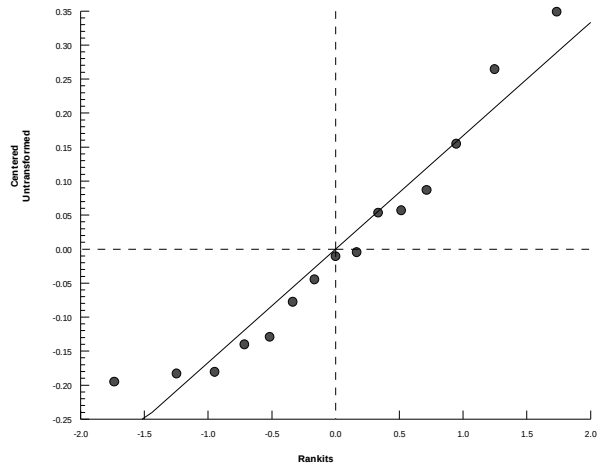
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
001	0.889	1.1	0.825	Outlier	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-8487-8773	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-5298-3145	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	0.3196	1.761	0.217	14	0.3770	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.7	2.586	0.0266	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006201537	0.006201537	1	0.1021	0.7540	Non-Significant Effect
Error	0.8500653	0.06071895	14			
Total	0.8562669		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.215	8.885	0.3159	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9065	0.8408	0.1021	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
001	8	0.7438	0.5019	0.9856	0.808	0.101	1.1	0.1023	38.89%	5.03%

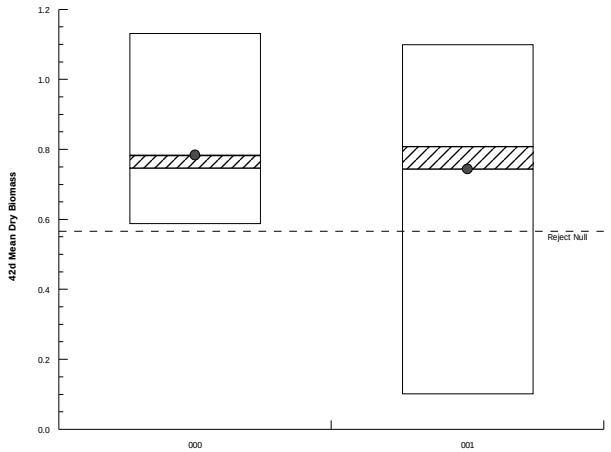
42d Mean Dry Biomass Detail

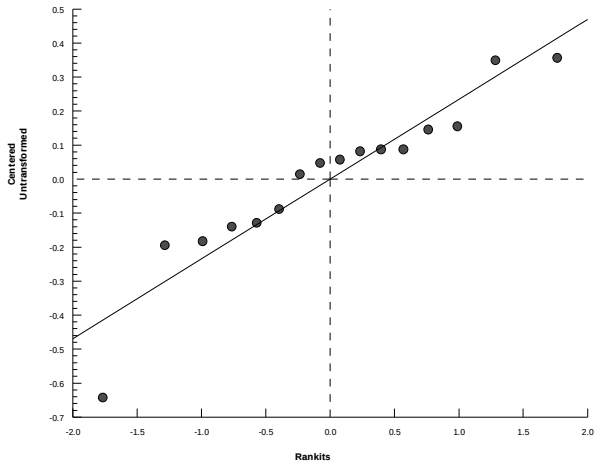
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
001	0.889	1.1	0.825	0.101	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-5298-3145	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-0964-2451	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	21.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	-0.2197	1.761	0.170	14	0.5854	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.239	2.586	0.2340	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001806178	0.001806178	1	0.04827	0.8293	Non-Significant Effect
Error	0.523874	0.03741958	14			
Total	0.5256802		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.019	8.885	0.9809	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9782	0.8408	0.9481	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	-2.71%

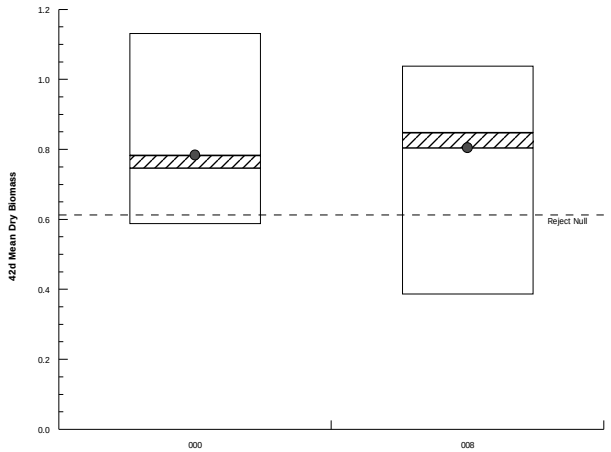
42d Mean Dry Biomass Detail

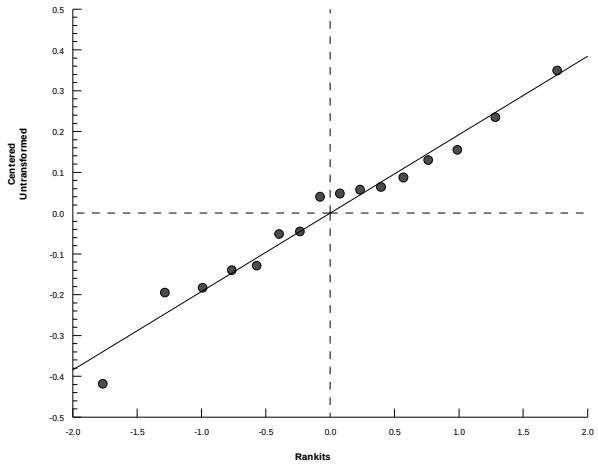
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-0964-2451	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-4878-0875	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	18.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	0.3849	1.771	0.145	13	0.3533	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.296	2.548	0.1640	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003683425	0.003683425	1	0.1482	0.7065	Non-Significant Effect
Error	0.3231519	0.02485784	13			
Total	0.3268353		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.857	10.79	0.1207	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9415	0.8328	0.4014	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	0.7831	0.6206	0.9456	0.747	0.588	1.132	0.06871	24.82%	0.0%
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	4.01%

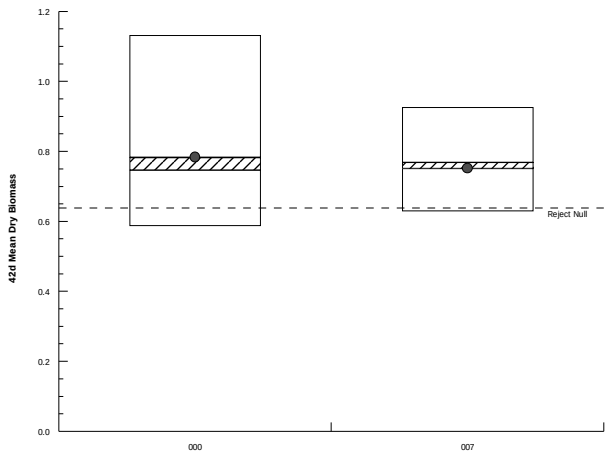
42d Mean Dry Biomass Detail

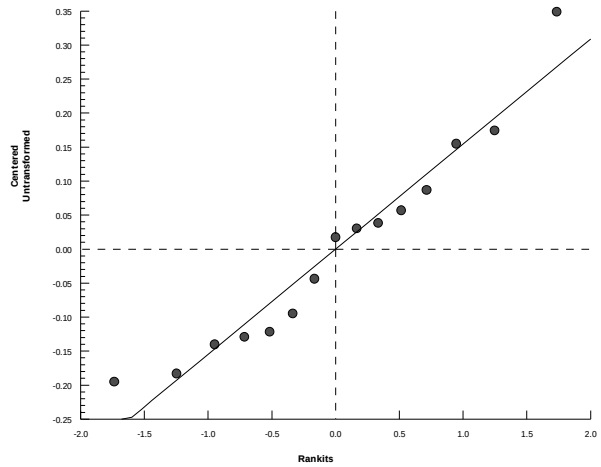
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	0.87	0.654	0.938	0.84	1.132	0.6	0.643	0.588
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-4878-0875	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-7043-8119	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	13.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.229	1.771	0.099	13	0.4112	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.062	2.548	0.3956	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006145177	0.0006145177	1	0.05244	0.8224	Non-Significant Effect
Error	0.1523517	0.01171936	13			
Total	0.1529662		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.366	10.79	0.7201	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9518	0.8328	0.5529	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
006	8	0.7389	0.6422	0.8356	0.7315	0.54	0.954	0.04088	15.65%	1.71%

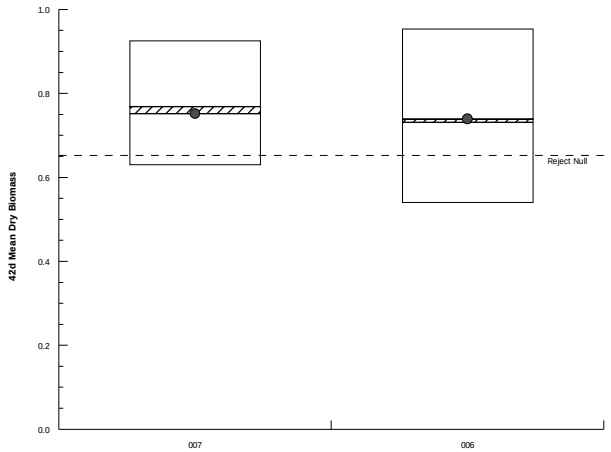
42d Mean Dry Biomass Detail

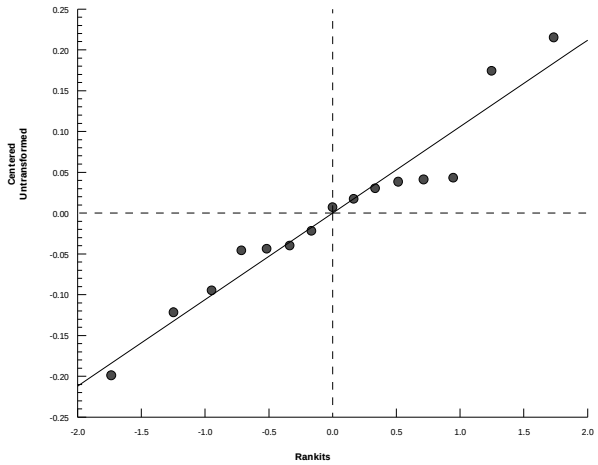
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
006	0.782	0.954	0.54	0.717	0.6931	0.78	0.699	0.746

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-7043-8119	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-5889-2543	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	20.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-1.235	1.771	0.155	13	0.8807	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.05	2.548	0.4126	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04367512	0.04367512	1	1.526	0.2386	Non-Significant Effect
Error	0.3720444	0.0286188	13			
Total	0.4157196		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.571	10.79	0.0832	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9553	0.8328	0.6111	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
005	8	0.8599	0.683	1.037	0.925	0.567	1.194	0.0748	24.6%	-14.39%

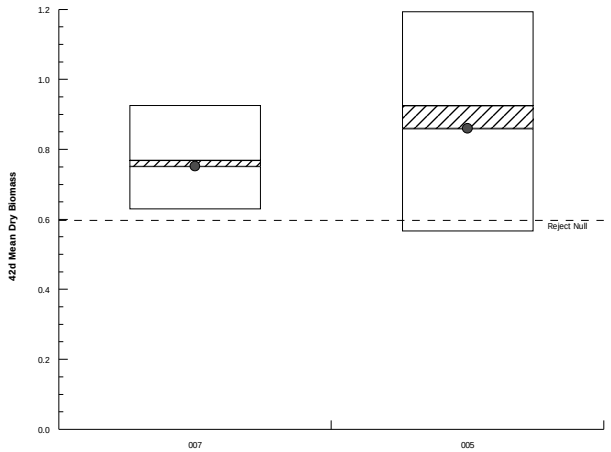
42d Mean Dry Biomass Detail

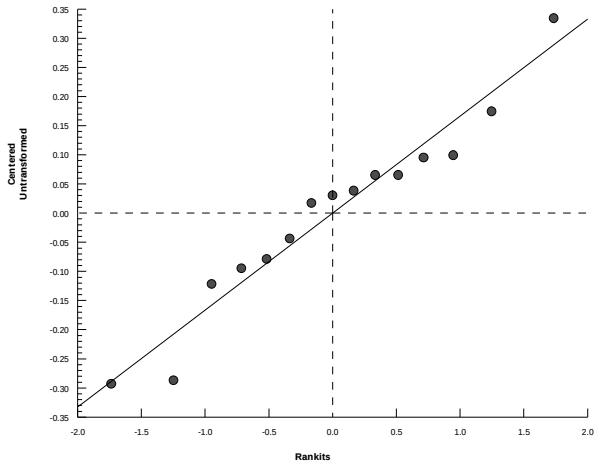
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
005	1.194	0.955	0.959	0.925	0.781	0.567	0.925	0.573

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-5889-2543	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-3955-4109	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	12.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	1.369	1.771	0.091	13	0.0971	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.832	2.548	0.8087	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01827489	0.01827489	1	1.874	0.1942	Non-Significant Effect
Error	0.1267623	0.009750947	13			
Total	0.1450372		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.008	9.155	0.9760	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9382	0.8328	0.3600	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
004	8	0.6817	0.5993	0.7642	0.6765	0.56	0.826	0.03485	14.46%	9.31%

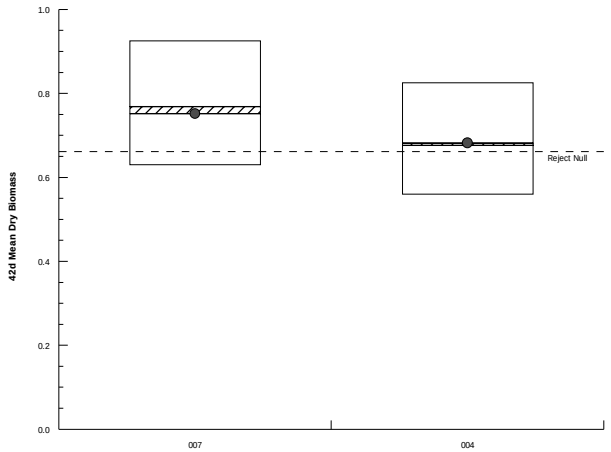
42d Mean Dry Biomass Detail

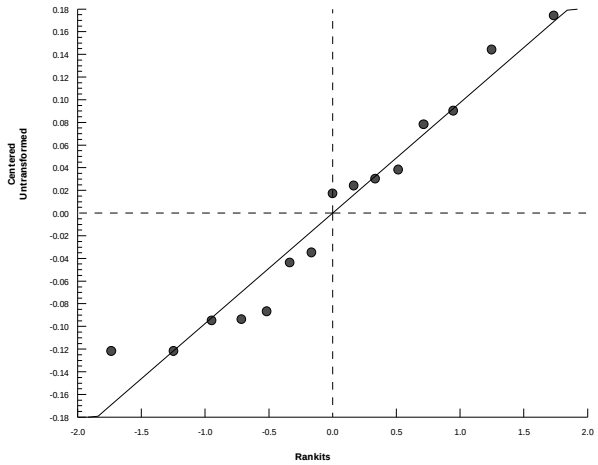
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
004	0.56	0.772	0.826	0.706	0.595	0.76	0.647	0.588

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-3955-4109	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9451-0970	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	19.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	0.8397	1.771	0.146	13	0.2081	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.033	2.548	0.4362	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01780886	0.01780886	1	0.705	0.4163	Non-Significant Effect
Error	0.3283718	0.02525937	13			
Total	0.3461807		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.933	10.79	0.1157	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.95	0.8328	0.5248	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
003	8	0.6826	0.5186	0.8467	0.636	0.422	0.994	0.06939	28.75%	9.19%

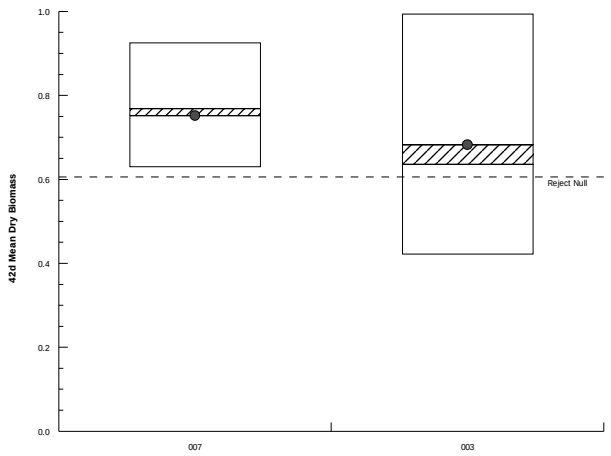
42d Mean Dry Biomass Detail

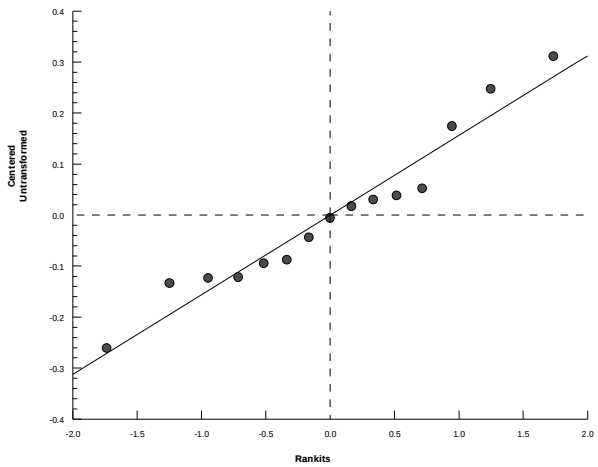
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
003	0.994	0.422	0.93	0.5491	0.595	0.735	0.677	0.5591

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9451-0970	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4624-5738	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	12.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.212	1.771	0.094	13	0.5823	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.836	2.548	0.7976	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004755178	0.0004755178	1	0.04496	0.8354	Non-Significant Effect
Error	0.1375031	0.01057716	13			
Total	0.1379786		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.149	10.79	0.8817	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9268	0.8328	0.2441	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
002	8	0.763	0.6743	0.8517	0.738	0.637	0.945	0.0375	13.9%	-1.5%

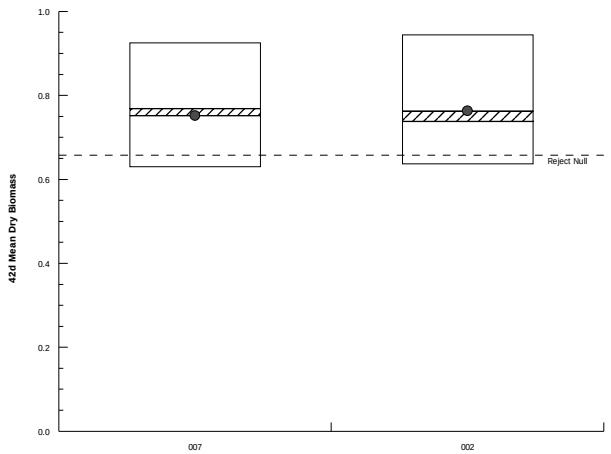
42d Mean Dry Biomass Detail

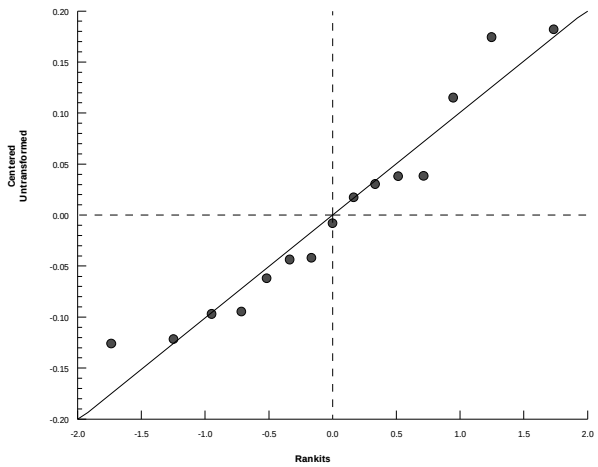
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
002	0.945	0.878	0.755	0.666	0.721	0.701	0.801	0.637

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4624-5738	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5658-8627	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	15.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-1.309	1.782	0.114	12	0.8925	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02461217	0.02461217	1	1.714	0.2149	Non-Significant Effect
Error	0.1722725	0.01435605	12			
Total	0.1968847		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.932	11.07	0.4429	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.943	0.8239	0.4588	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
001	7	0.8356	0.7084	0.9628	0.825	0.655	1.1	0.05199	16.46%	-11.16%

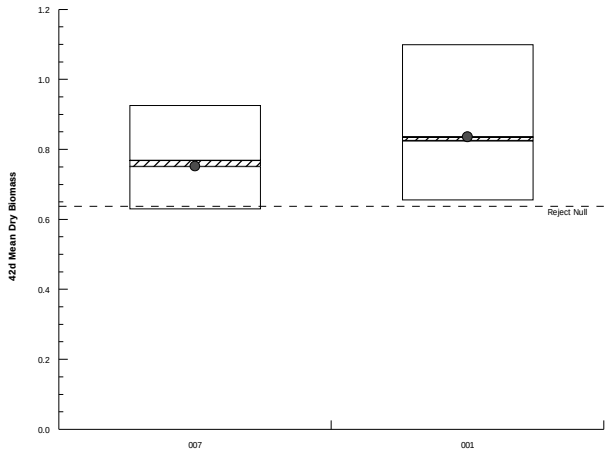
42d Mean Dry Biomass Detail

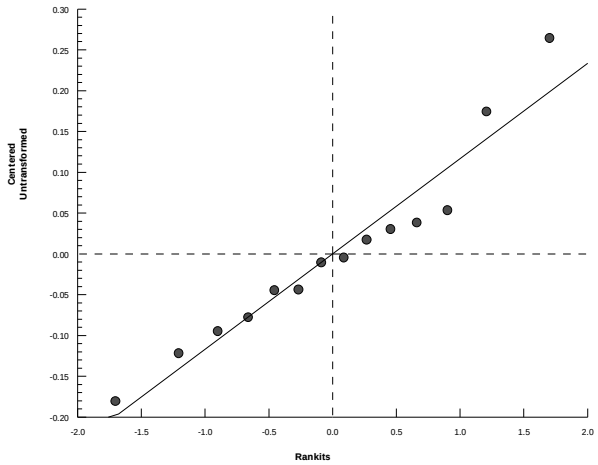
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
001	0.889	1.1	0.825	Outlier	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5658-8627	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-7621-5076	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	27.1%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		001	71	NA	0	13	0.8016	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.996	2.548	0.0020	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002368014	0.0002368014	1	0.004777	0.9459	Non-Significant Effect
Error	0.6444194	0.04957072	13			
Total	0.6446562		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	8.544	10.79	0.0183	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8178	0.8328	0.0063	Non-normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	0.7517	0.6602	0.8432	0.769	0.63	0.926	0.0374	13.16%	0.0%
001	8	0.7438	0.5019	0.9856	0.808	0.101	1.1	0.1023	38.89%	1.06%

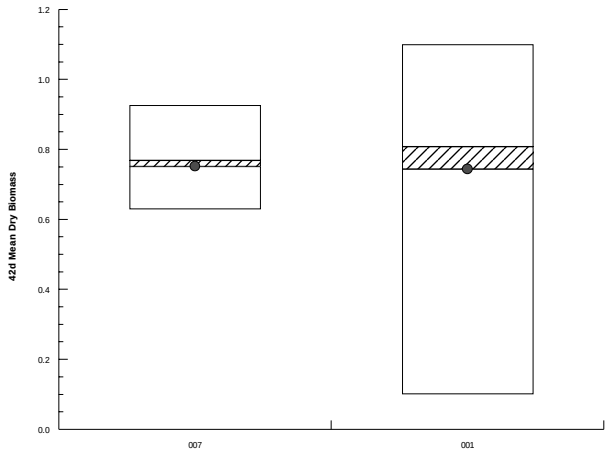
42d Mean Dry Biomass Detail

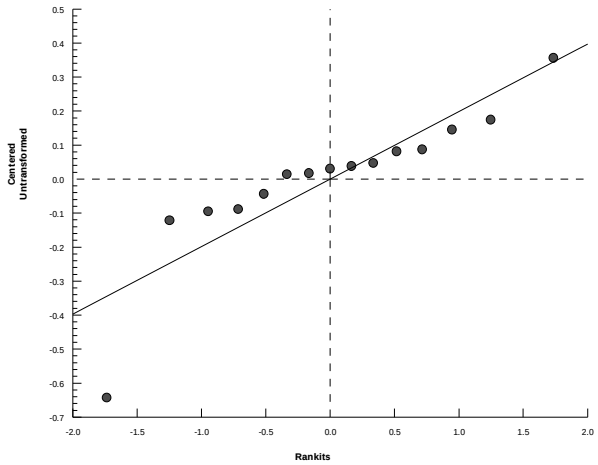
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.782	0.769	0.926	0.708	0.657	0.63	0.79	
001	0.889	1.1	0.825	0.101	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-7621-5076	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-1234-8737	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	11.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	2.231	1.771	0.099	13	0.0220	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05857444	0.05857444	1	4.976	0.0439	Significant Effect
Error	0.1530298	0.01177152	13			
Total	0.2116042		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.35	10.79	0.7305	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.957	0.8328	0.6408	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	7	0.8641	0.7721	0.9562	0.852	0.753	1.039	0.03762	11.52%	0.0%
006	8	0.7389	0.6422	0.8356	0.7315	0.54	0.954	0.04088	15.65%	14.5%

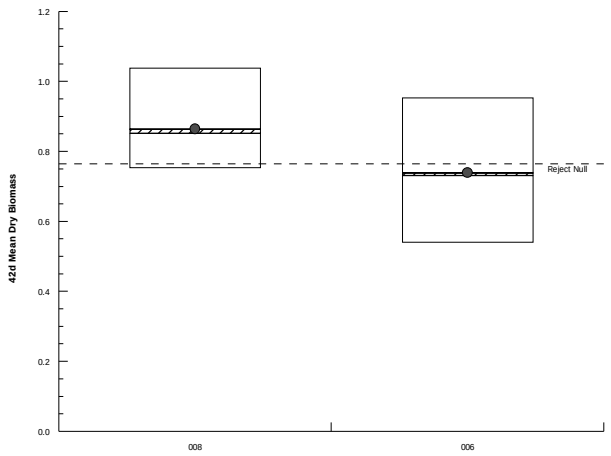
42d Mean Dry Biomass Detail

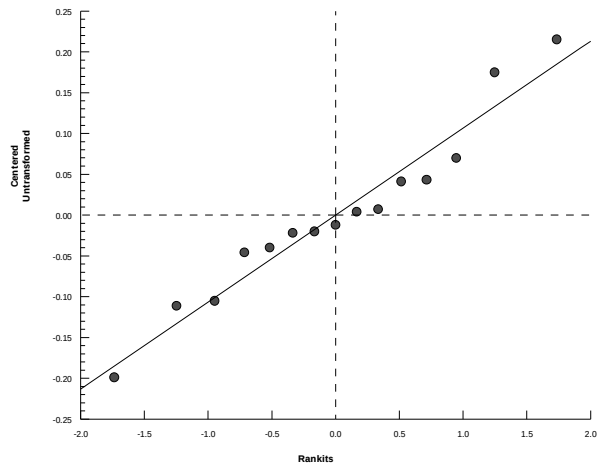
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	Outlier	0.868	0.753
006	0.782	0.954	0.54	0.717	0.6931	0.78	0.699	0.746

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-1234-8737	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-3917-2849	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	0.8248	1.761	0.14	14	0.2117	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.727	2.586	0.0226	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01715578	0.01715578	1	0.6803	0.4233	Non-Significant Effect
Error	0.3530739	0.02521956	14			
Total	0.3702296		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.772	8.885	0.2019	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8866	0.8408	0.0491	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
006	8	0.7389	0.6422	0.8356	0.7315	0.54	0.954	0.04088	15.65%	8.14%

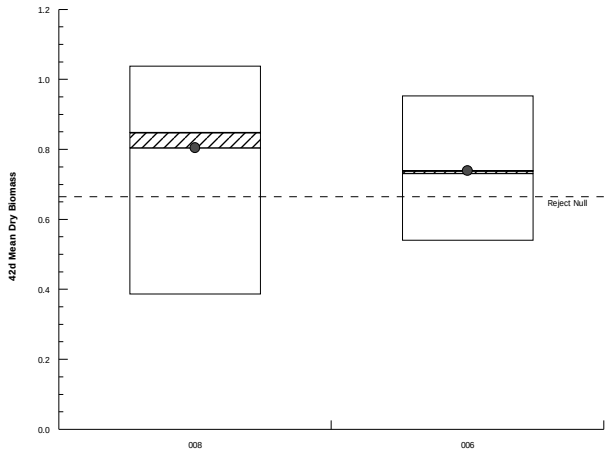
42d Mean Dry Biomass Detail

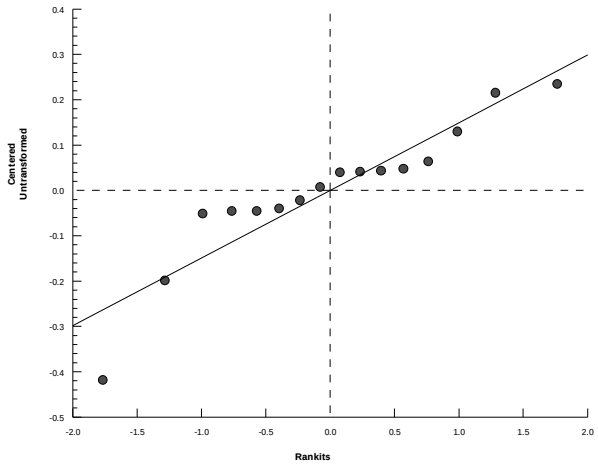
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
006	0.782	0.954	0.54	0.717	0.6931	0.78	0.699	0.746

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-3917-2849	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-7668-7624	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	22.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-0.5488	1.761	0.178	14	0.7041	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.141	2.586	0.3343	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0123211	0.0123211	1	0.3012	0.5918	Non-Significant Effect
Error	0.5727666	0.0409119	14			
Total	0.5850877		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.207	8.885	0.8100	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9244	0.8408	0.1987	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
005	8	0.8599	0.683	1.037	0.925	0.567	1.194	0.0748	24.6%	-6.9%

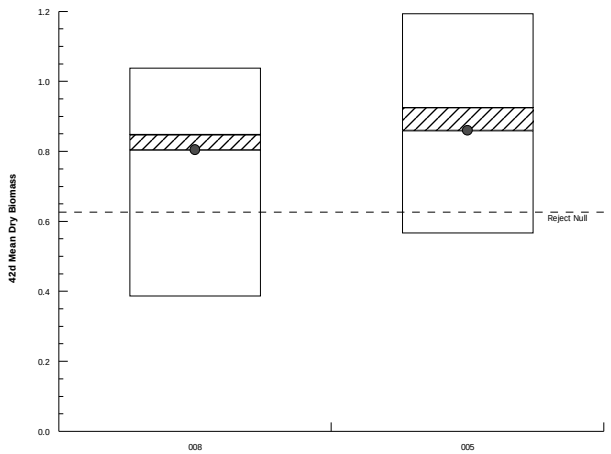
42d Mean Dry Biomass Detail

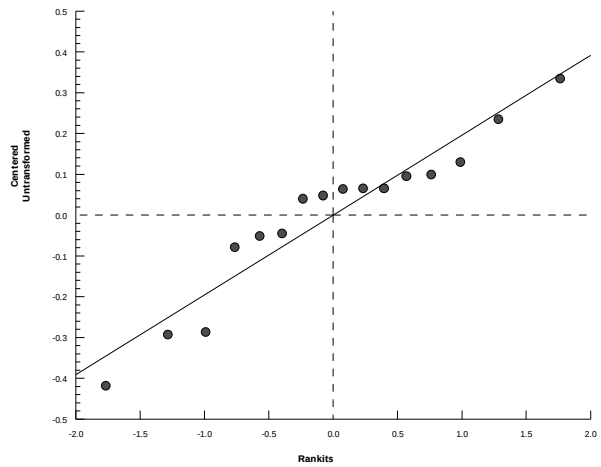
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
005	1.194	0.955	0.959	0.925	0.781	0.567	0.925	0.573

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-7668-7624	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-2593-0248	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	3.559	1.771	0.091	13	0.0017	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1241976	0.1241976	1	12.67	0.0035	Significant Effect
Error	0.1274404	0.009803107	13			
Total	0.2516379		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.02	9.155	0.9648	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9377	0.8328	0.3540	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	7	0.8641	0.7721	0.9562	0.852	0.753	1.039	0.03762	11.52%	0.0%
004	8	0.6817	0.5993	0.7642	0.6765	0.56	0.826	0.03485	14.46%	21.11%

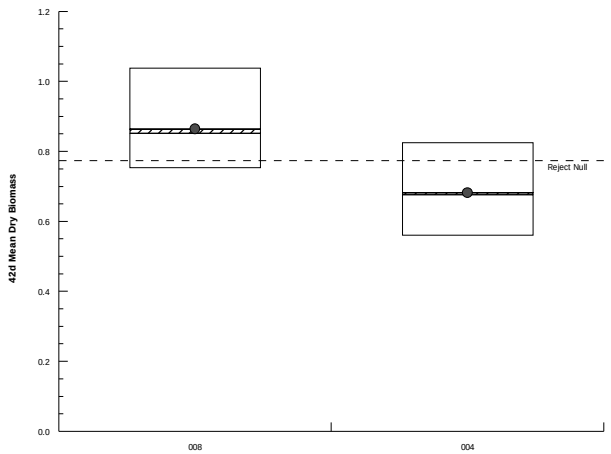
42d Mean Dry Biomass Detail

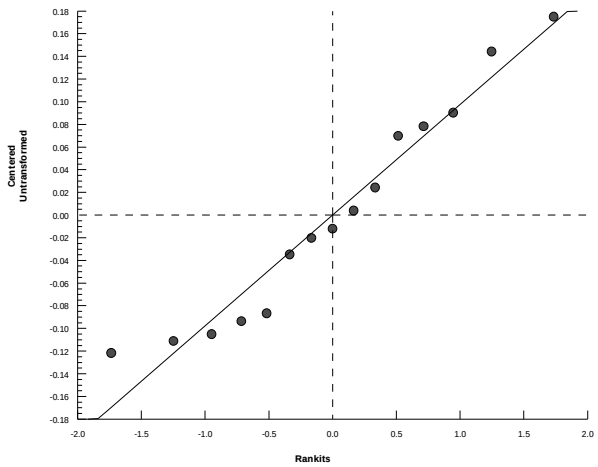
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	Outlier	0.868	0.753
004	0.56	0.772	0.826	0.706	0.595	0.76	0.647	0.588

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-2593-0248	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-0714-0409	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	16.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	1.604	1.761	0.135	14	0.0656	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.832	2.586	0.0115	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.06014754	0.06014754	1	2.571	0.1311	Non-Significant Effect
Error	0.3274845	0.02339175	14			
Total	0.387632		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.815	8.885	0.0982	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.901	0.8408	0.0835	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
004	8	0.6817	0.5993	0.7642	0.6765	0.56	0.826	0.03485	14.46%	15.24%

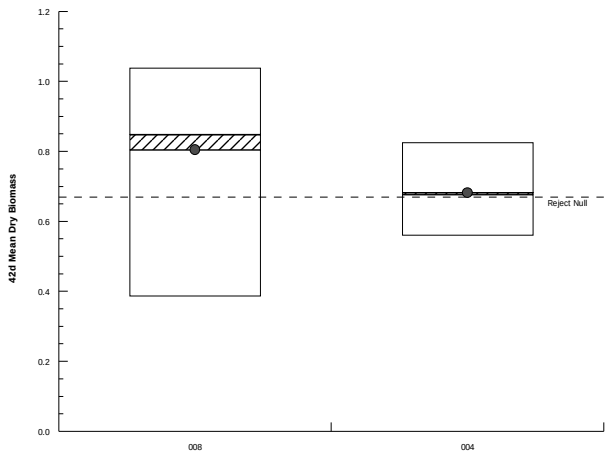
42d Mean Dry Biomass Detail

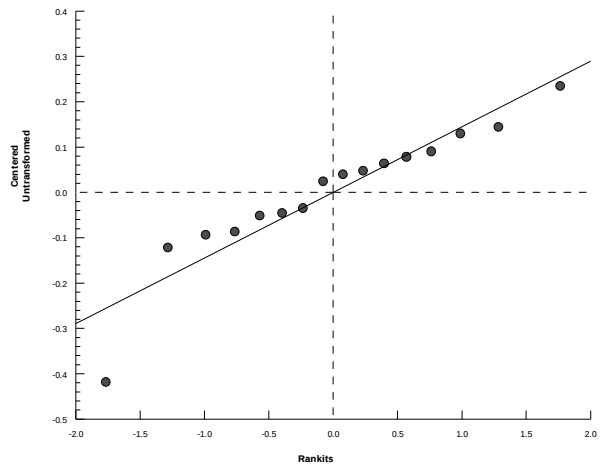
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
004	0.56	0.772	0.826	0.706	0.595	0.76	0.647	0.588

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-0714-0409	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6481-2154	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	21.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	1.252	1.761	0.171	14	0.1155	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.228	2.586	0.2440	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05926998	0.05926998	1	1.568	0.2310	Non-Significant Effect
Error	0.529094	0.03779243	14			
Total	0.588364		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.039	8.885	0.9610	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9709	0.8408	0.8533	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
003	8	0.6826	0.5186	0.8467	0.636	0.422	0.994	0.06939	28.75%	15.13%

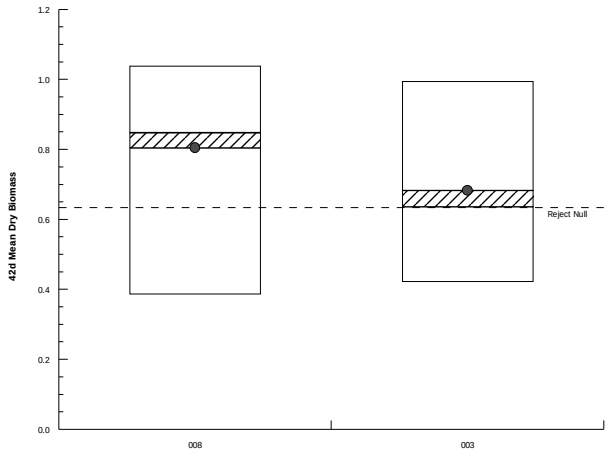
42d Mean Dry Biomass Detail

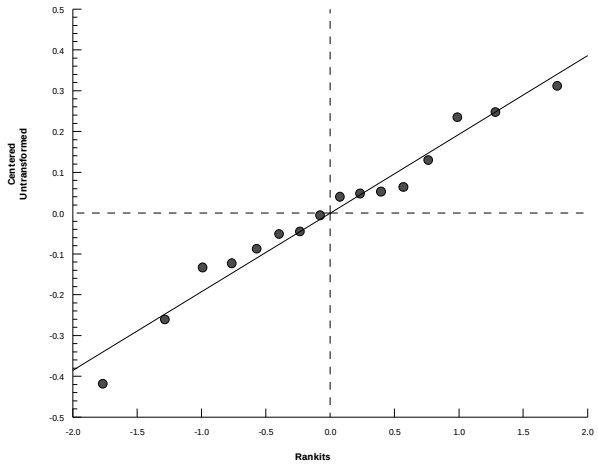
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
003	0.994	0.422	0.93	0.5491	0.595	0.735	0.677	0.5591

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-6481-2154	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-2586-9960	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	10.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	1.896	1.771	0.094	13	0.0402	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03819121	0.03819121	1	3.593	0.0805	Non-Significant Effect
Error	0.1381811	0.01062932	13			
Total	0.1763723		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.136	10.79	0.8927	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9251	0.8328	0.2300	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	7	0.8641	0.7721	0.9562	0.852	0.753	1.039	0.03762	11.52%	0.0%
002	8	0.763	0.6743	0.8517	0.738	0.637	0.945	0.0375	13.9%	11.7%

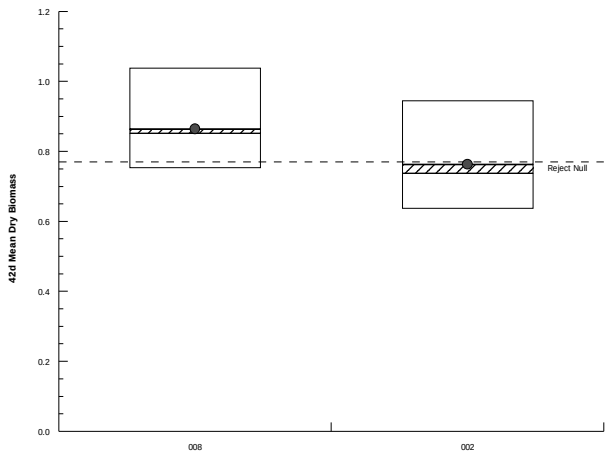
42d Mean Dry Biomass Detail

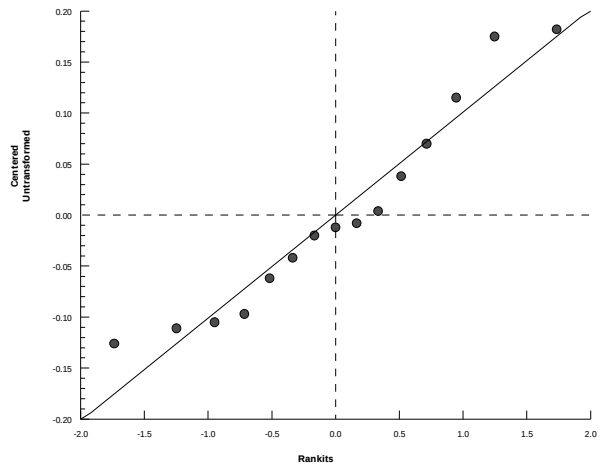
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	Outlier	0.868	0.753
002	0.945	0.878	0.755	0.666	0.721	0.701	0.801	0.637

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-2586-9960	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-3693-6907	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	17.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	0.5324	1.761	0.137	14	0.3014	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.786	2.586	0.0156	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006847364	0.006847364	1	0.2834	0.6028	Non-Significant Effect
Error	0.3382252	0.02415895	14			
Total	0.3450726		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.295	8.885	0.1383	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9097	0.8408	0.1151	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
002	8	0.763	0.6743	0.8517	0.738	0.637	0.945	0.0375	13.9%	5.14%

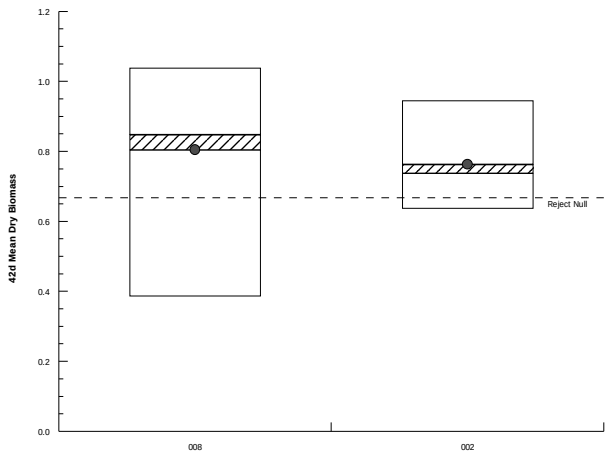
42d Mean Dry Biomass Detail

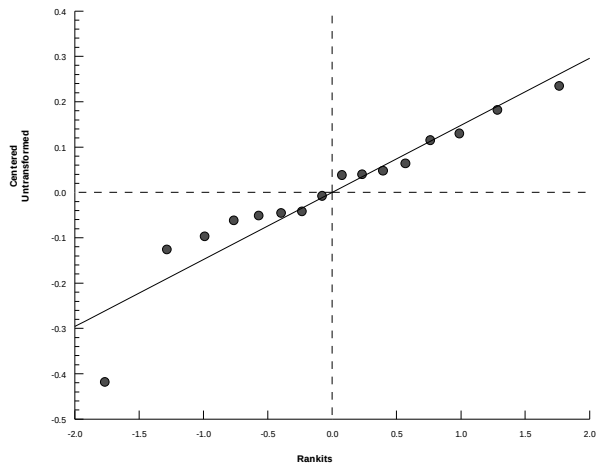
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
002	0.945	0.878	0.755	0.666	0.721	0.701	0.801	0.637

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-3693-6907	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-7748-2924	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	19.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-0.3559	1.771	0.155	13	0.6362	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003633486	0.003633486	1	0.1266	0.7277	Non-Significant Effect
Error	0.3729948	0.0286919	13			
Total	0.3766282		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.959	10.79	0.4306	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9204	0.8328	0.1950	Normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
001	7	0.8356	0.7084	0.9628	0.825	0.655	1.1	0.05199	16.46%	-3.88%

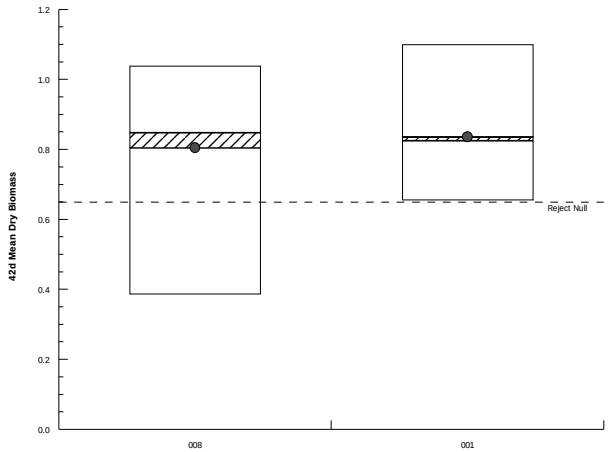
42d Mean Dry Biomass Detail

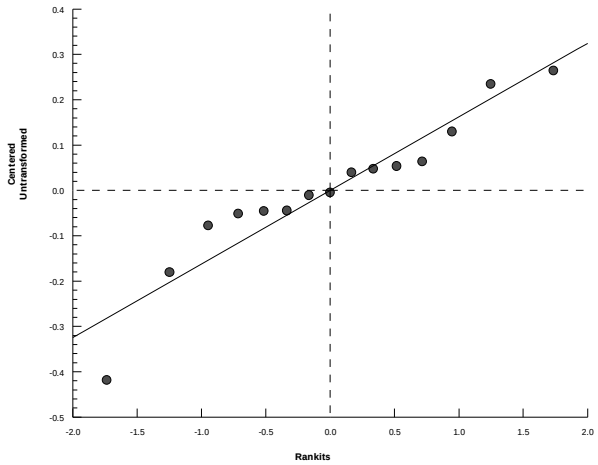
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
001	0.889	1.1	0.825	Outlier	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	02-7748-2924	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-9940-3861	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	26.9%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
008		001	62	NA	0	14	0.2869	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.708	2.586	0.0254	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01470132	0.01470132	1	0.2435	0.6293	Non-Significant Effect
Error	0.8451416	0.06036726	14			
Total	0.8598429		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.257	8.885	0.3049	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8379	0.8408	0.0091	Non-normal Distribution

42d Mean Dry Biomass Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	0.8044	0.6434	0.9653	0.848	0.386	1.039	0.06807	23.94%	0.0%
001	8	0.7438	0.5019	0.9856	0.808	0.101	1.1	0.1023	38.89%	7.54%

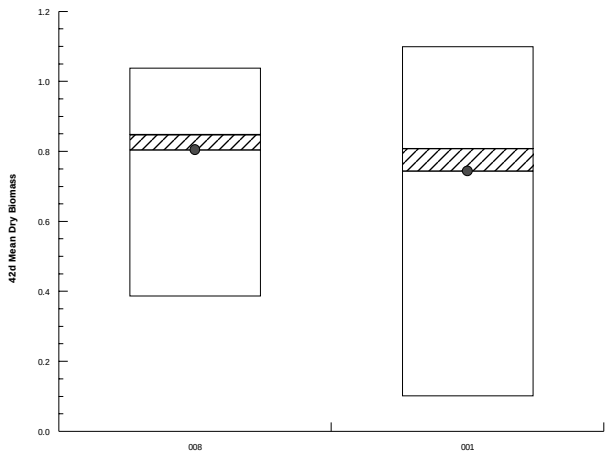
42d Mean Dry Biomass Detail

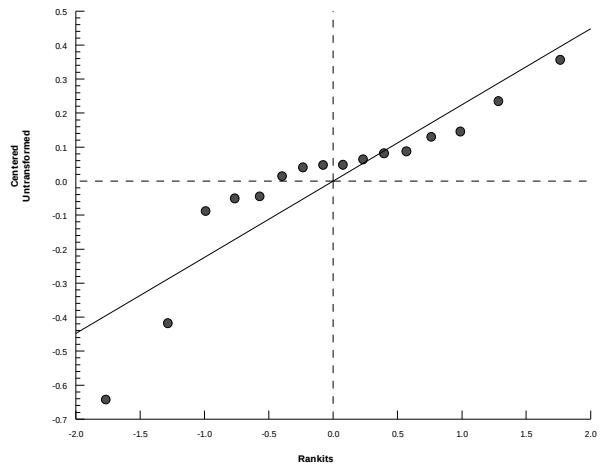
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	0.934	0.844	0.852	0.759	1.039	0.386	0.868	0.753
001	0.889	1.1	0.825	0.101	0.831	0.758	0.655	0.791

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-9940-3861	**Endpoint:**	42d Mean Dry Biomass	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 35 Reproduction Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	1.403	0.6252	2.182	0.4444	2.778	0.3291	0.931	66.33%	0.0%
007	7	1.577	-0.2076	3.362	0.2222	5.778	0.7293	1.93	122.4%	-12.36%
008	8	1.936	1.279	2.592	0.4444	2.7	0.2778	0.7856	40.59%	-37.91%
001	8	2.14	1.221	3.059	0.8	3.5	0.3888	1.1	51.38%	-52.47%
002	8	1.417	0.5253	2.309	0.1	2.625	0.3771	1.067	75.27%	-0.96%
003	8	1.304	0.3905	2.218	0.2222	3.6	0.3865	1.093	83.81%	7.05%
004	8	0.8538	0.1126	1.595	0	2.1	0.3135	0.8866	103.8%	39.16%
005	8	2.233	0.8393	3.627	0	5	0.5894	1.667	74.65%	-59.1%
006	8	0.7288	0.3256	1.132	0	1.4	0.1705	0.4823	66.18%	48.07%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

35d Reproduction Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2		
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222			
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556		
001	3.5	1.3	2.875	3	1.111	1.333	0.8	3.2		
002	0.2222	0.1	2	1.667	2	0.2222	2.5	2.625		
003	2	0.5556	3.6	0.2222	0.8571	1.1	1.556	0.5455		
004	0.875	1.2	2.1	0.5556	0	2.1	0	0		
005	2.6	0	2.222	5	3.286	0.3333	1.222	3.2		
006	0.5	1.4	1	0.75	0.2308	0.7	0	1.25		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-2066-8471	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	46.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	1.82	1.761	0.653	14	0.0451	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.919	2.586	0.6844	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.820481	1.820481	1	3.312	0.0902	Non-Significant Effect
Error	7.695369	0.5496692	14			
Total	9.51585		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.725	8.885	0.1040	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9442	0.8408	0.4039	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
006	8	0.7288	0.3256	1.132	0.725	0	1.4	0.1705	66.18%	48.07%

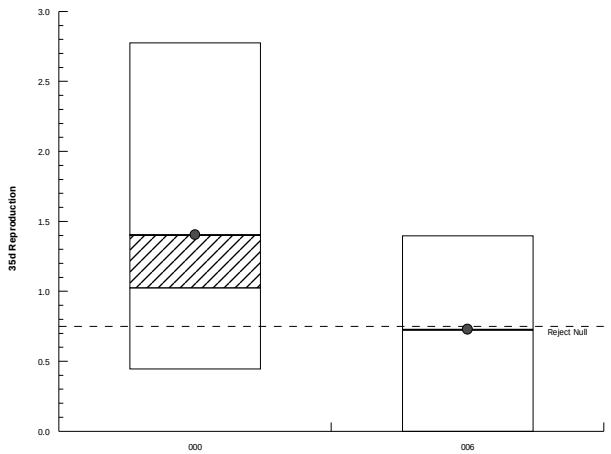
35d Reproduction Detail

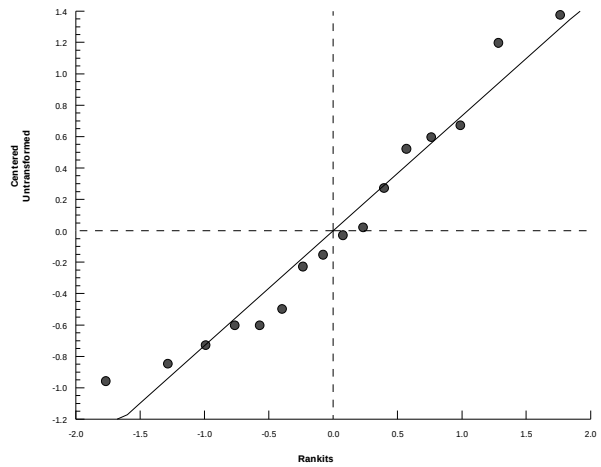
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
006	0.5	1.4	1	0.75	0.2308	0.7	0	1.25

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-2066-8471	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-9175-8503	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	84.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	-1.229	1.761	1.189	14	0.8803	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.121	2.586	0.3578	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.752044	2.752044	1	1.51	0.2394	Non-Significant Effect
Error	25.51793	1.822709	14			
Total	28.26998		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.206	8.885	0.1471	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.978	0.8408	0.9461	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
005	8	2.233	0.8393	3.627	2.411	0	5	0.5894	74.65%	-59.1%

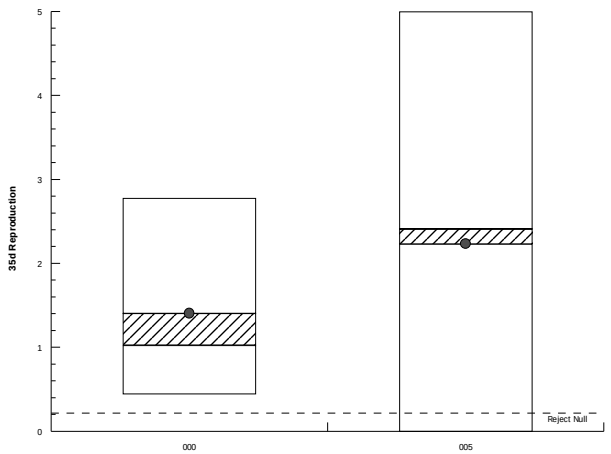
35d Reproduction Detail

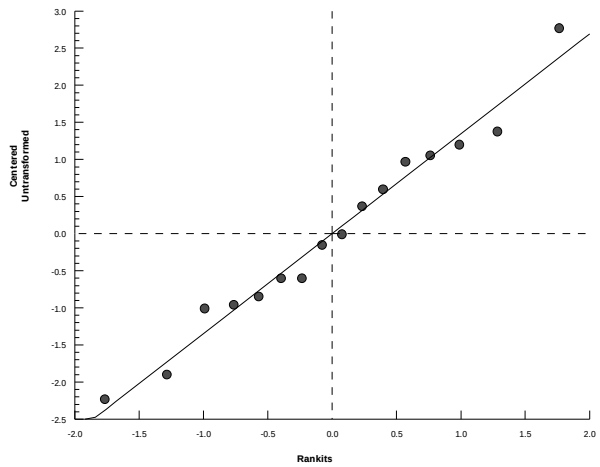
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
005	2.6	0	2.222	5	3.286	0.3333	1.222	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-9175-8503	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-7395-8029	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	57.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	1.209	1.761	0.801	14	0.1233	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.565	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.208473	1.208473	1	1.462	0.2466	Non-Significant Effect
Error	11.56905	0.826361	14			
Total	12.77753		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.103	8.885	0.9008	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8533	0.8408	0.0152	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
004	8	0.8538	0.1126	1.595	0.7153	0	2.1	0.3135	103.8%	39.16%

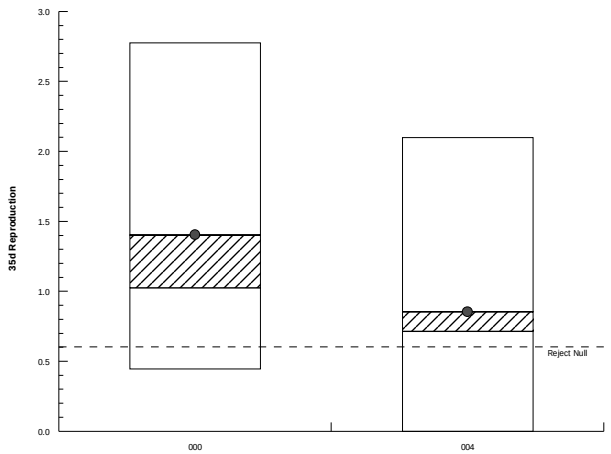
35d Reproduction Detail

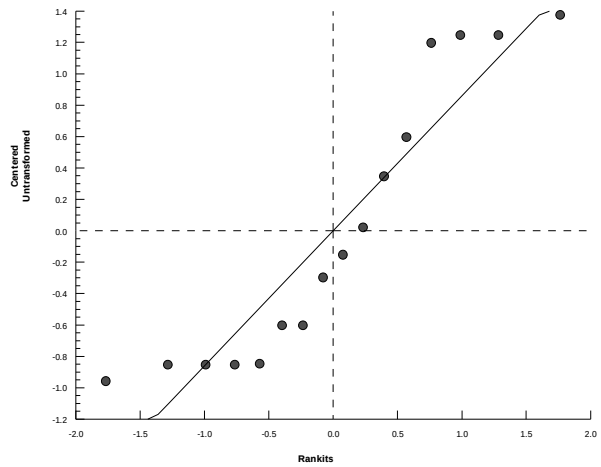
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
004	0.875	1.2	2.1	0.5556	0	2.1	0	0

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-7395-8029	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-5837-4942	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	63.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	0.195	1.761	0.894	14	0.4241	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.34	2.586	0.1564	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03918886	0.03918886	1	0.03801	0.8482	Non-Significant Effect
Error	14.43326	1.030947	14			
Total	14.47245		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.379	8.885	0.6822	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8904	0.8408	0.0566	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
003	8	1.304	0.3905	2.218	0.9786	0.2222	3.6	0.3865	83.81%	7.05%

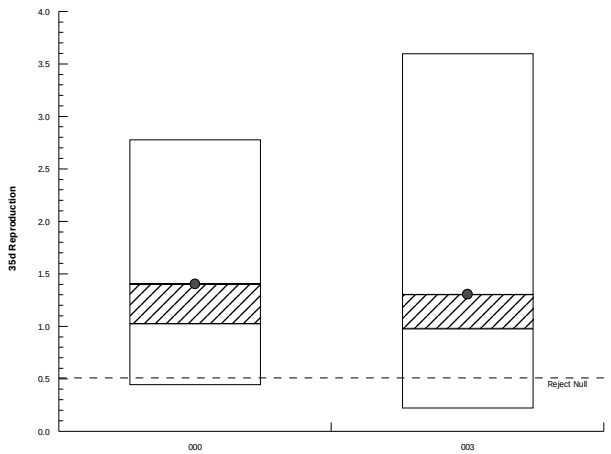
35d Reproduction Detail

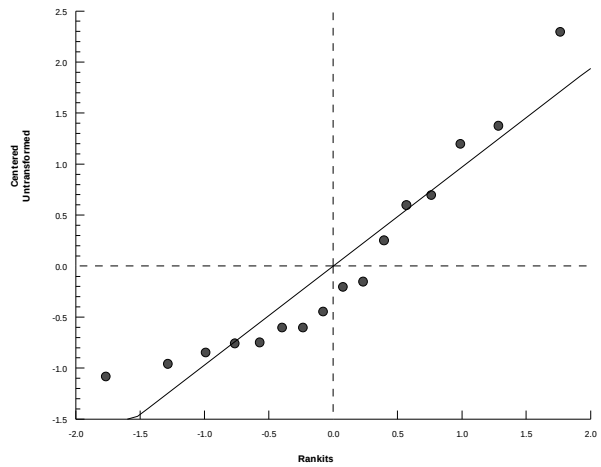
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
003	2	0.5556	3.6	0.2222	0.8571	1.1	1.556	0.5455

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-5837-4942	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-4339-1306	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	62.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-0.02705	1.761	0.882	14	0.5106	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.421	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007335069	0.0007335069	1	0.000732	0.9788	Non-Significant Effect
Error	14.03059	1.002185	14			
Total	14.03132		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.313	8.885	0.7287	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9015	0.8408	0.0851	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
002	8	1.417	0.5253	2.309	1.833	0.1	2.625	0.3771	75.27%	-0.96%

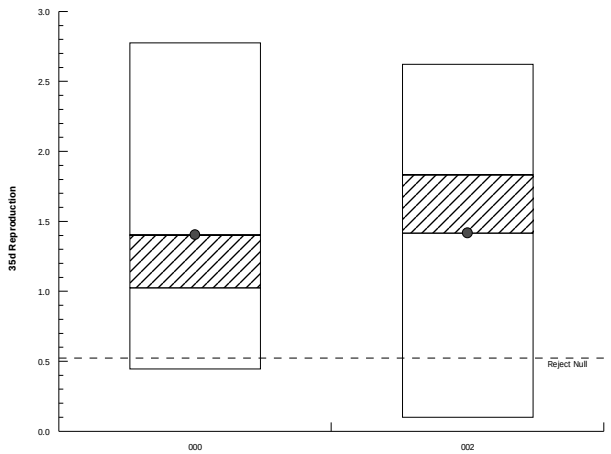
35d Reproduction Detail

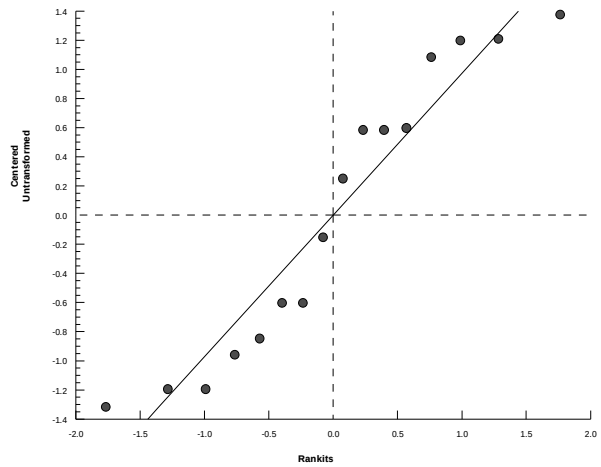
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
002	0.2222	0.1	2	1.667	2	0.2222	2.5	2.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-4339-1306	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-6404-0247	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	63.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-1.446	1.761	0.897	14	0.9149	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.396	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.169483	2.169483	1	2.09	0.1703	Non-Significant Effect
Error	14.5304	1.037885	14			
Total	16.69988		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.395	8.885	0.6715	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8687	0.8408	0.0260	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
001	8	2.14	1.221	3.059	2.104	0.8	3.5	0.3888	51.38%	-52.47%

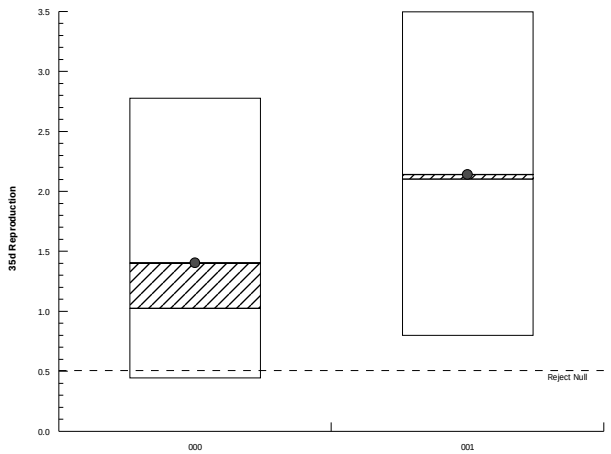
35d Reproduction Detail

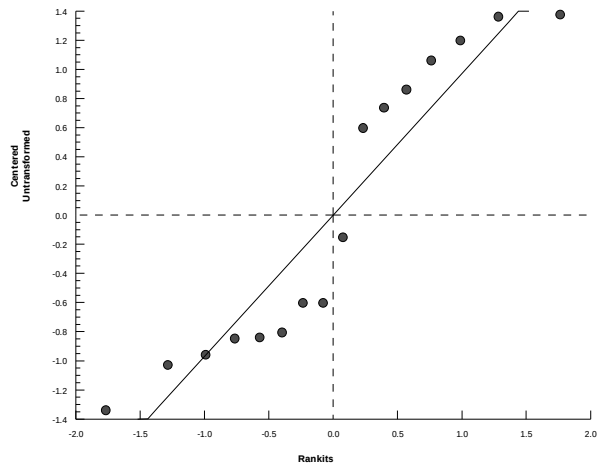
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
001	3.5	1.3	2.875	3	1.111	1.333	0.8	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-6404-0247	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7305-1740	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	54.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	-1.235	1.761	0.759	14	0.8815	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.792	2.586	0.9795	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.132282	1.132282	1	1.526	0.2370	Non-Significant Effect
Error	10.38715	0.7419393	14			
Total	11.51943		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.404	8.885	0.6654	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9522	0.8408	0.5248	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	-37.91%

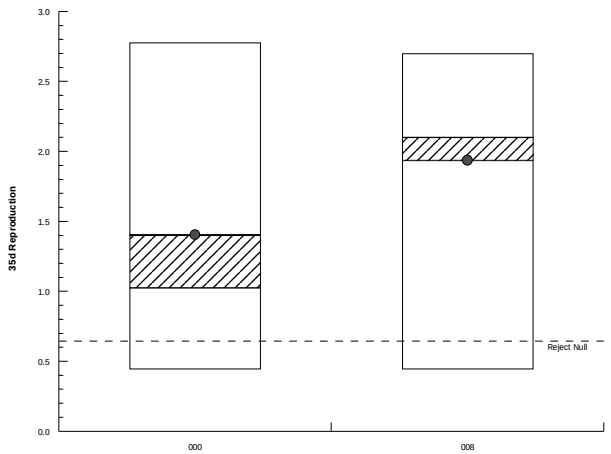
35d Reproduction Detail

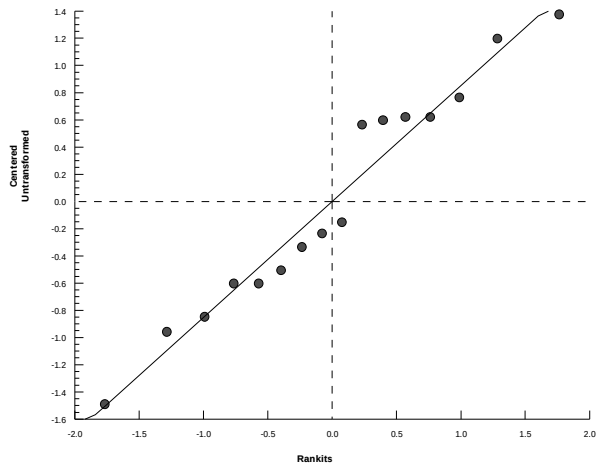
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7305-1740	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-1549-8825	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	55.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	1.208	1.782	0.777	12	0.1252	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.9508423	0.9508423	1	1.459	0.2503	Non-Significant Effect
Error	7.81996	0.6516634	12			
Total	8.770802		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.472	14.2	0.3363	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9143	0.8239	0.1818	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	37.52%

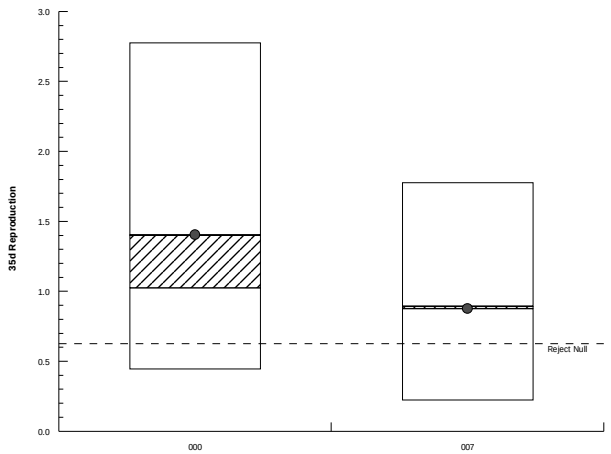
35d Reproduction Detail

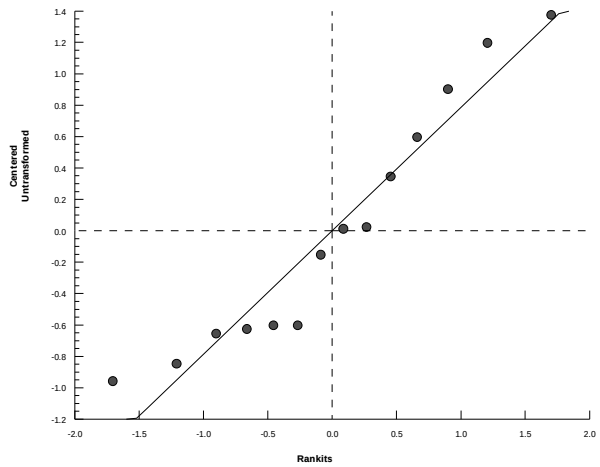
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-1549-8825	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-0509-1349	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	96.5%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
000		007	53	NA	0	13	0.3778	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.949	2.548	0.0031	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1123972	0.1123972	1	0.05144	0.8241	Non-Significant Effect
Error	28.40774	2.185211	13			
Total	28.52013		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.296	9.155	0.0776	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.791	0.8328	0.0028	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	1.403	0.6252	2.182	1.025	0.4444	2.778	0.3291	66.33%	0.0%
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	-12.36%

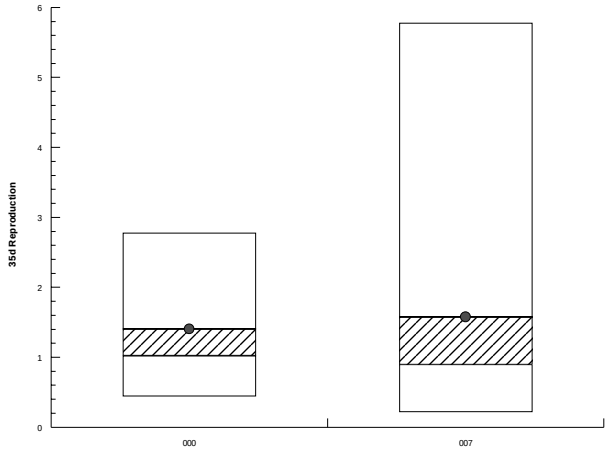
35d Reproduction Detail

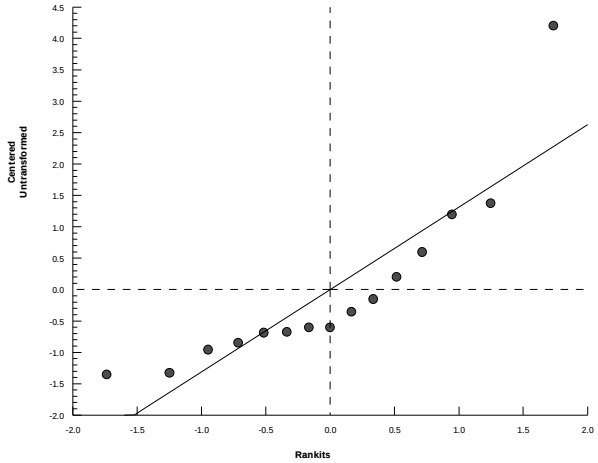
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	2.778	0.8	0.4444	1.25	2.6	0.8	0.5556	2
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-0509-1349	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8689-2021	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	58.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.5163	1.782	0.511	12	0.3075	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.07510521	0.07510521	1	0.2665	0.6151	Non-Significant Effect
Error	3.381633	0.2818027	12			
Total	3.456738		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.507	9.522	0.5991	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9538	0.8239	0.6208	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	0.0%
006	8	0.7288	0.3256	1.132	0.725	0	1.4	0.1705	66.18%	16.88%

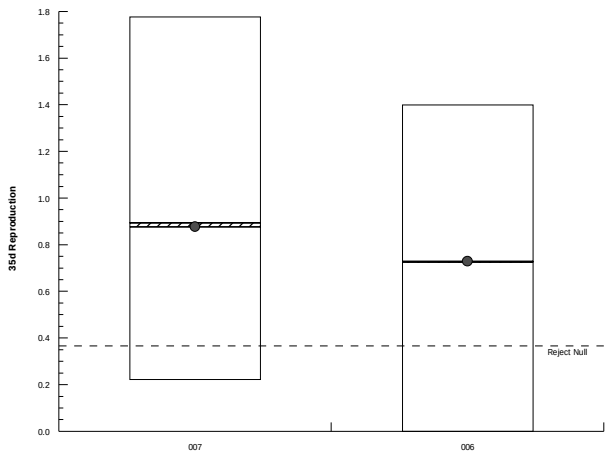
35d Reproduction Detail

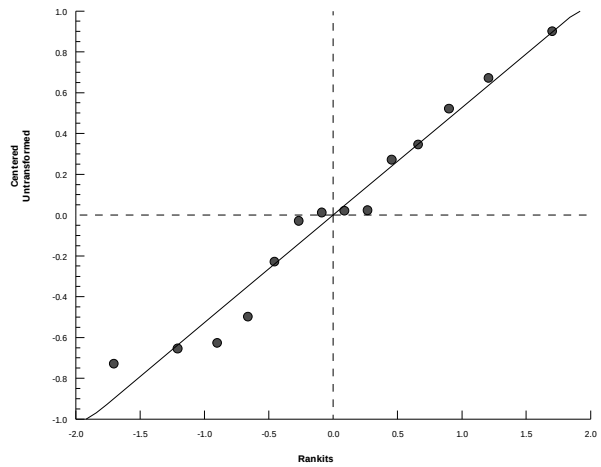
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	
006	0.5	1.4	1	0.75	0.2308	0.7	0	1.25

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8689-2021	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-0530-7979	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	78.9%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		006	57	NA	0	13	0.2317	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	3.21	2.548	0.0001	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.685529	2.685529	1	1.457	0.2490	Non-Significant Effect
Error	23.96941	1.843801	13			
Total	26.65494		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	16	9.155	0.0018	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7333	0.8328	0.0006	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
006	8	0.7288	0.3256	1.132	0.725	0	1.4	0.1705	66.18%	53.78%

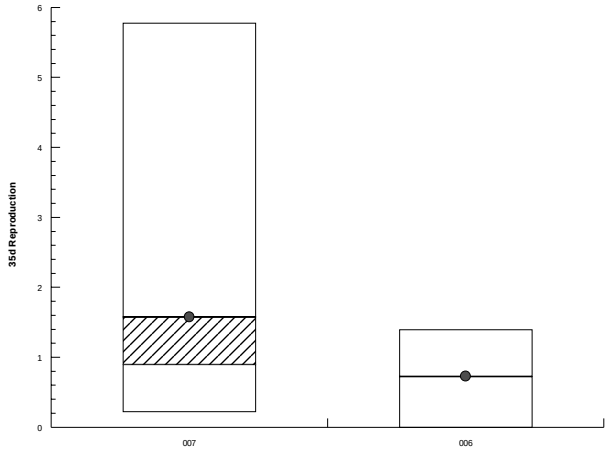
35d Reproduction Detail

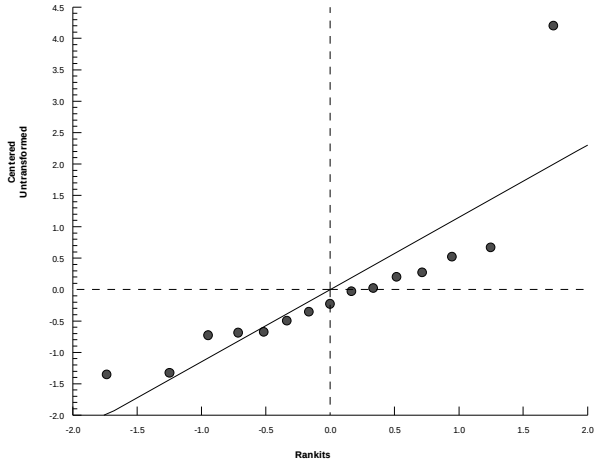
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
006	0.5	1.4	1	0.75	0.2308	0.7	0	1.25

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-0530-7979	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-7622-2590	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	104.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-0.7069	1.771	1.643	13	0.7539	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.431	2.548	0.0901	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.606354	1.606354	1	0.4997	0.4921	Non-Significant Effect
Error	41.79198	3.214767	13			
Total	43.39833		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.34	9.155	0.7045	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9144	0.8328	0.1583	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
005	8	2.233	0.8393	3.627	2.411	0	5	0.5894	74.65%	-41.6%

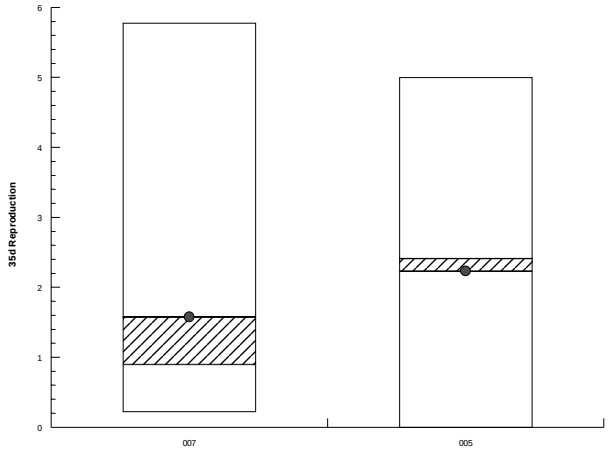
35d Reproduction Detail

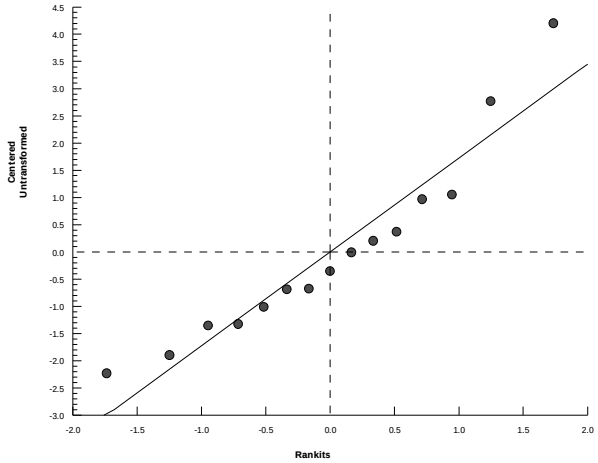
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
005	2.6	0	2.222	5	3.286	0.3333	1.222	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-7622-2590	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-9740-1887	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	85.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.05485	1.782	0.748	12	0.4786	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001818829	0.001818829	1	0.003008	0.9572	Non-Significant Effect
Error	7.255318	0.6046098	12			
Total	7.257137		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.242	14.2	0.3912	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9001	0.8239	0.1132	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	0.0%
004	8	0.8538	0.1126	1.595	0.7153	0	2.1	0.3135	103.8%	2.63%

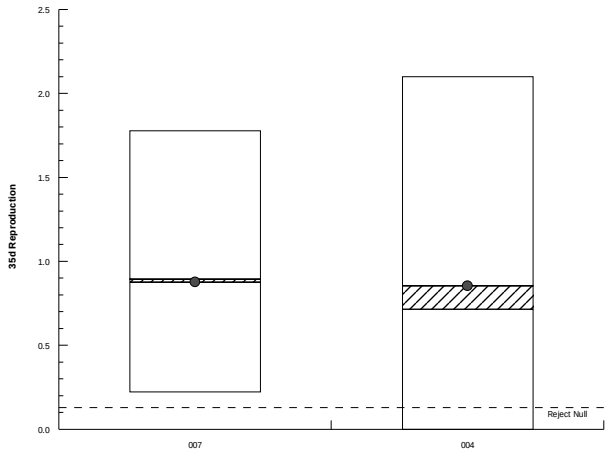
35d Reproduction Detail

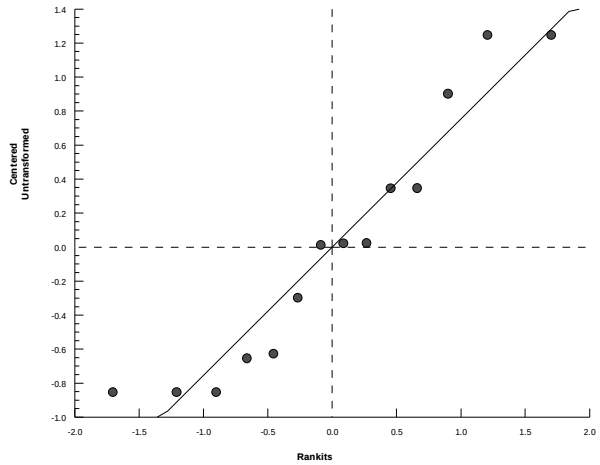
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	
004	0.875	1.2	2.1	0.5556	0	2.1	0	0

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-9740-1887	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9781-4804	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	85.1%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		004	56	NA	0	13	0.1891	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.979	2.548	0.0024	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.952411	1.952411	1	0.9116	0.3571	Non-Significant Effect
Error	27.8431	2.141777	13			
Total	29.79551		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.737	9.155	0.0609	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7875	0.8328	0.0026	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
004	8	0.8538	0.1126	1.595	0.7153	0	2.1	0.3135	103.8%	45.86%

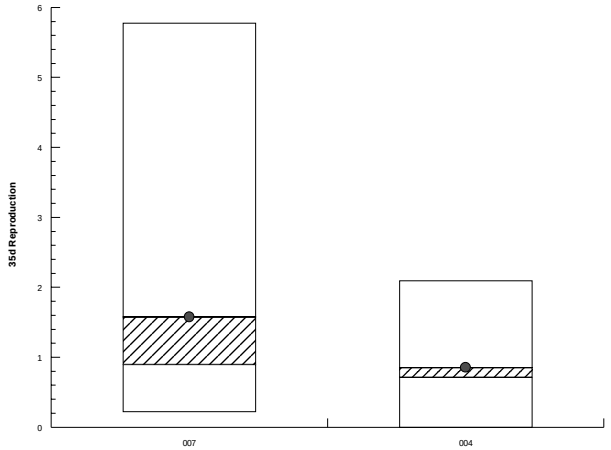
35d Reproduction Detail

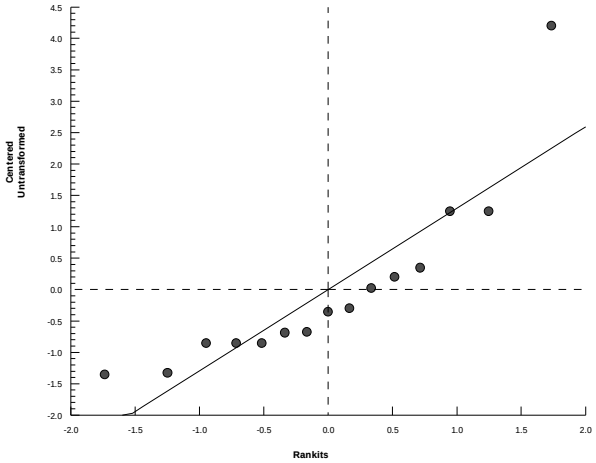
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
004	0.875	1.2	2.1	0.5556	0	2.1	0	0

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9781-4804	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-9187-6578	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	101.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	-0.8623	1.782	0.884	12	0.7973	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6270018	0.6270018	1	0.7435	0.4054	Non-Significant Effect
Error	10.11952	0.8432936	12			
Total	10.74652		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.409	14.2	0.1958	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8941	0.8239	0.0928	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	0.0%
003	8	1.304	0.3905	2.218	0.9786	0.2222	3.6	0.3865	83.81%	-48.77%

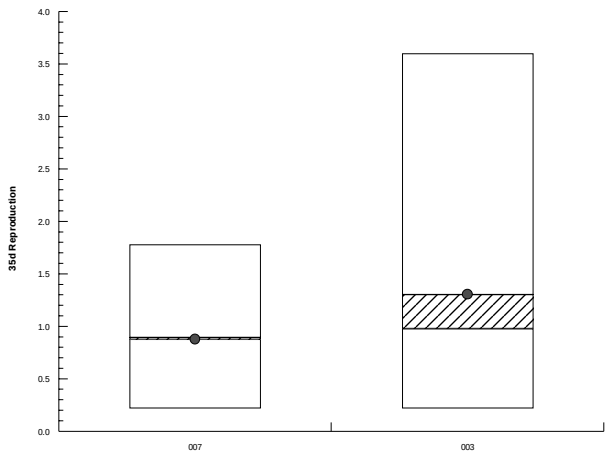
35d Reproduction Detail

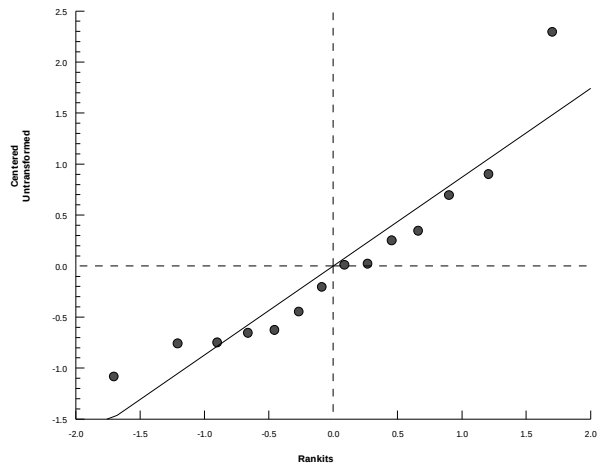
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	
003	2	0.5556	3.6	0.2222	0.8571	1.1	1.556	0.5455

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-9187-6578	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-2881-8646	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	89.3%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		003	63.5	NA	1	13	0.4922	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.836	2.548	0.0080	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2772087	0.2772087	1	0.1174	0.7374	Non-Significant Effect
Error	30.7073	2.3621	13			
Total	30.98451		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.115	9.155	0.1629	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7747	0.8328	0.0018	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
003	8	1.304	0.3905	2.218	0.9786	0.2222	3.6	0.3865	83.81%	17.28%

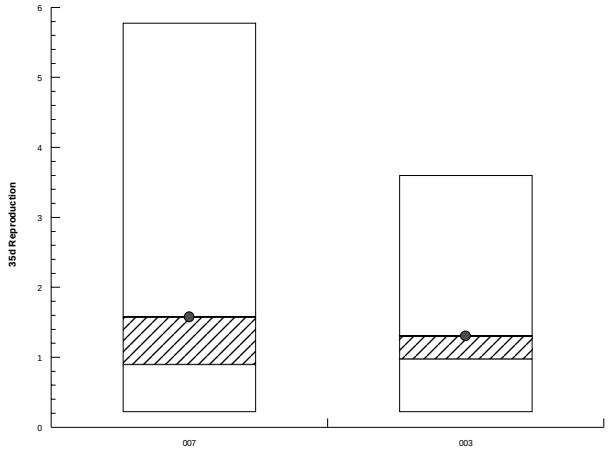
35d Reproduction Detail

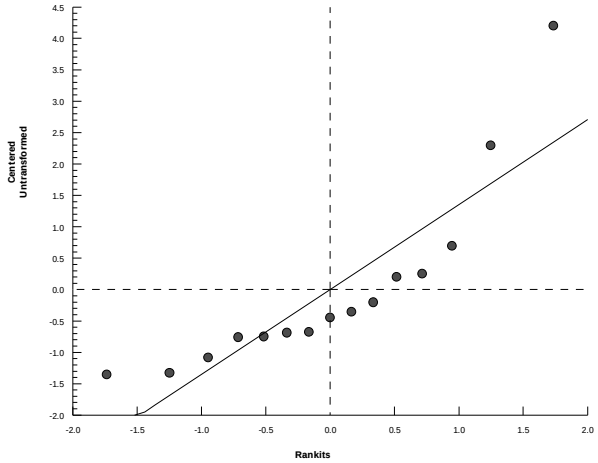
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
003	2	0.5556	3.6	0.2222	0.8571	1.1	1.556	0.5455

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-2881-8646	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-1599-6305	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	98.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-1.111	1.782	0.866	12	0.8559	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.000372	1.000372	1	1.235	0.2881	Non-Significant Effect
Error	9.716853	0.8097378	12			
Total	10.71723		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.245	14.2	0.2136	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.926	0.8239	0.2681	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	0.0%
002	8	1.417	0.5253	2.309	1.833	0.1	2.625	0.3771	75.27%	-61.6%

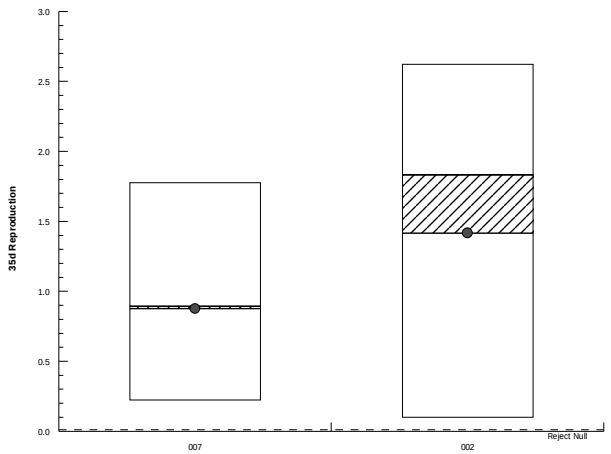
35d Reproduction Detail

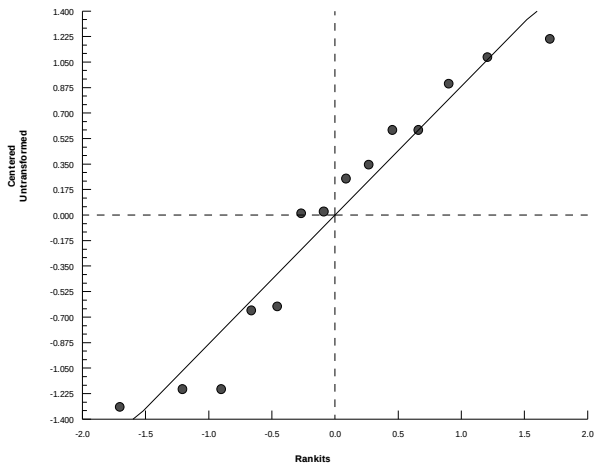
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	
002	0.2222	0.1	2	1.667	2	0.2222	2.5	2.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-1599-6305	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-0025-0332	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	88.7%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		002	66	NA	1	13	0.5997	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.855	2.548	0.0069	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09553778	0.09553778	1	0.04098	0.8427	Non-Significant Effect
Error	30.30463	2.331125	13			
Total	30.40017		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.273	9.155	0.1462	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8227	0.8328	0.0073	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
002	8	1.417	0.5253	2.309	1.833	0.1	2.625	0.3771	75.27%	10.14%

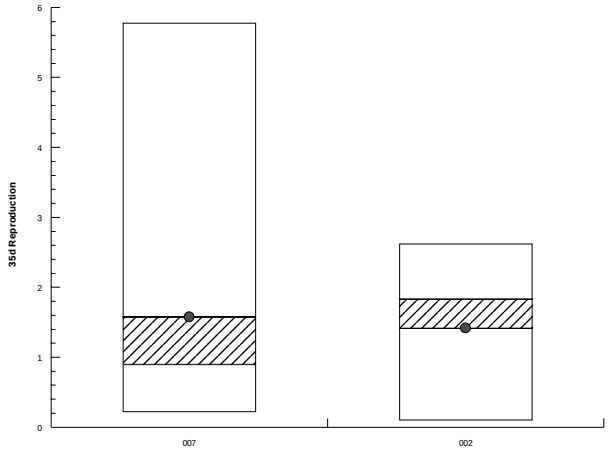
35d Reproduction Detail

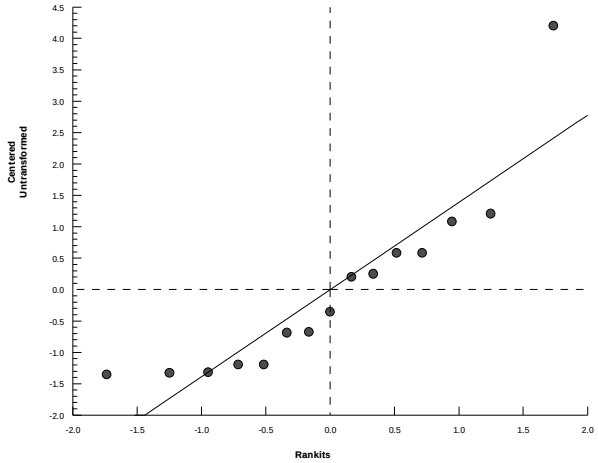
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
002	0.2222	0.1	2	1.667	2	0.2222	2.5	2.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-0025-0332	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4089-1231	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	101.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-2.535	1.782	0.888	12	0.9869	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.469832	5.469832	1	6.425	0.0262	Significant Effect
Error	10.21666	0.8513884	12			
Total	15.68649		13			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.448	14.2	0.1918	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9302	0.8239	0.3073	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	6	0.8769	0.2554	1.498	0.8944	0.2222	1.778	0.2417	67.53%	0.0%
001	8	2.14	1.221	3.059	2.104	0.8	3.5	0.3888	51.38%	-144.0%

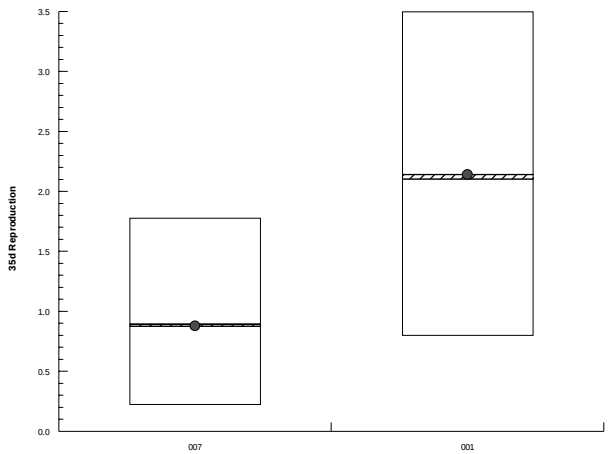
35d Reproduction Detail

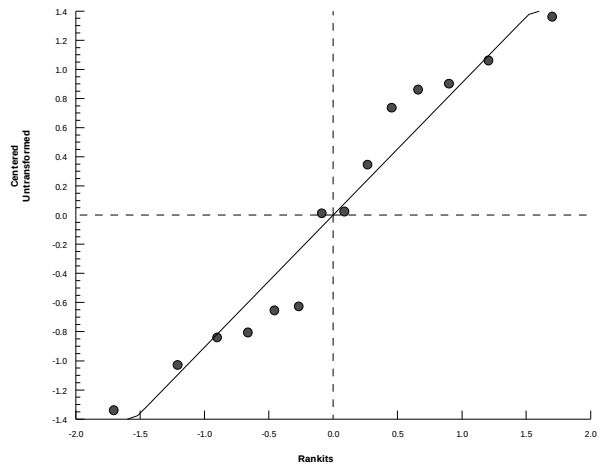
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	Outlier	0.9	0.2222	1.778	0.25	1.222	
001	3.5	1.3	2.875	3	1.111	1.333	0.8	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-4089-1231	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-6708-6541	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	89.5%	

Wilcoxon Rank Sum Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
007		001	76	NA	0	13	0.9240	Exact	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.832	2.548	0.0082	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.183126	1.183126	1	0.4993	0.4923	Non-Significant Effect
Error	30.80444	2.369572	13			
Total	31.98757		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.08	9.155	0.1670	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8182	0.8328	0.0064	Non-normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	1.577	-0.2076	3.362	0.9	0.2222	5.778	0.7293	122.4%	0.0%
001	8	2.14	1.221	3.059	2.104	0.8	3.5	0.3888	51.38%	-35.7%

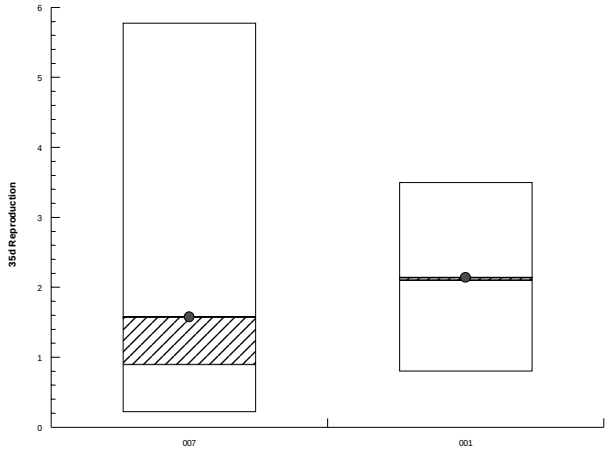
35d Reproduction Detail

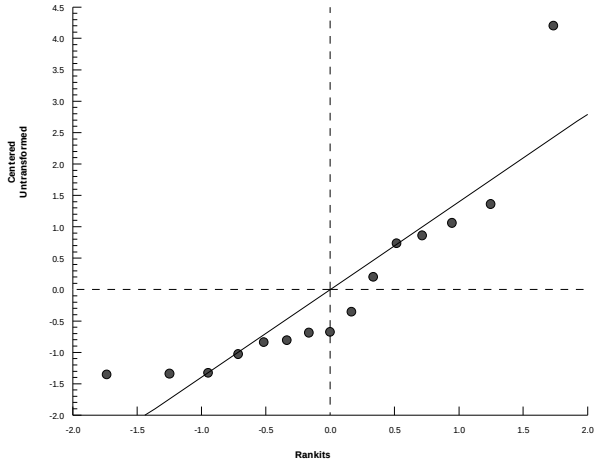
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	0.8889	5.778	0.9	0.2222	1.778	0.25	1.222	
001	3.5	1.3	2.875	3	1.111	1.333	0.8	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-6708-6541	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-9373-3826	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	29.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	3.702	1.761	0.574	14	0.0012	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.368	2.586	0.1394	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.824207	5.824207	1	13.71	0.0024	Significant Effect
Error	5.948823	0.4249159	14			
Total	11.77303		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.653	8.885	0.2213	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9197	0.8408	0.1665	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
006	8	0.7288	0.3256	1.132	0.725	0	1.4	0.1705	66.18%	62.34%

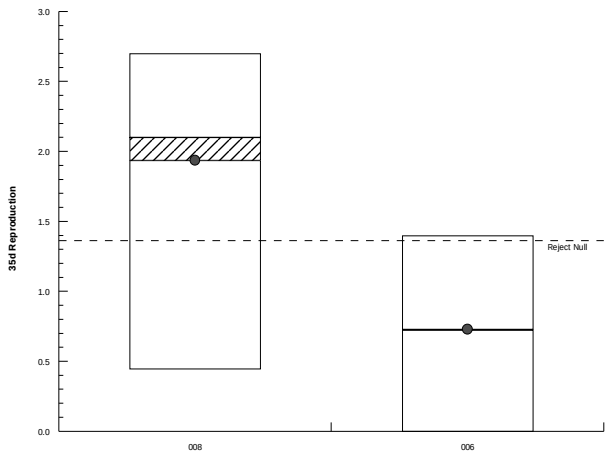
35d Reproduction Detail

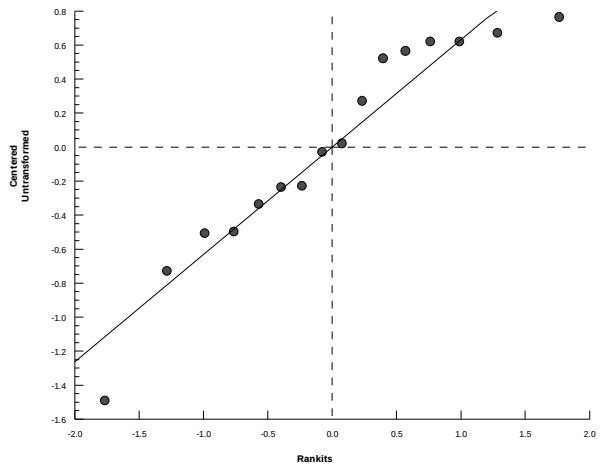
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
006	0.5	1.4	1	0.75	0.2308	0.7	0	1.25

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-9373-3826	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-1677-8029	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	59.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-0.4565	1.761	1.148	14	0.6725	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.198	2.586	0.2724	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3538361	0.3538361	1	0.2084	0.6550	Non-Significant Effect
Error	23.77139	1.697956	14			
Total	24.12522		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.502	8.885	0.0653	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9601	0.8408	0.6630	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
005	8	2.233	0.8393	3.627	2.411	0	5	0.5894	74.65%	-15.37%

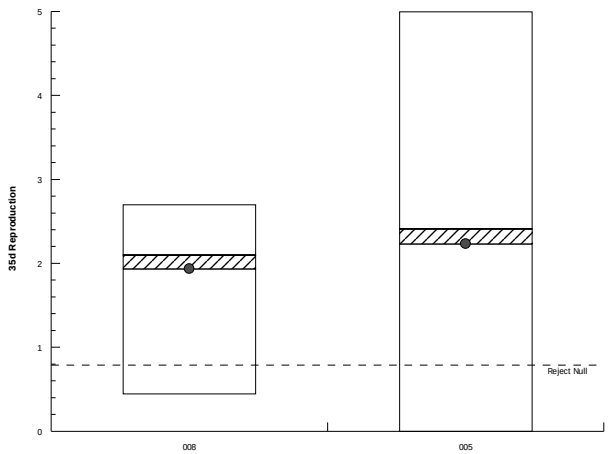
35d Reproduction Detail

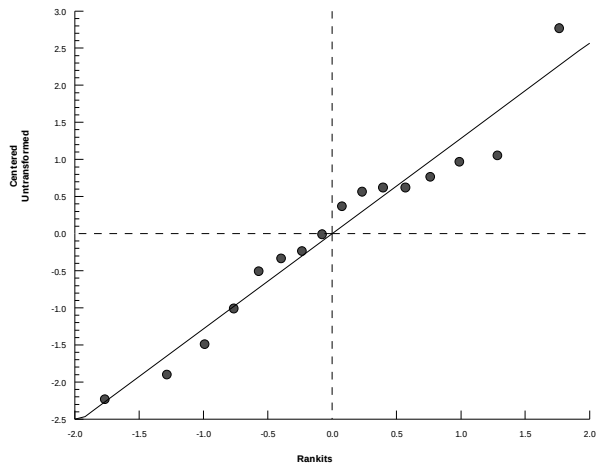
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
005	2.6	0	2.222	5	3.286	0.3333	1.222	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-1677-8029	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3561-4202	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	2.583	1.761	0.738	14	0.0108	CDF	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.843	2.586	0.8519	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.680269	4.680269	1	6.671	0.0217	Significant Effect
Error	9.822508	0.7016077	14			
Total	14.50278		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.274	8.885	0.7578	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9568	0.8408	0.6039	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
004	8	0.8538	0.1126	1.595	0.7153	0	2.1	0.3135	103.8%	55.89%

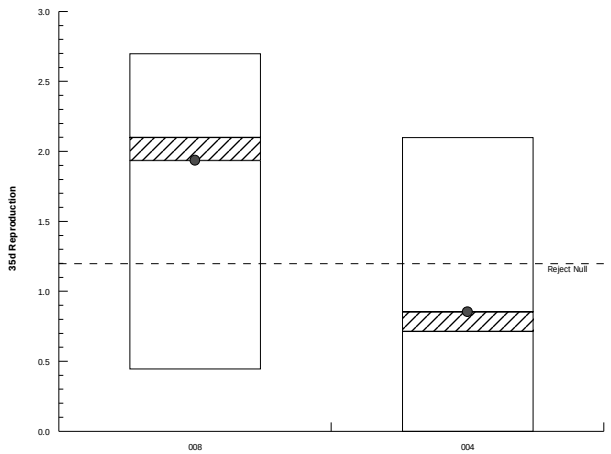
35d Reproduction Detail

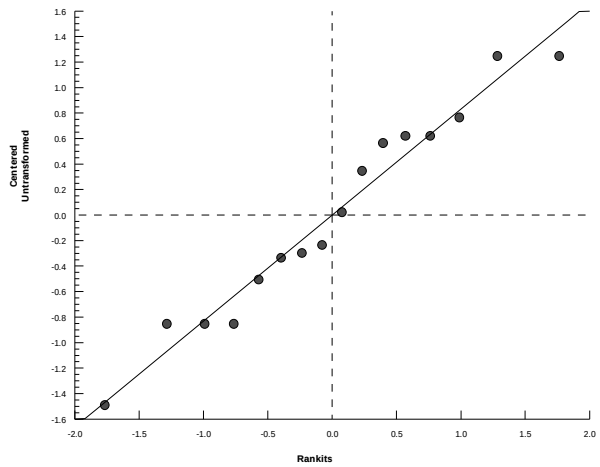
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
004	0.875	1.2	2.1	0.5556	0	2.1	0	0

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3561-4202	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-0542-2363	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	43.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	1.326	1.761	0.838	14	0.1031	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.496	2.586	0.0782	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.592768	1.592768	1	1.758	0.2061	Non-Significant Effect
Error	12.68671	0.9061938	14			
Total	14.27948		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.937	8.885	0.4029	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9407	0.8408	0.3574	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
003	8	1.304	0.3905	2.218	0.9786	0.2222	3.6	0.3865	83.81%	32.6%

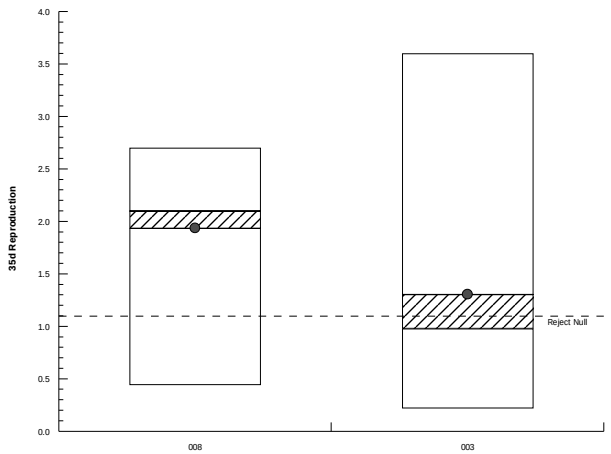
35d Reproduction Detail

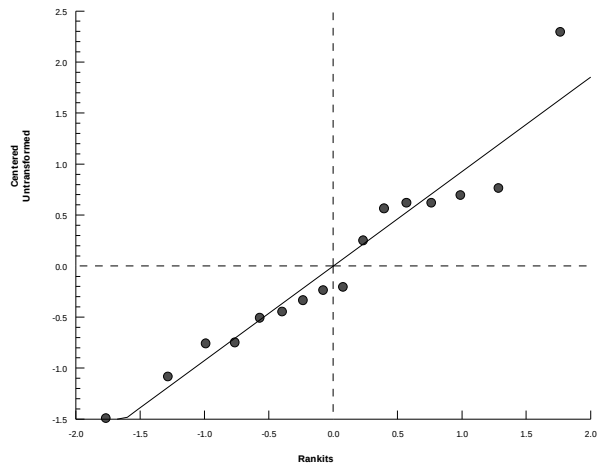
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
003	2	0.5556	3.6	0.2222	0.8571	1.1	1.556	0.5455

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-0542-2363	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-2655-7636	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	42.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	1.107	1.761	0.825	14	0.1435	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.648	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.075377	1.075377	1	1.226	0.2869	Non-Significant Effect
Error	12.28404	0.8774317	14			
Total	13.35942		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.843	8.885	0.4383	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8921	0.8408	0.0601	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
002	8	1.417	0.5253	2.309	1.833	0.1	2.625	0.3771	75.27%	26.79%

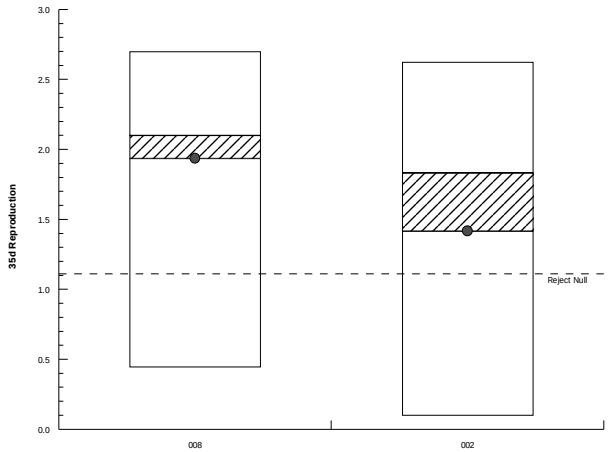
35d Reproduction Detail

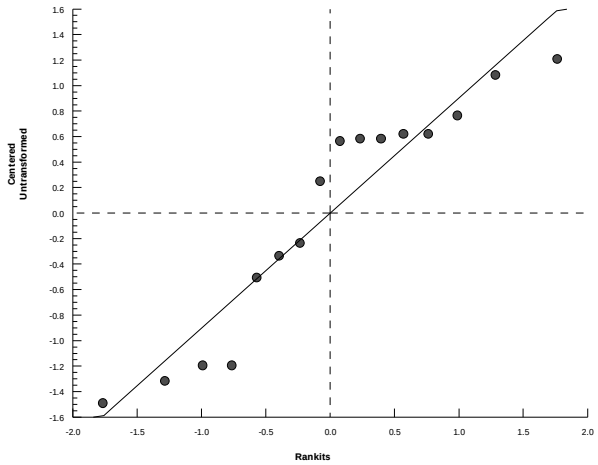
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
002	0.2222	0.1	2	1.667	2	0.2222	2.5	2.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-2655-7636	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9243-3003	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	43.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-0.4278	1.761	0.842	14	0.6624	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.615	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1671415	0.1671415	1	0.183	0.6753	Non-Significant Effect
Error	12.78385	0.9131322	14			
Total	12.95099		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.959	8.885	0.3948	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9189	0.8408	0.1621	Normal Distribution

35d Reproduction Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	1.936	1.279	2.592	2.1	0.4444	2.7	0.2778	40.59%	0.0%
001	8	2.14	1.221	3.059	2.104	0.8	3.5	0.3888	51.38%	-10.56%

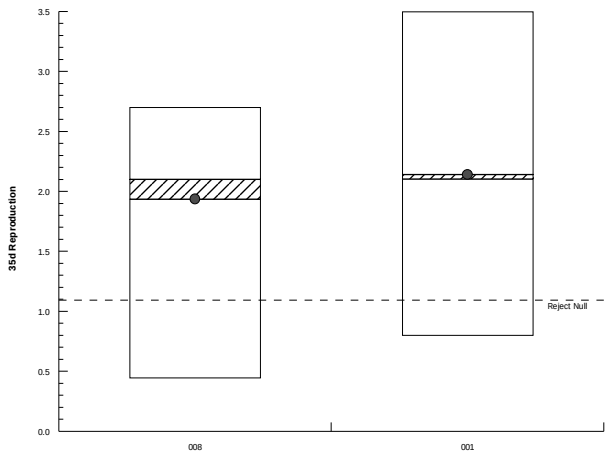
35d Reproduction Detail

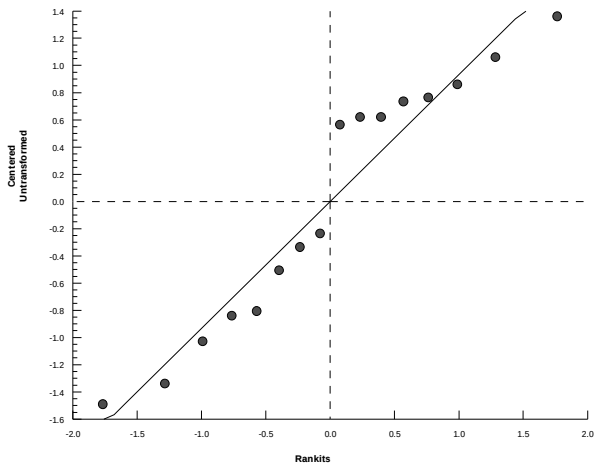
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	2.7	0.4444	2.556	1.6	1.7	1.429	2.5	2.556
001	3.5	1.3	2.875	3	1.111	1.333	0.8	3.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9243-3003	**Endpoint:**	35d Reproduction	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 42 Juveniles per Female Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

CETIS Summary Report

Report Date:	08 Jan-13 16:03 (p 1 of 1)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	7.469	4.189	10.75	0.6667	14.33	1.387	3.923	52.52%	0.0%
007	7	8.643	5.964	11.32	3	11.5	1.095	2.897	33.52%	-15.72%
008	8	6.601	4.098	9.104	2.5	11	1.059	2.994	45.36%	11.62%
001	8	9.808	6.42	13.2	3	15.4	1.433	4.052	41.32%	-31.32%
002	8	9.47	7.316	11.62	6.143	14	0.911	2.577	27.21%	-26.79%
003	8	8.885	5.044	12.73	1.833	16.75	1.625	4.595	51.71%	-18.97%
004	8	7.283	5.241	9.325	2.667	10.75	0.8636	2.442	33.54%	2.48%
005	8	11.31	8.098	14.53	5.75	16.33	1.359	3.844	33.98%	-51.46%
006	8	7.982	5.488	10.48	3.333	13	1.055	2.983	37.37%	-6.87%

42 d Juveniles per Female Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
007	7	10	11.5	11	9	3	9	
008	7.333	11	5.4	8.857	3	2.5	5.714	9
001	12.6	10.5	15.4	3	4.75	10.43	11.5	10.29
002	14	8.667	12.5	6.143	8.25	9.4	9.2	7.6
003	16.75	1.833	11	7.667	9	9.5	11.33	4
004	8.25	10.75	9	5.4	2.667	8.2	7	7
005	10.75	5.75	16.33	10.8	14.2	12.33	14.33	6
006	4.667	7.75	13	9.75	8.5	7.857	3.333	9

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-9695-4598	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	41.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	-0.2947	1.761	3.069	14	0.6137	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.039	2.586	0.4715	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.054289	1.054289	1	0.08682	0.7726	Non-Significant Effect
Error	170.0031	12.14308	14			
Total	171.0574		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.73	8.885	0.4869	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.936	0.8408	0.3027	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
006	8	7.982	5.488	10.48	8.179	3.333	13	1.055	37.37%	-6.87%

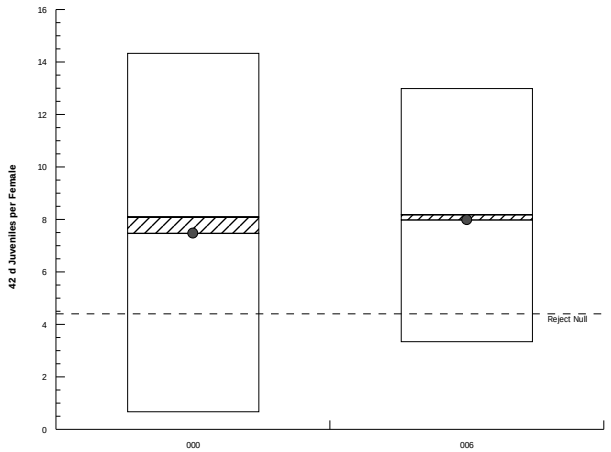
42 d Juveniles per Female Detail

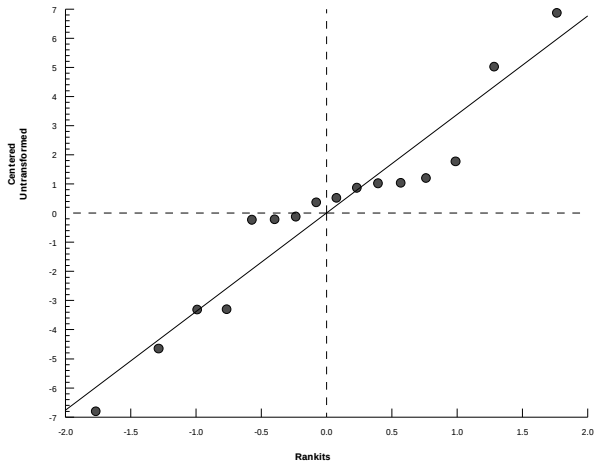
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
006	4.667	7.75	13	9.75	8.5	7.857	3.333	9

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-9695-4598	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5587-0402	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	45.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	-1.979	1.761	3.42	14	0.9661	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.83	2.586	0.8836	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	59.09766	59.09766	1	3.918	0.0678	Non-Significant Effect
Error	211.1784	15.08417	14			
Total	270.2761		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.041	8.885	0.9589	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9529	0.8408	0.5370	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
005	8	11.31	8.098	14.53	11.57	5.75	16.33	1.359	33.98%	-51.46%

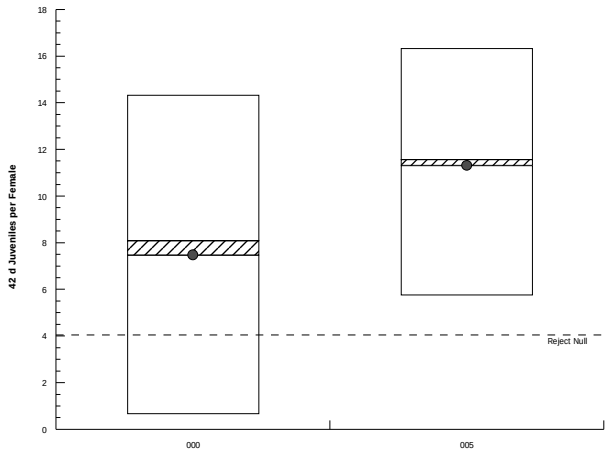
42 d Juveniles per Female Detail

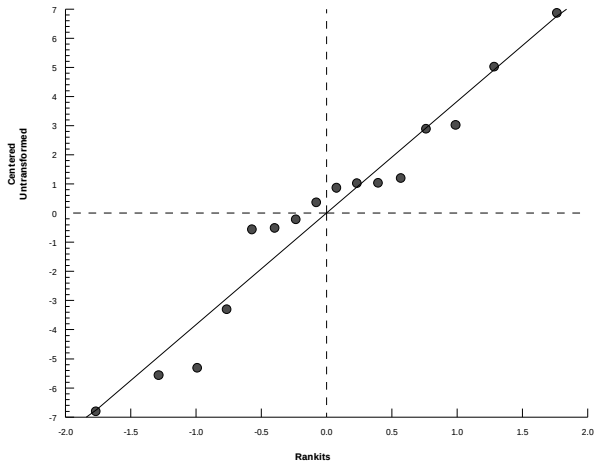
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
005	10.75	5.75	16.33	10.8	14.2	12.33	14.33	6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-5587-0402	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3874-7703	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	0.1135	1.761	2.878	14	0.4556	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.175	2.586	0.2967	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1375174	0.1375174	1	0.01288	0.9113	Non-Significant Effect
Error	149.4819	10.67728	14			
Total	149.6194		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.579	8.885	0.2345	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9355	0.8408	0.2978	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
004	8	7.283	5.241	9.325	7.6	2.667	10.75	0.8636	33.54%	2.48%

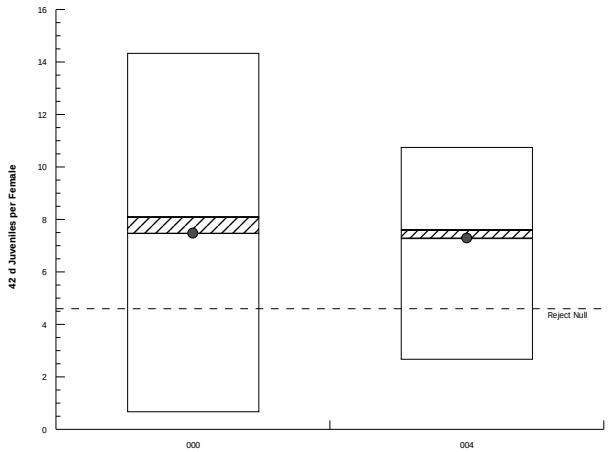
42 d Juveniles per Female Detail

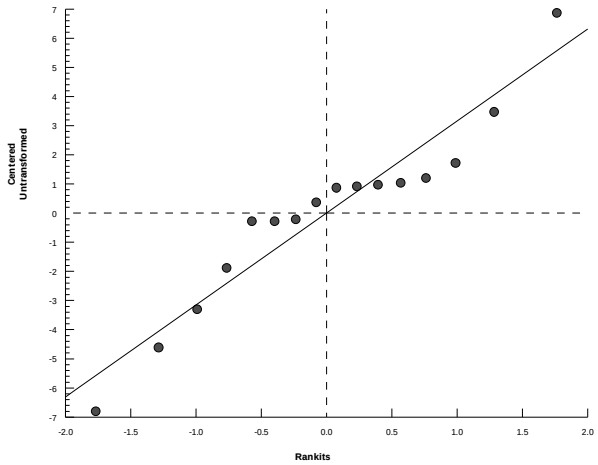
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
004	8.25	10.75	9	5.4	2.667	8.2	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-3874-7703	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9572-8736	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	50.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	-0.6632	1.761	3.762	14	0.7410	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.906	2.586	0.7115	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.027778	8.027778	1	0.4399	0.5180	Non-Significant Effect
Error	255.5121	18.25087	14			
Total	263.5399		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.372	8.885	0.6870	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9359	0.8408	0.3014	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
003	8	8.885	5.044	12.73	9.25	1.833	16.75	1.625	51.71%	-18.97%

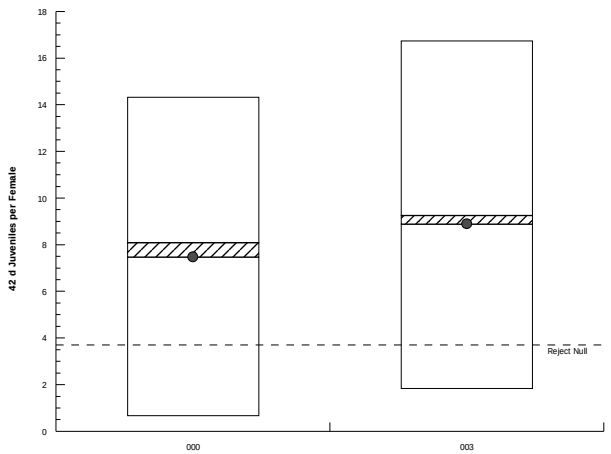
42 d Juveniles per Female Detail

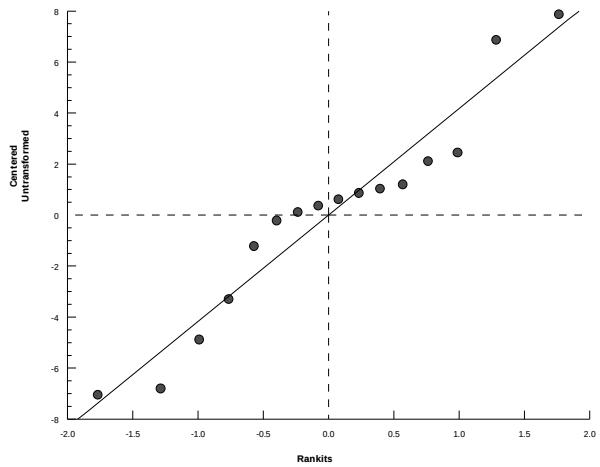
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
003	16.75	1.833	11	7.667	9	9.5	11.33	4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9572-8736	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9098-0663	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	39.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-1.206	1.761	2.923	14	0.8761	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.141	2.586	0.3343	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	16.01905	16.01905	1	1.454	0.2478	Non-Significant Effect
Error	154.2015	11.01439	14			
Total	170.2205		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.318	8.885	0.2899	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9684	0.8408	0.8116	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
002	8	9.47	7.316	11.62	8.933	6.143	14	0.911	27.21%	-26.79%

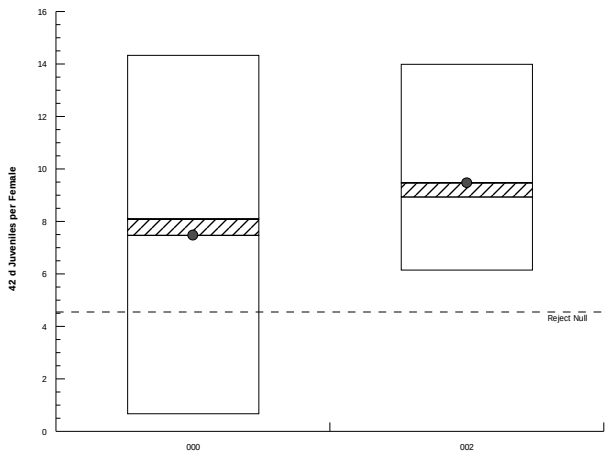
42 d Juveniles per Female Detail

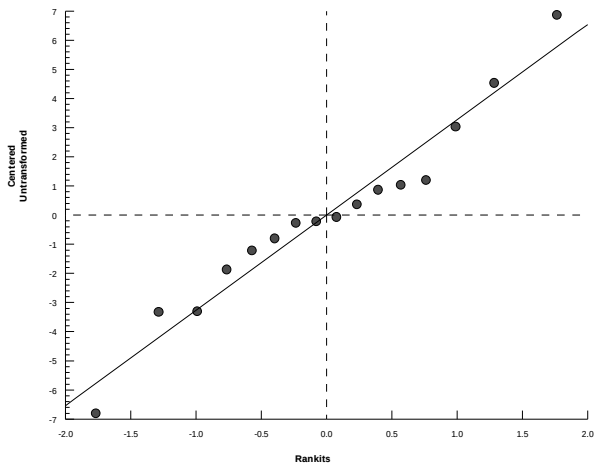
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
002	14	8.667	12.5	6.143	8.25	9.4	9.2	7.6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9098-0663	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-3642-8462	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	47.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-1.173	1.761	3.512	14	0.8698	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.782	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	21.88903	21.88903	1	1.376	0.2603	Non-Significant Effect
Error	222.6744	15.90531	14			
Total	244.5634		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.067	8.885	0.9339	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.91	0.8408	0.1162	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
001	8	9.808	6.42	13.2	10.46	3	15.4	1.433	41.32%	-31.32%

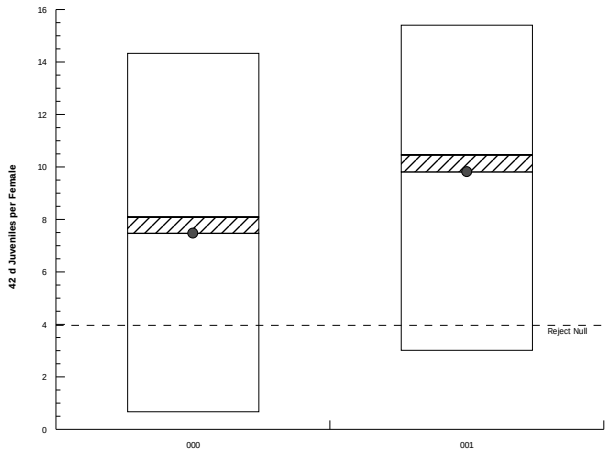
42 d Juveniles per Female Detail

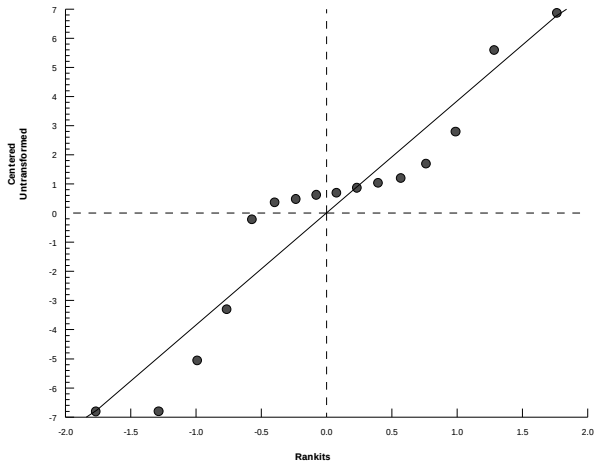
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
001	12.6	10.5	15.4	3	4.75	10.43	11.5	10.29

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-3642-8462	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9343-4029	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	41.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	0.4976	1.761	3.073	14	0.3132	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.036	2.586	0.4757	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.014771	3.014771	1	0.2476	0.6265	Non-Significant Effect
Error	170.4683	12.17631	14			
Total	173.4831		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.717	8.885	0.4927	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9775	0.8408	0.9403	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	11.62%

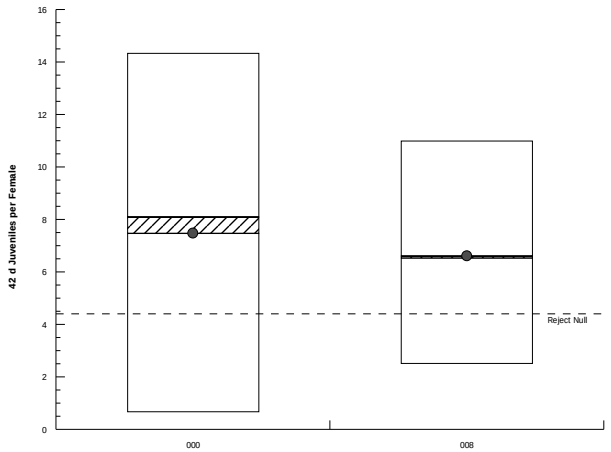
42 d Juveniles per Female Detail

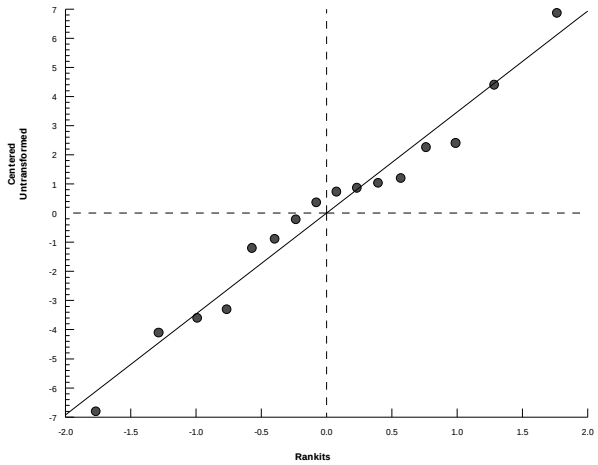
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
008	7.333	11	5.4	8.857	3	2.5	5.714	9

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-9343-4029	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-2445-8541	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	42.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	-0.6506	1.771	3.196	13	0.7367	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.043	2.548	0.4221	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.146503	5.146503	1	0.4232	0.5267	Non-Significant Effect
Error	158.0785	12.15988	13			
Total	163.225		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.834	10.79	0.4776	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9257	0.8328	0.2349	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	7.469	4.189	10.75	8.083	0.6667	14.33	1.387	52.52%	0.0%
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	-15.72%

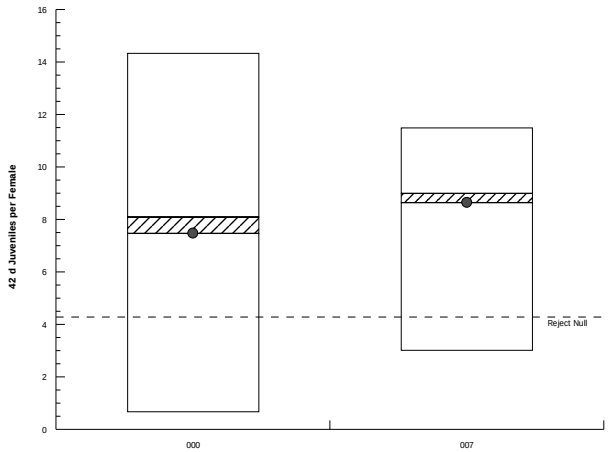
42 d Juveniles per Female Detail

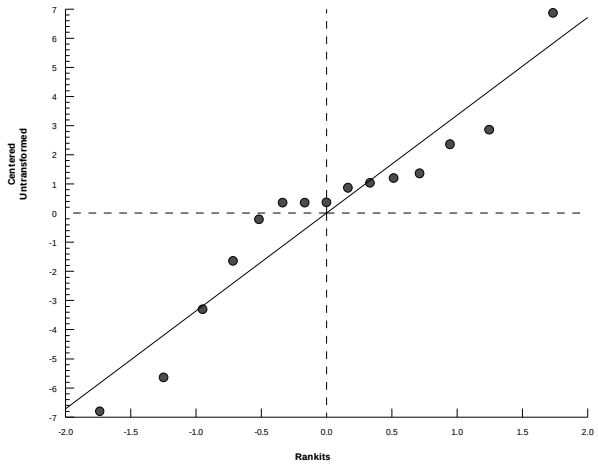
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	7.25	4.167	8.667	14.33	8.5	0.6667	8.333	7.833
007	7	10	11.5	11	9	3	9	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-2445-8541	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7370-8142	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	31.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.4337	1.771	2.698	13	0.3358	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.989	2.548	0.5028	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.629762	1.629762	1	0.1881	0.6716	Non-Significant Effect
Error	112.6389	8.66453	13			
Total	114.2686		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.06	10.79	0.9595	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.951	0.8328	0.5404	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
006	8	7.982	5.488	10.48	8.179	3.333	13	1.055	37.37%	7.65%

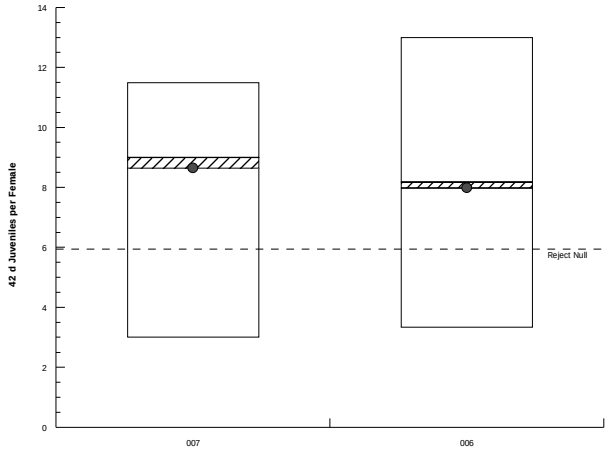
42 d Juveniles per Female Detail

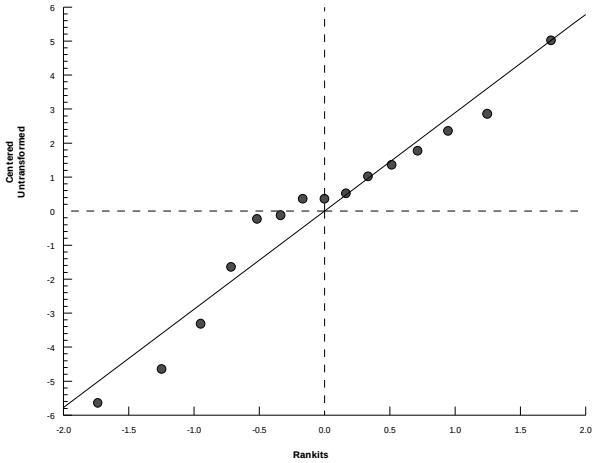
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
006	4.667	7.75	13	9.75	8.5	7.857	3.333	9

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-7370-8142	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-7232-4499	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	36.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-1.5	1.771	3.153	13	0.9212	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.702	2.548	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	26.60744	26.60744	1	2.249	0.1576	Non-Significant Effect
Error	153.8142	11.83186	13			
Total	180.4217		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.761	10.79	0.5077	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9065	0.8328	0.1196	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
005	8	11.31	8.098	14.53	11.57	5.75	16.33	1.359	33.98%	-30.89%

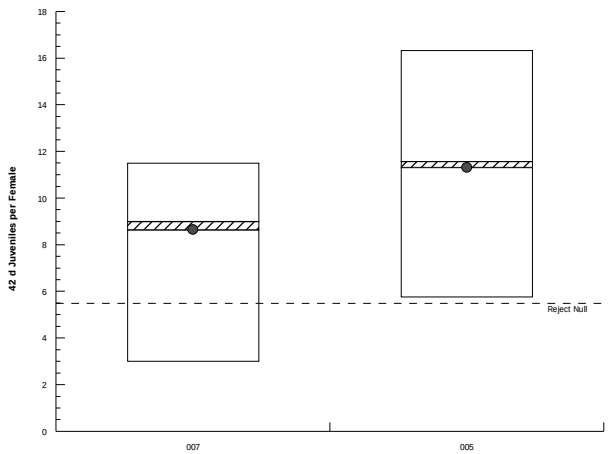
42 d Juveniles per Female Detail

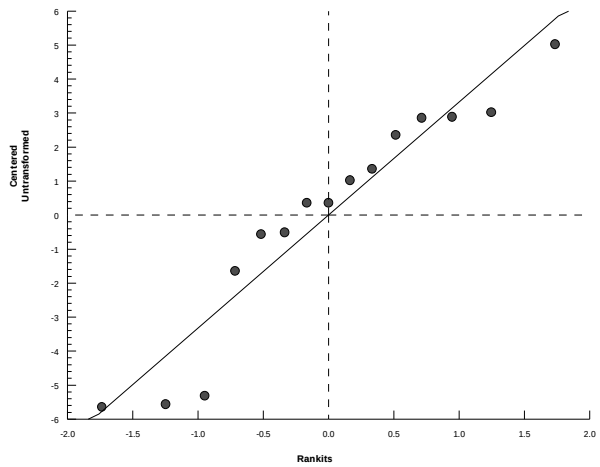
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
005	10.75	5.75	16.33	10.8	14.2	12.33	14.33	6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-7232-4499	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-6514-4646	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	28.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.9868	1.771	2.44	13	0.1709	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.2	2.548	0.2409	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.900339	6.900339	1	0.9738	0.3417	Non-Significant Effect
Error	92.1177	7.085977	13			
Total	99.01804		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.407	9.155	0.6608	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9204	0.8328	0.1955	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
004	8	7.283	5.241	9.325	7.6	2.667	10.75	0.8636	33.54%	15.73%

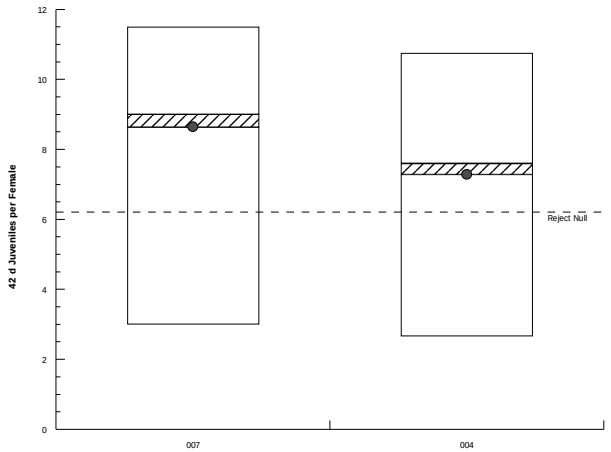
42 d Juveniles per Female Detail

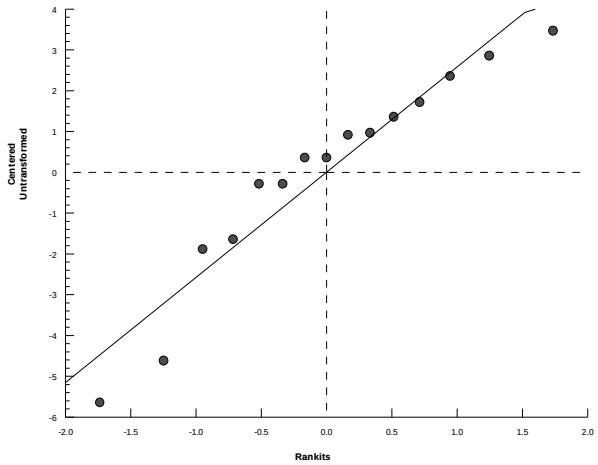
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
004	8.25	10.75	9	5.4	2.667	8.2	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-6514-4646	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-8496-7491	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	41.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	-0.12	1.771	3.578	13	0.5469	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.09	2.548	0.3589	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2196511	0.2196511	1	0.01441	0.9063	Non-Significant Effect
Error	198.1479	15.24215	13			
Total	198.3676		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.516	10.79	0.2813	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9395	0.8328	0.3761	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
003	8	8.885	5.044	12.73	9.25	1.833	16.75	1.625	51.71%	-2.81%

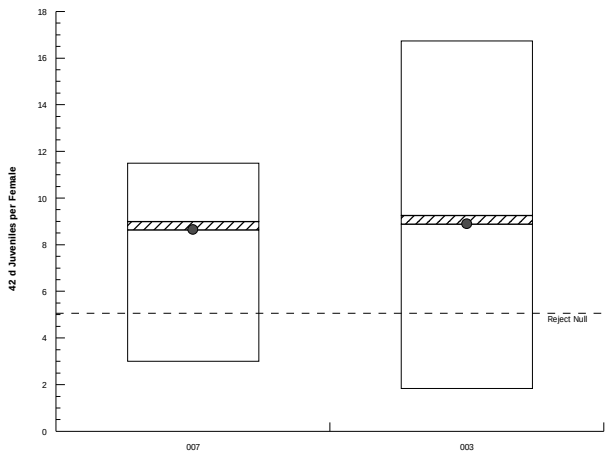
42 d Juveniles per Female Detail

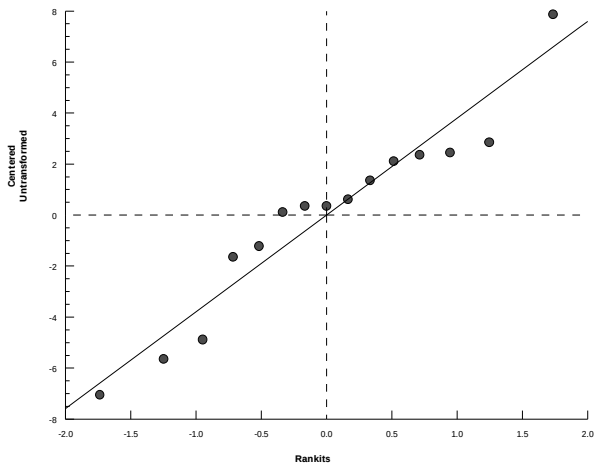
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
003	16.75	1.833	11	7.667	9	9.5	11.33	4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-8496-7491	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-1632-3729	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	28.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.5855	1.771	2.502	13	0.7159	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.146	2.548	0.2950	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.553849	2.553849	1	0.3428	0.5682	Non-Significant Effect
Error	96.83727	7.44902	13			
Total	99.39111		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.264	9.155	0.7584	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9816	0.8328	0.9791	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
002	8	9.47	7.316	11.62	8.933	6.143	14	0.911	27.21%	-9.57%

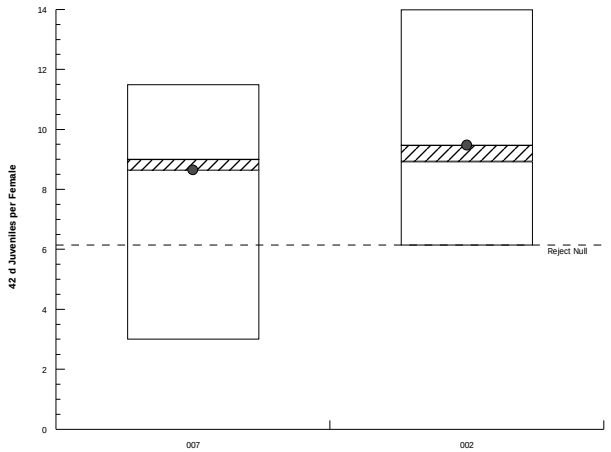
42 d Juveniles per Female Detail

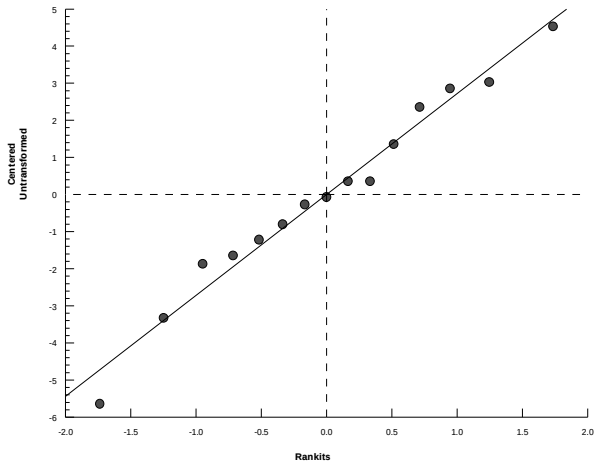
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
002	14	8.667	12.5	6.143	8.25	9.4	9.2	7.6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-1632-3729	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-9957-6003	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	37.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-0.6313	1.771	3.268	13	0.7306	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.981	2.548	0.5161	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.068527	5.068527	1	0.3986	0.5388	Non-Significant Effect
Error	165.3102	12.71617	13			
Total	170.3787		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.957	10.79	0.4315	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8978	0.8328	0.0881	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	8.643	5.964	11.32	9	3	11.5	1.095	33.52%	0.0%
001	8	9.808	6.42	13.2	10.46	3	15.4	1.433	41.32%	-13.48%

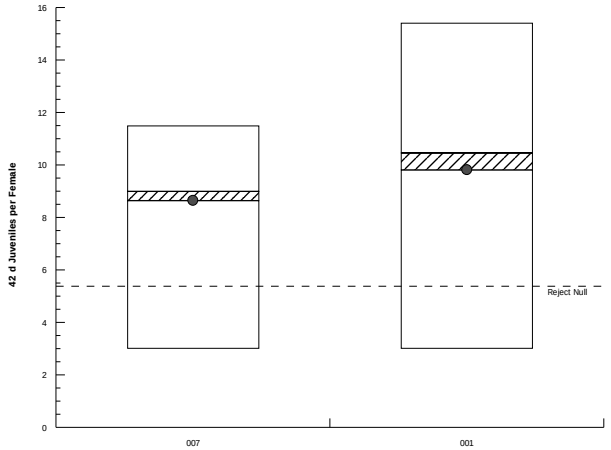
42 d Juveniles per Female Detail

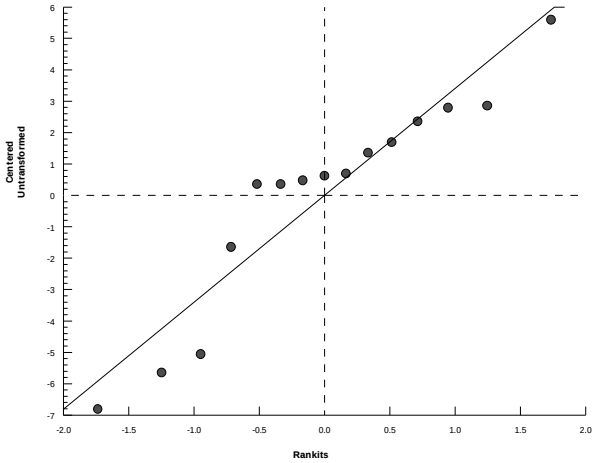
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	7	10	11.5	11	9	3	9	
001	12.6	10.5	15.4	3	4.75	10.43	11.5	10.29

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-9957-6003	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9590-3486	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	39.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	-0.9246	1.761	2.632	14	0.8146	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.738	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.634696	7.634696	1	0.8549	0.3708	Non-Significant Effect
Error	125.0287	8.930622	14			
Total	132.6634		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.007	8.885	0.9924	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9622	0.8408	0.7018	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
006	8	7.982	5.488	10.48	8.179	3.333	13	1.055	37.37%	-20.93%

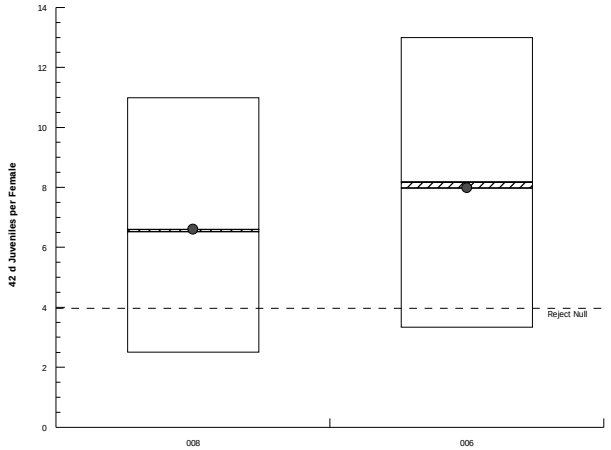
42 d Juveniles per Female Detail

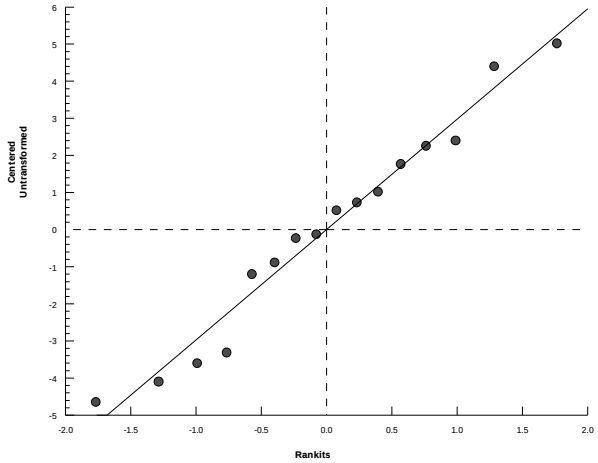
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
006	4.667	7.75	13	9.75	8.5	7.857	3.333	9

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9590-3486	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-9450-6753	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	46.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-2.735	1.761	3.034	14	0.9919	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.671	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	88.80819	88.80819	1	7.481	0.0161	Significant Effect
Error	166.204	11.87172	14			
Total	255.0122		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.649	8.885	0.5253	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9484	0.8408	0.4655	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
005	8	11.31	8.098	14.53	11.57	5.75	16.33	1.359	33.98%	-71.39%

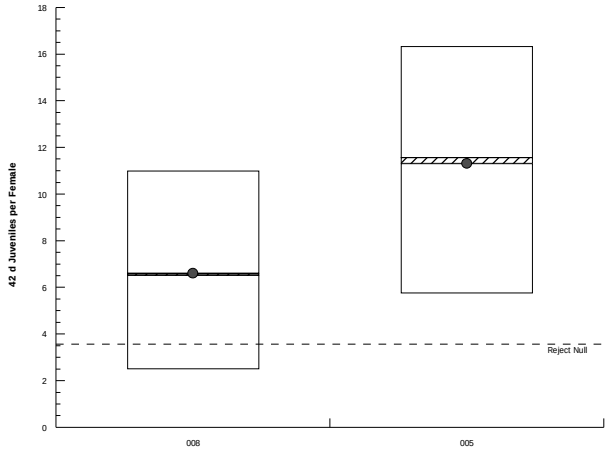
42 d Juveniles per Female Detail

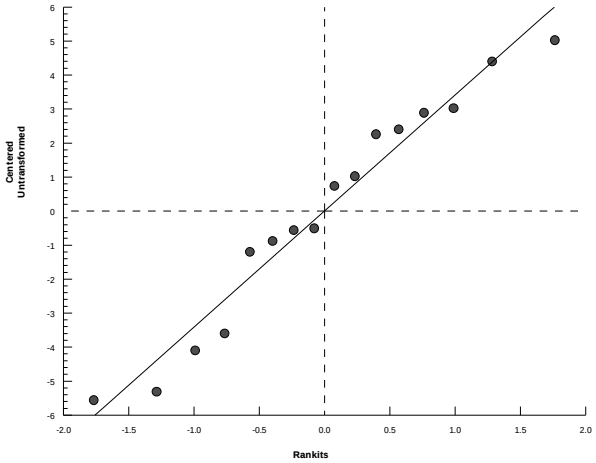
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
005	10.75	5.75	16.33	10.8	14.2	12.33	14.33	6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	07-9450-6753	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1099-5379	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	36.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	-0.4998	1.761	2.406	14	0.6875	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.749	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.864525	1.864525	1	0.2498	0.6250	Non-Significant Effect
Error	104.5075	7.464822	14			
Total	106.372		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.503	8.885	0.6044	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.969	0.8408	0.8219	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
004	8	7.283	5.241	9.325	7.6	2.667	10.75	0.8636	33.54%	-10.34%

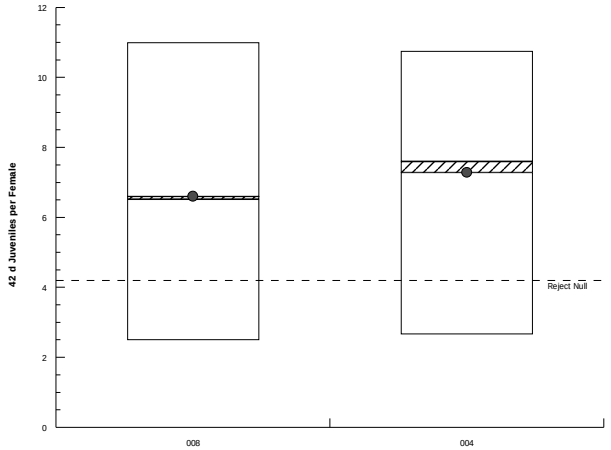
42 d Juveniles per Female Detail

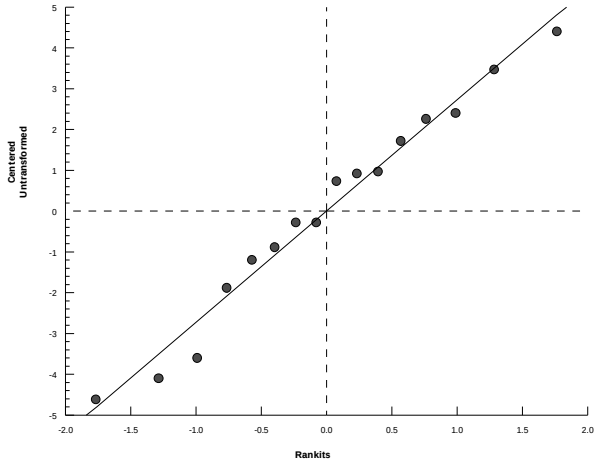
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
004	8.25	10.75	9	5.4	2.667	8.2	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-1099-5379	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-1722-9642	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	51.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	-1.178	1.761	3.415	14	0.8709	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.099	2.586	0.3862	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	20.88164	20.88164	1	1.389	0.2583	Non-Significant Effect
Error	210.5378	15.03841	14			
Total	231.4194		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.355	8.885	0.2809	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9786	0.8408	0.9512	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
003	8	8.885	5.044	12.73	9.25	1.833	16.75	1.625	51.71%	-34.62%

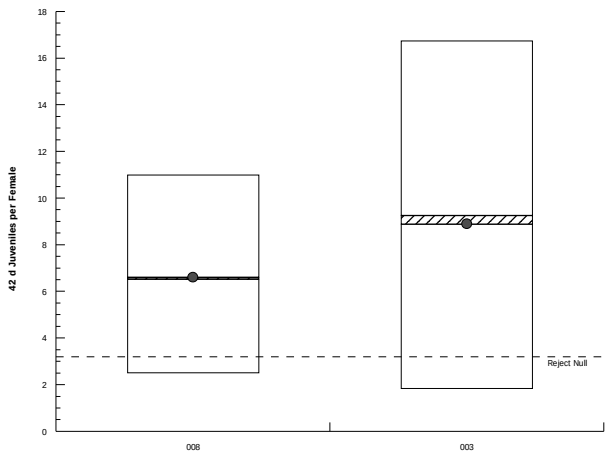
42 d Juveniles per Female Detail

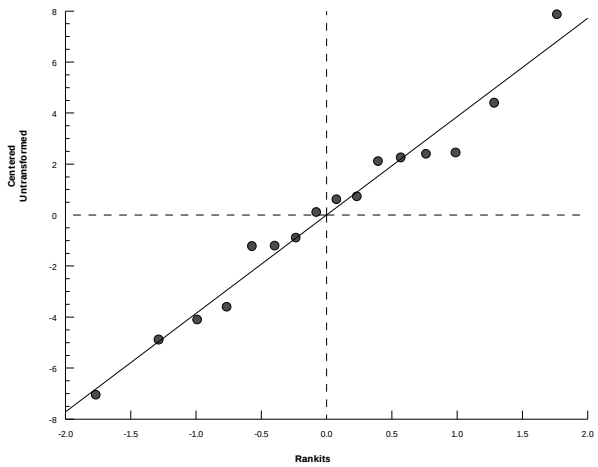
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
003	16.75	1.833	11	7.667	9	9.5	11.33	4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-1722-9642	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1627-2178	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	37.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	-2.055	1.761	2.46	14	0.9705	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.679	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	32.93257	32.93257	1	4.221	0.0591	Non-Significant Effect
Error	109.2271	7.801934	14			
Total	142.1597		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.35	8.885	0.7022	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9493	0.8408	0.4779	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
002	8	9.47	7.316	11.62	8.933	6.143	14	0.911	27.21%	-43.47%

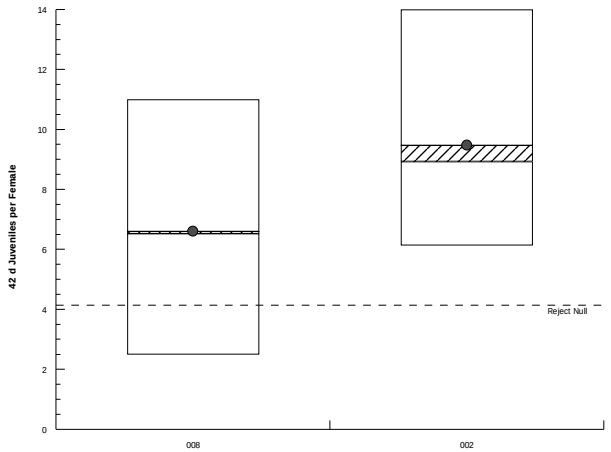
42 d Juveniles per Female Detail

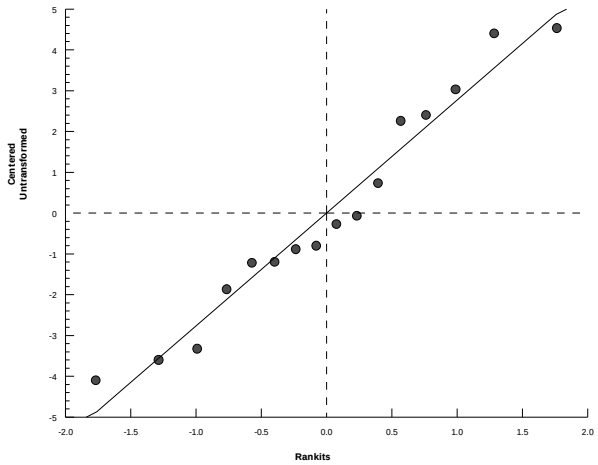
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
002	14	8.667	12.5	6.143	8.25	9.4	9.2	7.6

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1627-2178	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-6994-5641	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	47.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-1.801	1.761	3.138	14	0.9533	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.978	2.586	0.5720	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	41.1507	41.1507	1	3.242	0.0933	Non-Significant Effect
Error	177.7	12.69285	14			
Total	218.8507		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.832	8.885	0.4429	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9596	0.8408	0.6543	Normal Distribution

42 d Juveniles per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.601	4.098	9.104	6.524	2.5	11	1.059	45.36%	0.0%
001	8	9.808	6.42	13.2	10.46	3	15.4	1.433	41.32%	-48.59%

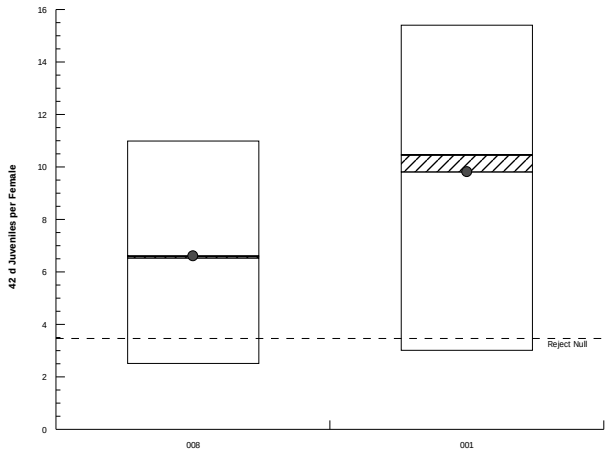
42 d Juveniles per Female Detail

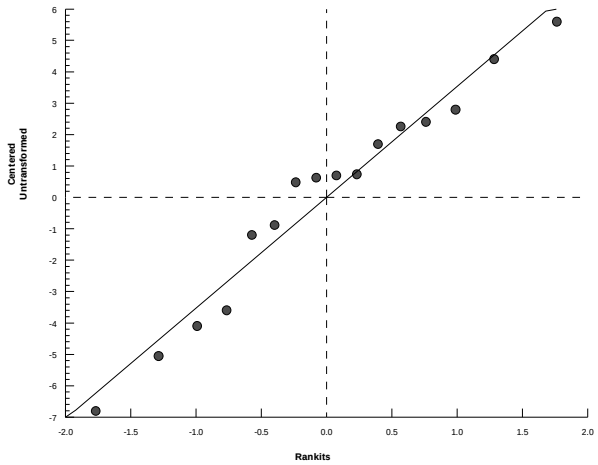
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.333	11	5.4	8.857	3	2.5	5.714	9
001	12.6	10.5	15.4	3	4.75	10.43	11.5	10.29

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-6994-5641	**Endpoint:**	42 d Juveniles per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Total Reproduction Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	5.743	3.502	7.984	1.25	9.222	0.9478	2.681	46.68%	0.0%
007	7	5.793	2.297	9.289	1.375	12.75	1.429	3.78	65.26%	-0.87%
008	8	6.083	4.187	7.979	2.857	9.625	0.8019	2.268	37.28%	-5.92%
001	8	8.486	5.272	11.7	3.222	12.5	1.359	3.844	45.3%	-47.76%
002	8	6.02	4.095	7.945	2.7	9.333	0.8141	2.303	38.25%	-4.82%
003	8	6.29	3.176	9.404	2	11.3	1.317	3.725	59.22%	-9.53%
004	8	4.641	2.008	7.275	1.143	9.8	1.114	3.15	67.86%	19.18%
005	8	8.848	5.504	12.19	2.3	13.43	1.414	4	45.21%	-54.06%
006	8	5.484	3.023	7.944	1.111	10.33	1.041	2.943	53.67%	4.51%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test **EnviroSystems, Inc.**

42d Reproduction-Overall Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222		
007	3.625	12.75	7.8	3	6.778	1.375	5.222			
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625		
001	11.38	5.5	12.5	12	3.222	9.444	3.444	10.4		
002	3.333	2.7	5.375	6.444	9.333	5.444	7.1	8.429		
003	10.63	2	11.3	3.571	4.714	6.8	9.111	2.2		
004	6.667	9.8	6.6	3.556	1.143	6.2	2	1.167		
005	6.9	2.3	13.11	11.75	13.43	5.714	10.78	6.8		
006	2.111	7.6	10.33	6.429	5.462	6.2	1.111	4.625		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1329-4704	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	43.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	0.1842	1.761	2.479	14	0.4283	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.783	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.268785	0.268785	1	0.03392	0.8565	Non-Significant Effect
Error	110.9449	7.924637	14			
Total	111.2137		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.205	8.885	0.8118	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9576	0.8408	0.6193	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
006	8	5.484	3.023	7.944	5.831	1.111	10.33	1.041	53.67%	4.51%

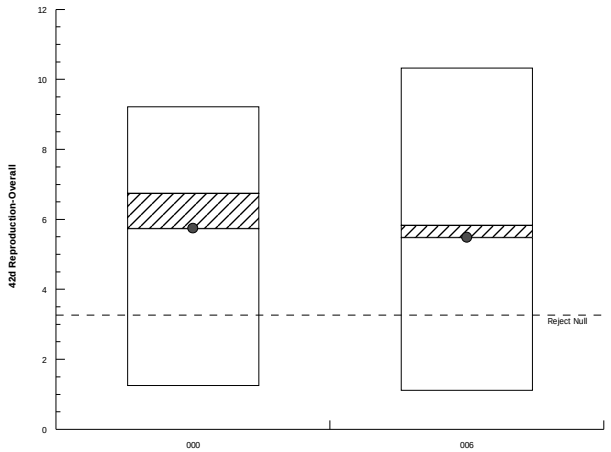
42d Reproduction-Overall Detail

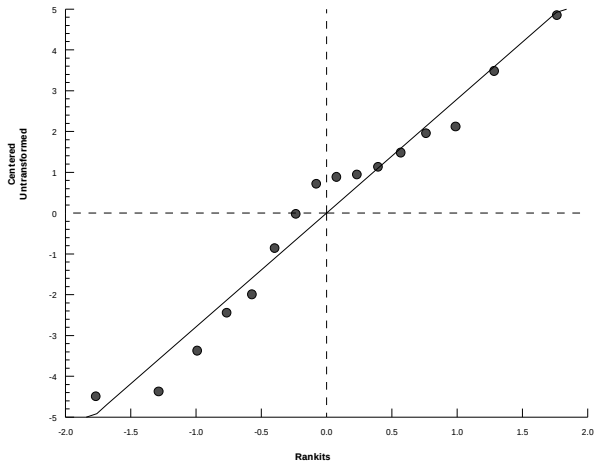
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
006	2.111	7.6	10.33	6.429	5.462	6.2	1.111	4.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-1329-4704	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-7419-7542	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	52.2%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	-1.824	1.761	2.998	14	0.9552	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.991	2.586	0.5501	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	38.55572	38.55572	1	3.326	0.0896	Non-Significant Effect
Error	162.2965	11.59261	14			
Total	200.8522		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.226	8.885	0.3130	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9465	0.8408	0.4359	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
005	8	8.848	5.504	12.19	8.839	2.3	13.43	1.414	45.21%	-54.06%

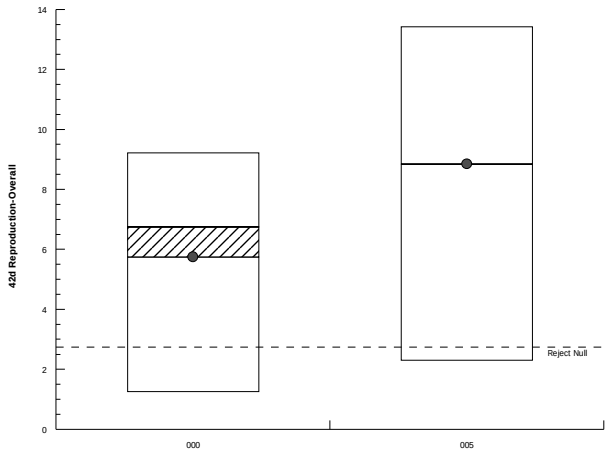
42d Reproduction-Overall Detail

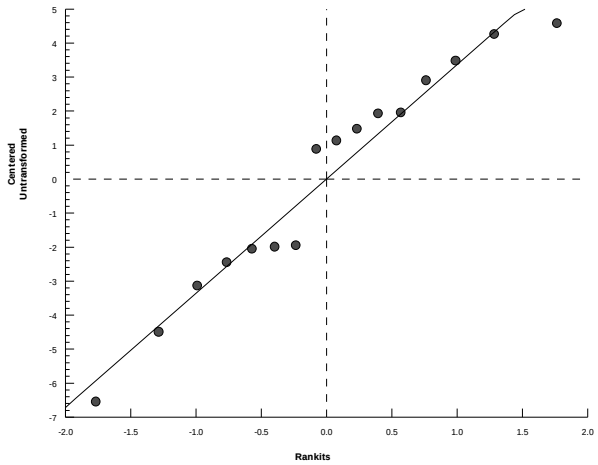
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
005	6.9	2.3	13.11	11.75	13.43	5.714	10.78	6.8

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-7419-7542	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9917-6122	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	44.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	0.7533	1.761	2.576	14	0.2319	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.826	2.586	0.8931	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.853978	4.853978	1	0.5674	0.4638	Non-Significant Effect
Error	119.7575	8.554105	14			
Total	124.6114		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.38	8.885	0.6813	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9392	0.8408	0.3394	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
004	8	4.641	2.008	7.275	4.878	1.143	9.8	1.114	67.86%	19.18%

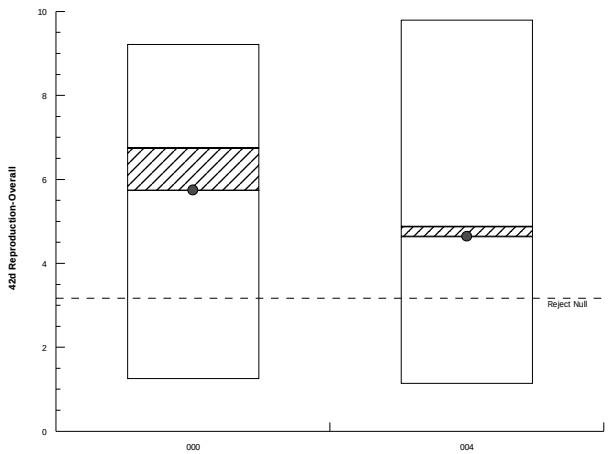
42d Reproduction-Overall Detail

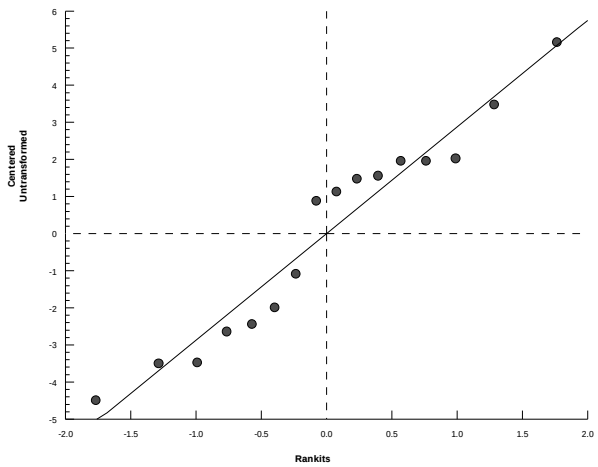
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
004	6.667	9.8	6.6	3.556	1.143	6.2	2	1.167

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-9917-6122	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-6755-2272	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	49.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	-0.3372	1.761	2.858	14	0.6295	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.598	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.197592	1.197592	1	0.1137	0.7409	Non-Significant Effect
Error	147.4264	10.53046	14			
Total	148.624		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.93	8.885	0.4051	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.941	0.8408	0.3617	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
003	8	6.29	3.176	9.404	5.757	2	11.3	1.317	59.22%	-9.53%

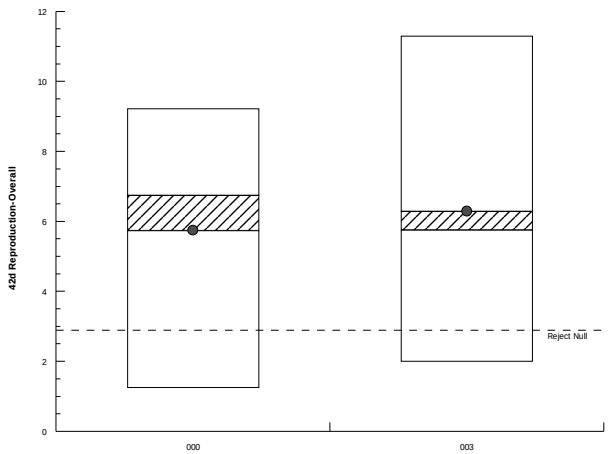
42d Reproduction-Overall Detail

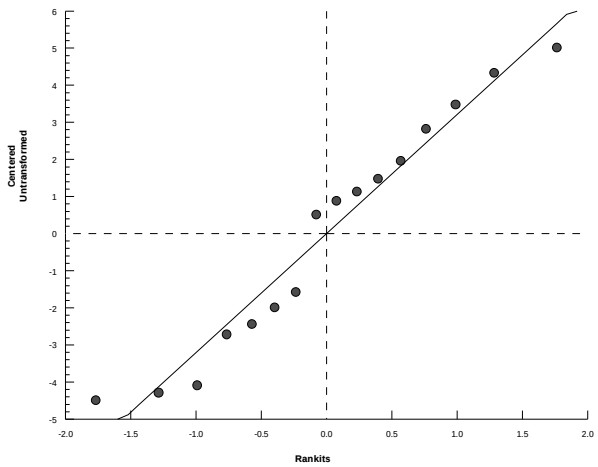
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
003	10.63	2	11.3	3.571	4.714	6.8	9.111	2.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-6755-2272	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-4339-2709	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-0.2216	1.761	2.201	14	0.5861	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.861	2.586	0.8087	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3065512	0.3065512	1	0.04909	0.8279	Non-Significant Effect
Error	87.42345	6.244532	14			
Total	87.73		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.356	8.885	0.6983	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9554	0.8408	0.5805	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
002	8	6.02	4.095	7.945	5.944	2.7	9.333	0.8141	38.25%	-4.82%

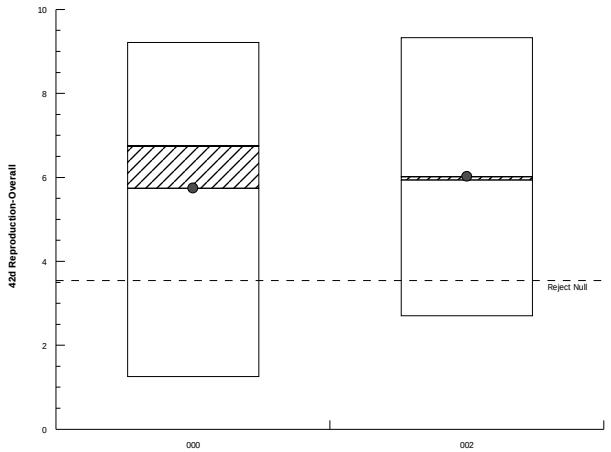
42d Reproduction-Overall Detail

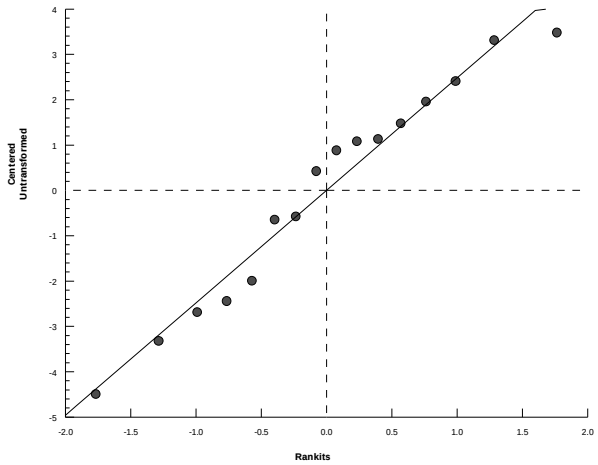
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
002	3.333	2.7	5.375	6.444	9.333	5.444	7.1	8.429

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	01-4339-2709	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-3339-9338	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	50.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-1.655	1.761	2.918	14	0.9400	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.644	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	30.0898	30.0898	1	2.74	0.1201	Non-Significant Effect
Error	153.7392	10.98137	14			
Total	183.829		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.056	8.885	0.3624	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8938	0.8408	0.0641	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
001	8	8.486	5.272	11.7	9.922	3.222	12.5	1.359	45.3%	-47.76%

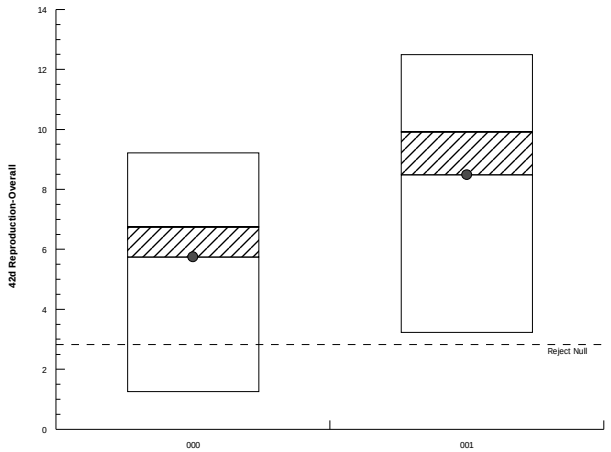
42d Reproduction-Overall Detail

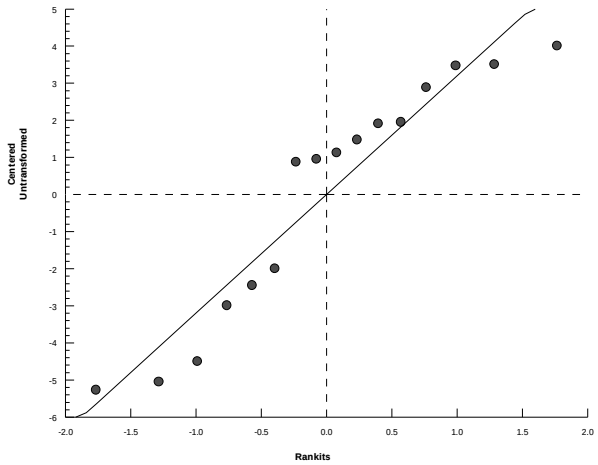
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
001	11.38	5.5	12.5	12	3.222	9.444	3.444	10.4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-3339-9338	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-3729-5623	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	-0.274	1.761	2.187	14	0.6059	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.873	2.586	0.7818	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4627509	0.4627509	1	0.07505	0.7881	Non-Significant Effect
Error	86.31939	6.165671	14			
Total	86.78214		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.397	8.885	0.6701	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9482	0.8408	0.4615	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	-5.92%

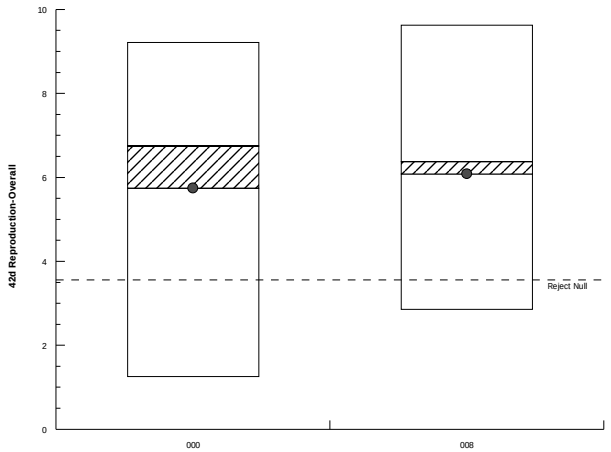
42d Reproduction-Overall Detail

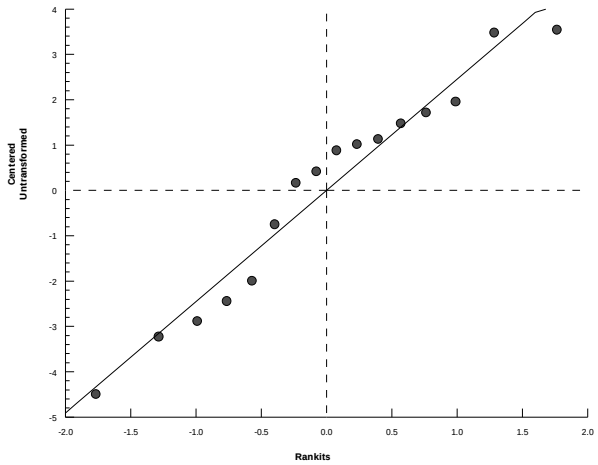
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-3729-5623	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5803-8993	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	51.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	-0.02974	1.771	2.965	13	0.5116	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.232	2.548	0.2130	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.009259406	0.009259406	1	0.000885	0.9767	Non-Significant Effect
Error	136.0529	10.46561	13			
Total	136.0622		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.988	9.155	0.3895	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.95	0.8328	0.5242	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	5.743	3.502	7.984	6.75	1.25	9.222	0.9478	46.68%	0.0%
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	-0.87%

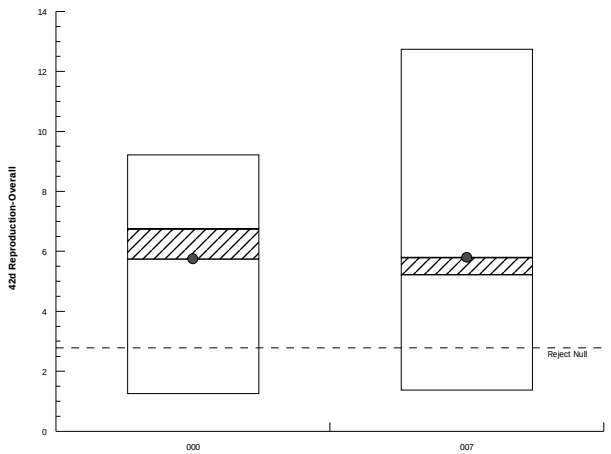
42d Reproduction-Overall Detail

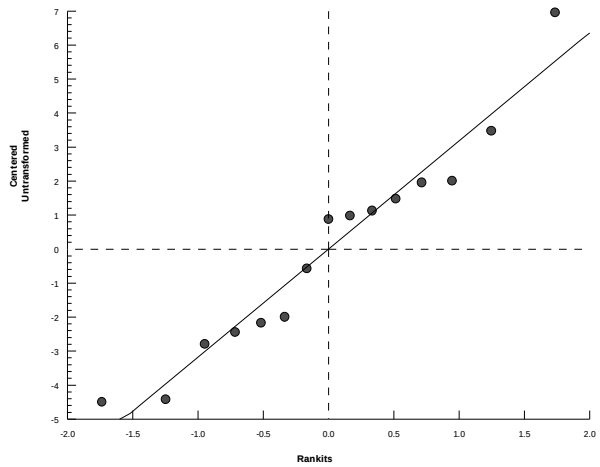
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	9.222	3.3	3.75	6.625	7.7	1.25	6.875	7.222
007	3.625	12.75	7.8	3	6.778	1.375	5.222	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-5803-8993	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-1074-5309	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	53.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	0.1779	1.771	3.076	13	0.4308	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.152	2.548	0.2886	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3565177	0.3565177	1	0.03166	0.8615	Non-Significant Effect
Error	146.3786	11.25989	13			
Total	146.7351		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.65	9.155	0.5263	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9545	0.8328	0.5973	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
006	8	5.484	3.023	7.944	5.831	1.111	10.33	1.041	53.67%	5.34%

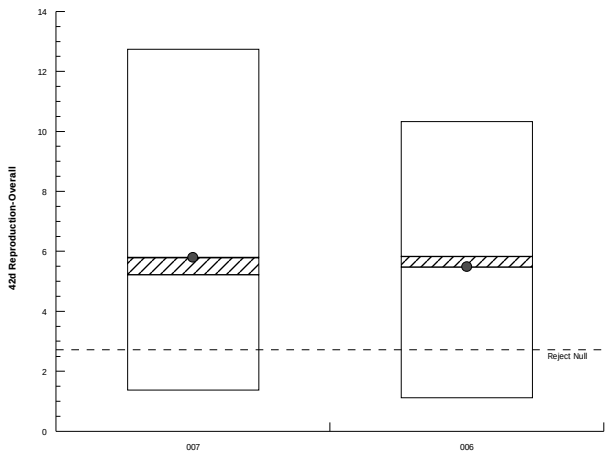
42d Reproduction-Overall Detail

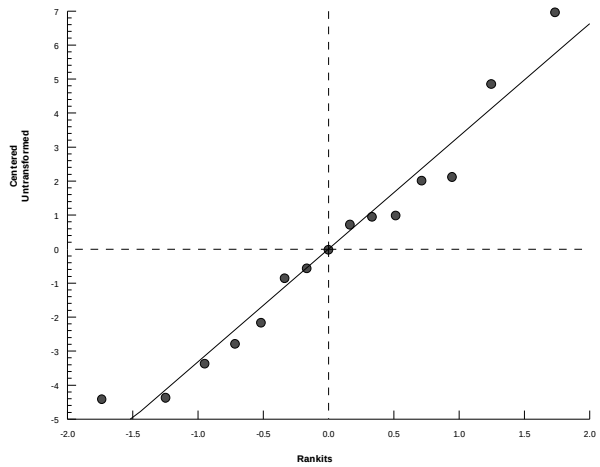
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
006	2.111	7.6	10.33	6.429	5.462	6.2	1.111	4.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-1074-5309	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-0631-6504	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	54.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	0.6439	1.771	3.167	13	0.2654	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.09	2.548	0.3600	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.949266	4.949266	1	0.4146	0.5308	Non-Significant Effect
Error	155.1911	11.93778	13			
Total	160.1404		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.44	9.155	0.6400	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9334	0.8328	0.3065	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
004	8	4.641	2.008	7.275	4.878	1.143	9.8	1.114	67.86%	19.88%

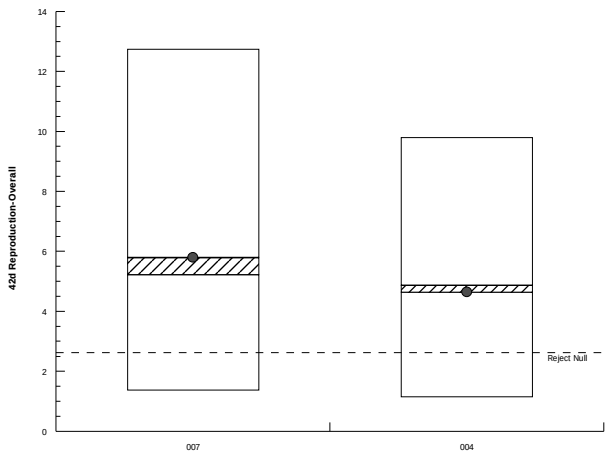
42d Reproduction-Overall Detail

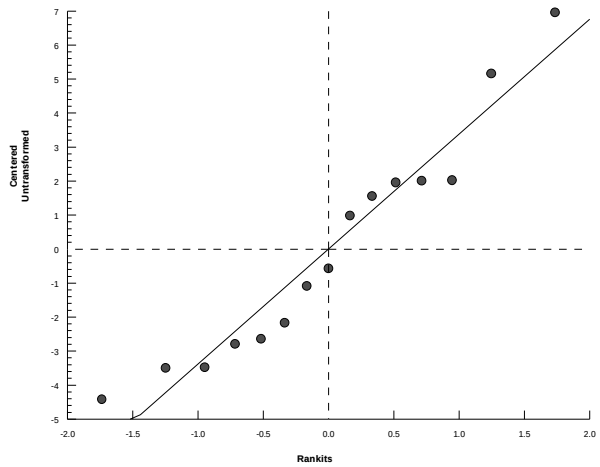
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
004	6.667	9.8	6.6	3.556	1.143	6.2	2	1.167

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	03-0631-6504	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-2897-9532	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	59.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	-0.2562	1.771	3.437	13	0.5991	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.925	2.548	0.6147	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.9235443	0.9235443	1	0.06566	0.8018	Non-Significant Effect
Error	182.8601	14.06616	13			
Total	183.7836		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.03	9.155	0.9547	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.938	0.8328	0.3575	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
003	8	6.29	3.176	9.404	5.757	2	11.3	1.317	59.22%	-8.59%

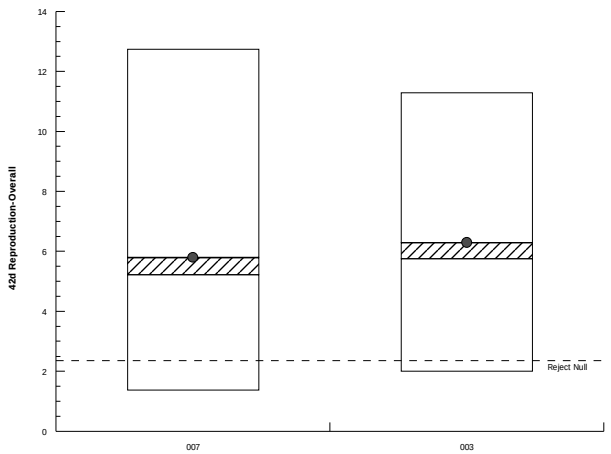
42d Reproduction-Overall Detail

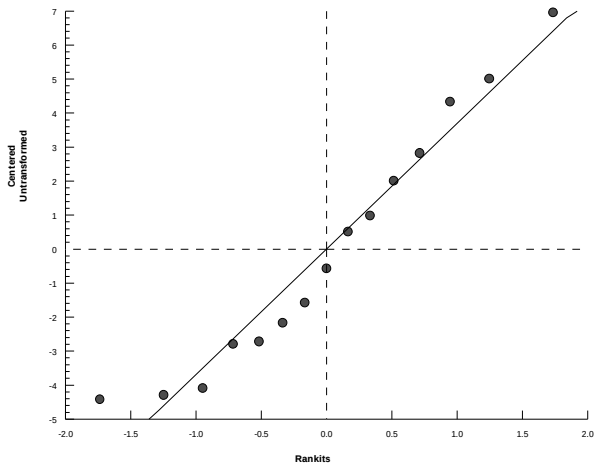
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
003	10.63	2	11.3	3.571	4.714	6.8	9.111	2.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	05-2897-9532	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-0477-1638	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	48.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.1427	1.771	2.818	13	0.5556	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.349	2.548	0.1313	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1924321	0.1924321	1	0.02036	0.8887	Non-Significant Effect
Error	122.8571	9.450545	13			
Total	123.0495		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.695	9.155	0.2206	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9594	0.8328	0.6825	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
002	8	6.02	4.095	7.945	5.944	2.7	9.333	0.8141	38.25%	-3.92%

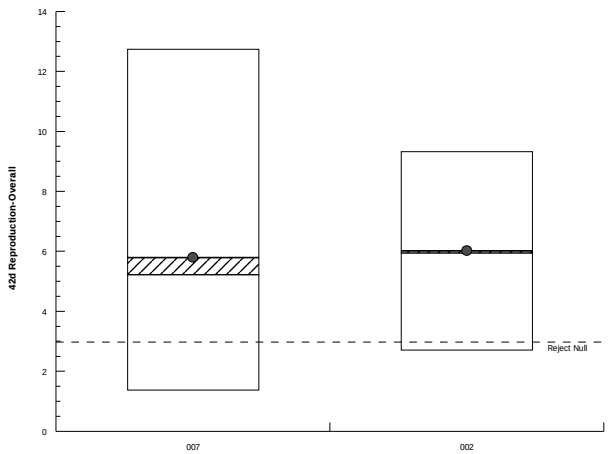
42d Reproduction-Overall Detail

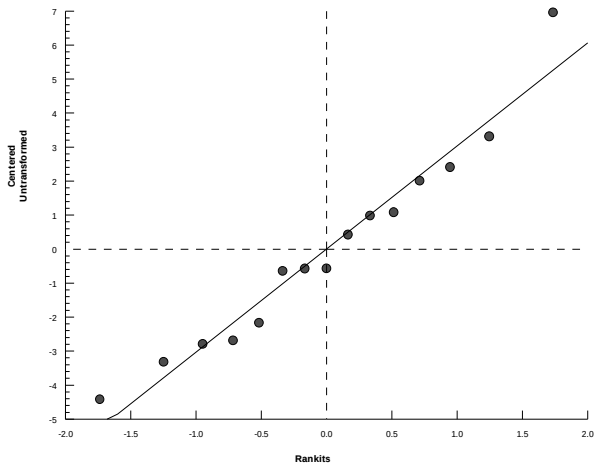
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
002	3.333	2.7	5.375	6.444	9.333	5.444	7.1	8.429

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	17-0477-1638	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-4262-1291	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	60.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-1.364	1.771	3.496	13	0.9021	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.893	2.548	0.6775	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	27.07319	27.07319	1	1.86	0.1957	Non-Significant Effect
Error	189.1728	14.55176	13			
Total	216.246		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.034	10.79	0.9838	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9558	0.8328	0.6193	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
001	8	8.486	5.272	11.7	9.922	3.222	12.5	1.359	45.3%	-46.49%

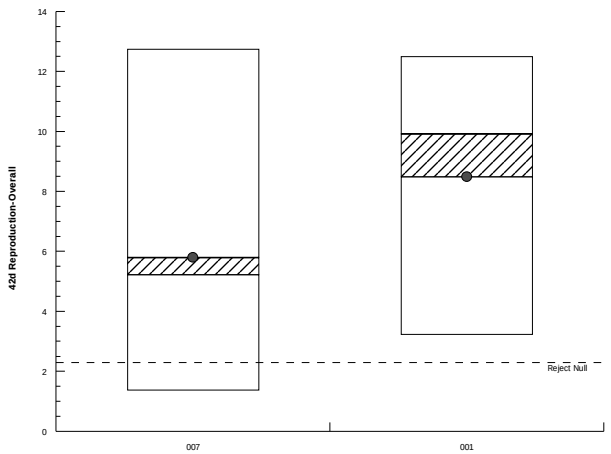
42d Reproduction-Overall Detail

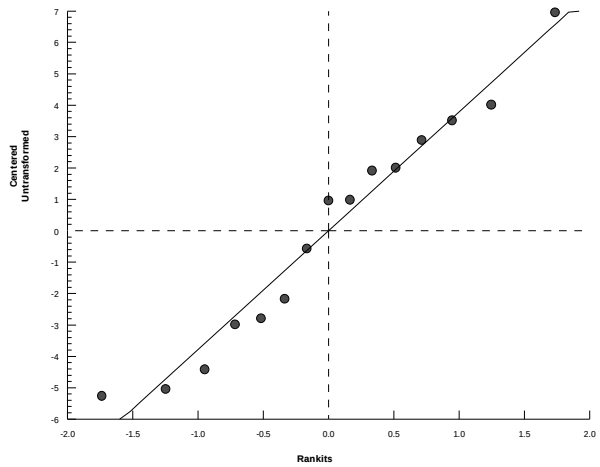
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
001	11.38	5.5	12.5	12	3.222	9.444	3.444	10.4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-4262-1291	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-3051-0904	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.0%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	0.4562	1.761	2.314	14	0.3276	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.911	2.586	0.7011	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.436888	1.436888	1	0.2081	0.6552	Non-Significant Effect
Error	96.64504	6.903218	14			
Total	98.08193		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.684	8.885	0.5082	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9669	0.8408	0.7864	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
006	8	5.484	3.023	7.944	5.831	1.111	10.33	1.041	53.67%	9.85%

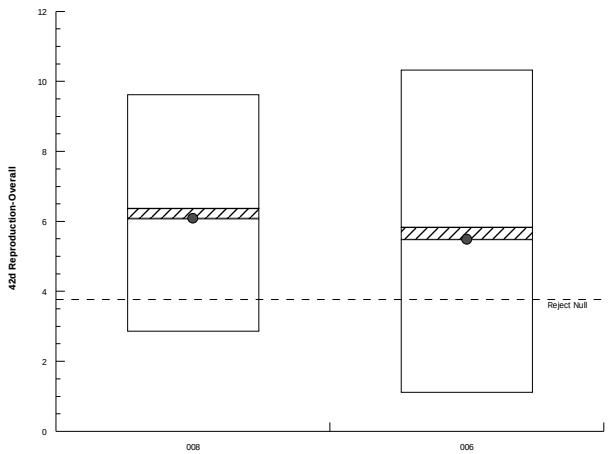
42d Reproduction-Overall Detail

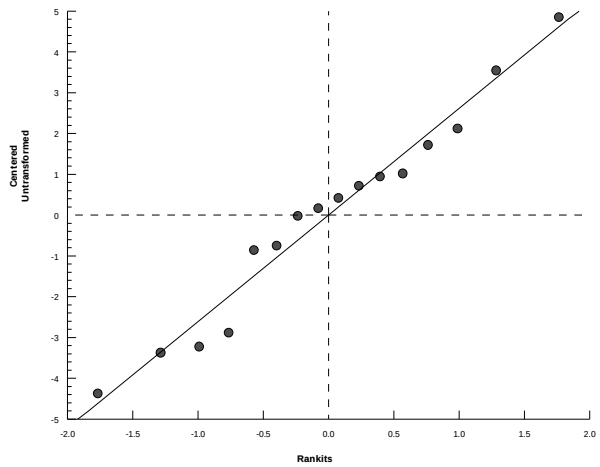
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
006	2.111	7.6	10.33	6.429	5.462	6.2	1.111	4.625

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-3051-0904	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2534-5678	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	47.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-1.701	1.761	2.863	14	0.9444	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.085	2.586	0.4058	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	30.57059	30.57059	1	2.892	0.1111	Non-Significant Effect
Error	147.9966	10.57119	14			
Total	178.5672		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.11	8.885	0.1575	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9647	0.8408	0.7478	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
005	8	8.848	5.504	12.19	8.839	2.3	13.43	1.414	45.21%	-45.45%

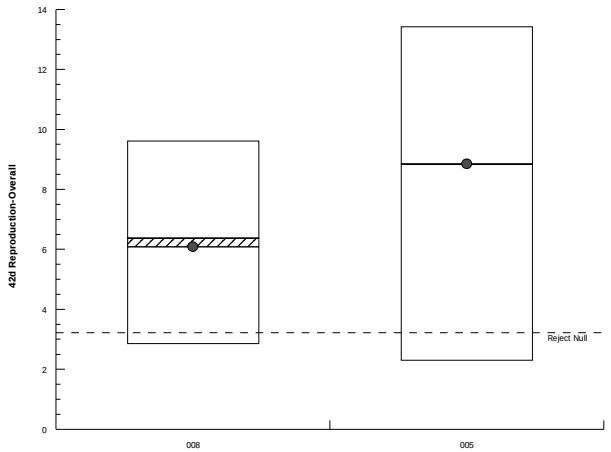
42d Reproduction-Overall Detail

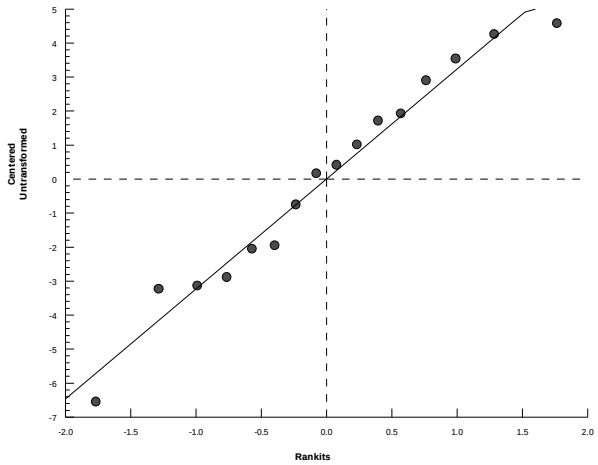
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
005	6.9	2.3	13.11	11.75	13.43	5.714	10.78	6.8

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-2534-5678	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7860-4516	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	39.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	1.051	1.761	2.417	14	0.1556	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.946	2.586	0.6317	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.314183	8.314183	1	1.104	0.3112	Non-Significant Effect
Error	105.4576	7.532685	14			
Total	113.7718		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.929	8.885	0.4058	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9397	0.8408	0.3458	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
004	8	4.641	2.008	7.275	4.878	1.143	9.8	1.114	67.86%	23.7%

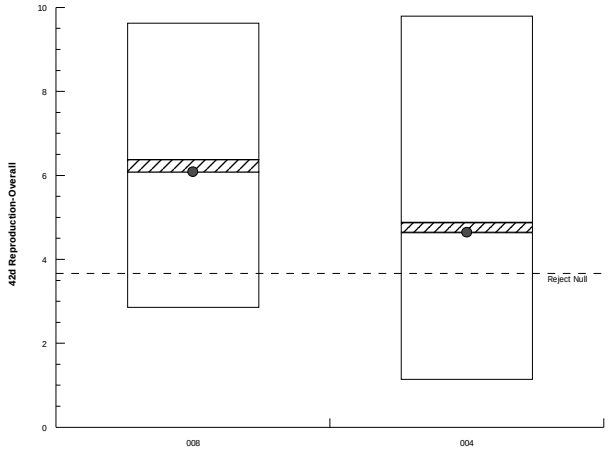
42d Reproduction-Overall Detail

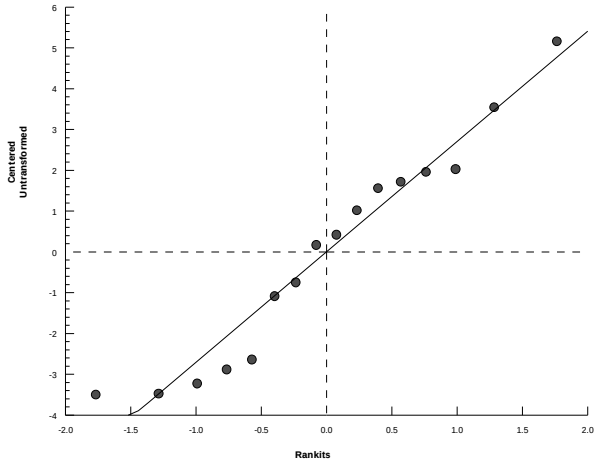
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
004	6.667	9.8	6.6	3.556	1.143	6.2	2	1.167

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-7860-4516	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-0454-4430	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	44.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	-0.1343	1.761	2.716	14	0.5525	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.682	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1714683	0.1714683	1	0.01803	0.8951	Non-Significant Effect
Error	133.1266	9.50904	14			
Total	133.298		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.697	8.885	0.2139	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9538	0.8408	0.5524	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
003	8	6.29	3.176	9.404	5.757	2	11.3	1.317	59.22%	-3.4%

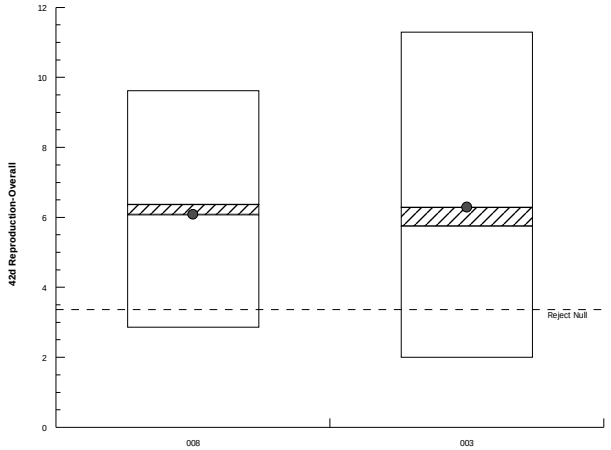
42d Reproduction-Overall Detail

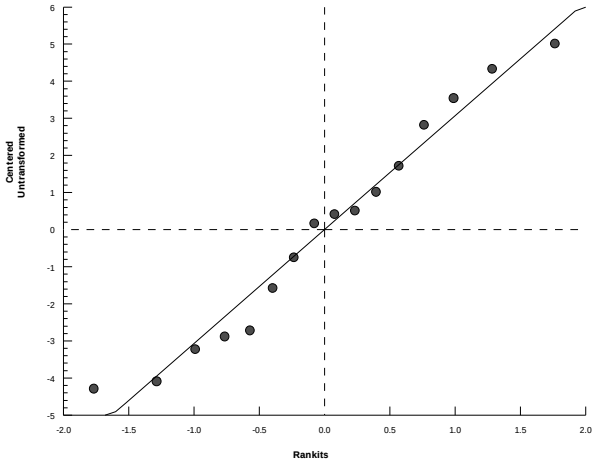
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
003	10.63	2	11.3	3.571	4.714	6.8	9.111	2.2

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	10-0454-4430	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8460-6145	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	33.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	0.05539	1.761	2.013	14	0.4783	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.604	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01602435	0.01602435	1	0.003068	0.9566	Non-Significant Effect
Error	73.12358	5.223113	14			
Total	73.1396		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.031	8.885	0.9692	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9432	0.8408	0.3895	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
002	8	6.02	4.095	7.945	5.944	2.7	9.333	0.8141	38.25%	1.04%

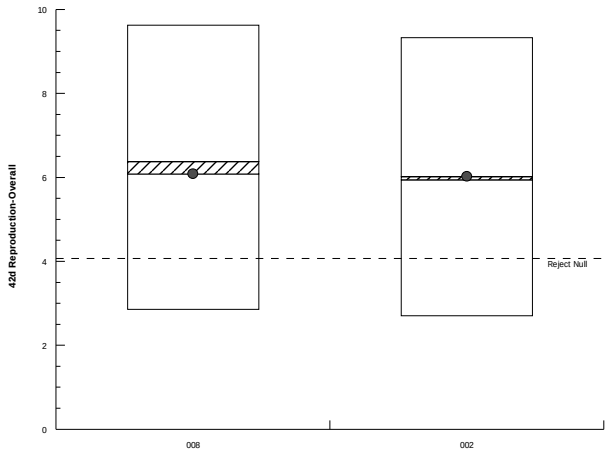
42d Reproduction-Overall Detail

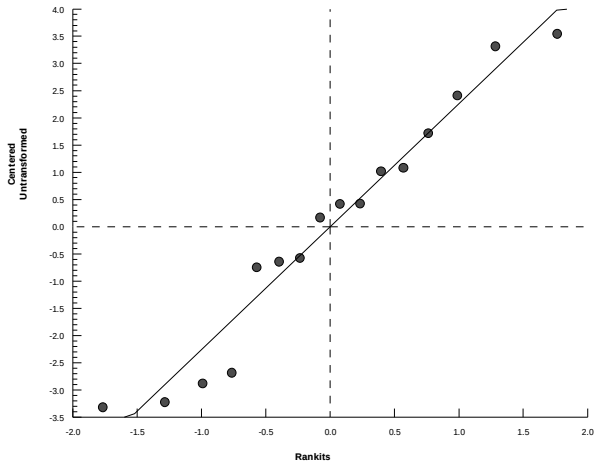
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
002	3.333	2.7	5.375	6.444	9.333	5.444	7.1	8.429

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	20-8460-6145	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date:	08 Jan-13 16:30 (p 1 of 1)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	19-1799-7993	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 16:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sediment	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	61.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-1.513	1.771	3.575	13	0.9230	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.851	2.548	0.7646	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	34.84013	34.84013	1	2.291	0.1541	Non-Significant Effect
Error	197.7301	15.21001	13			
Total	232.5703		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.119	10.79	0.9066	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9754	0.8328	0.9286	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	5.793	2.297	9.289	5.222	1.375	12.75	1.429	65.26%	0.0%
005	8	8.848	5.504	12.19	8.839	2.3	13.43	1.414	45.21%	-52.73%

42d Reproduction-Overall Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	3.625	12.75	7.8	3	6.778	1.375	5.222	
005	6.9	2.3	13.11	11.75	13.43	5.714	10.78	6.8

CETIS Analytical Report

Report Date:	09 Jan-13 08:54 (p 1 of 2)
Test Code:	22654Ha | 09-3564-3918

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-9339-7600	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	09 Jan-13 8:52	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	45.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-1.523	1.761	2.779	14	0.9249	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.726	2.586	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	23.08955	23.08955	1	2.318	0.1501	Non-Significant Effect
Error	139.4393	9.959951	14			
Total	162.5289		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.872	8.885	0.1873	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9249	0.8408	0.2025	Normal Distribution

42d Reproduction-Overall Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	6.083	4.187	7.979	6.375	2.857	9.625	0.8019	37.28%	0.0%
001	8	8.486	5.272	11.7	9.922	3.222	12.5	1.359	45.3%	-39.5%

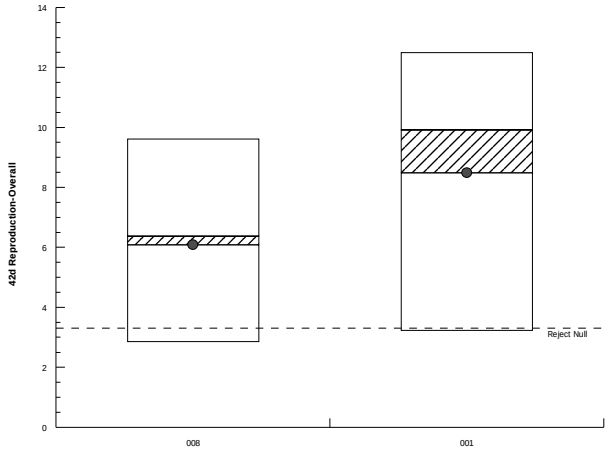
42d Reproduction-Overall Detail

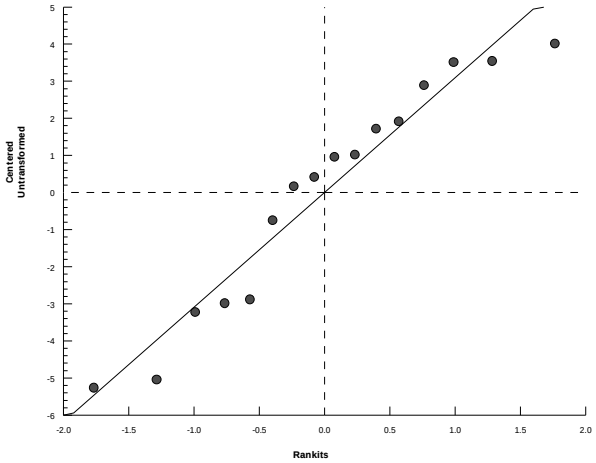
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	7.1	5.333	6.25	7.8	3.2	2.857	6.5	9.625
001	11.38	5.5	12.5	12	3.222	9.444	3.444	10.4

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	00-9339-7600	**Endpoint:**	42d Reproduction-Overall	**CETIS Version:**	CETISv1.8.6
Analyzed:	09 Jan-13 8:52	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





CETIS Analytical Reports
Day 42 Reproduction per Female Comparisons

CLEAN 8012 CTO-WE04
Site 4 Remedial Investigation
Cheatham Annex (CAX), Williamsburg, Virginia
Ecological Risk Assessment Toxicity Testing
CH2M Hill Purchase Order 947233

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
000	8	9.964	6.319	13.61	3.333	17.67	1.541	4.359	43.75%	0.0%
007	7	11.81	7.245	16.38	3.667	20.4	1.866	4.938	41.81%	-18.55%
008	8	9.812	7.471	12.15	5	12.83	0.99	2.8	28.54%	1.52%
001	8	14.21	10.91	17.52	7.25	20	1.397	3.952	27.81%	-42.65%
002	8	12.51	8.881	16.14	8.286	21.5	1.535	4.341	34.7%	-25.56%
003	8	11.24	6.29	16.18	2.667	21.25	2.092	5.917	52.66%	-12.78%
004	8	8.865	5.777	11.95	2.667	13.2	1.306	3.693	41.66%	11.03%
005	8	15.14	11.16	19.12	5.75	19.67	1.684	4.762	31.46%	-51.93%
006	8	9.498	6.403	12.59	3.333	15.5	1.309	3.702	38.98%	4.68%

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

42d Reproduction per Female Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83		
007	9.667	20.4	13	12	12.2	3.667	11.75			
008	11.83	12	10	11.14	6.4	5	9.286	12.83		
001	18.2	13.75	20	12	7.25	12.14	15.5	14.86		
002	15	9	21.5	8.286	10.5	9.8	14.2	11.8		
003	21.25	2.667	16.14	8.333	11	11.33	13.67	5.5		
004	10	12.25	13.2	6.4	2.667	12.4	7	7		
005	17.25	5.75	19.67	18.8	18.8	13.33	16.17	11.33		
006	6.333	9.5	15.5	11.25	8.875	8.857	3.333	12.33		

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-8428-3191	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	35.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		006	0.2303	1.761	3.561	14	0.4106	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.972	2.586	0.5834	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.867781	0.867781	1	0.05306	0.8212	Non-Significant Effect
Error	228.9686	16.3549	14			
Total	229.8363		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.386	8.885	0.6773	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9626	0.8408	0.7082	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
006	8	9.498	6.403	12.59	9.188	3.333	15.5	1.309	38.98%	4.68%

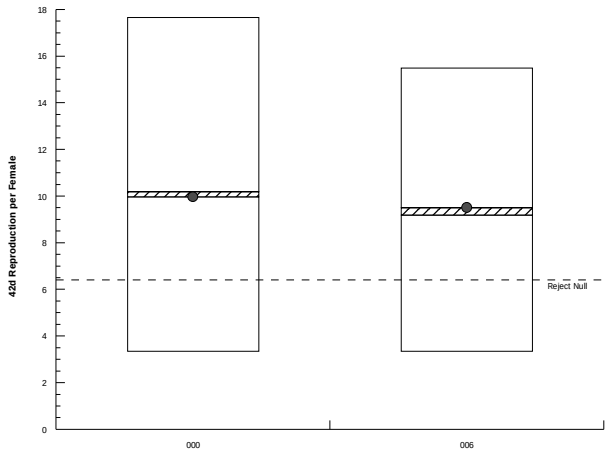
42d Reproduction per Female Detail

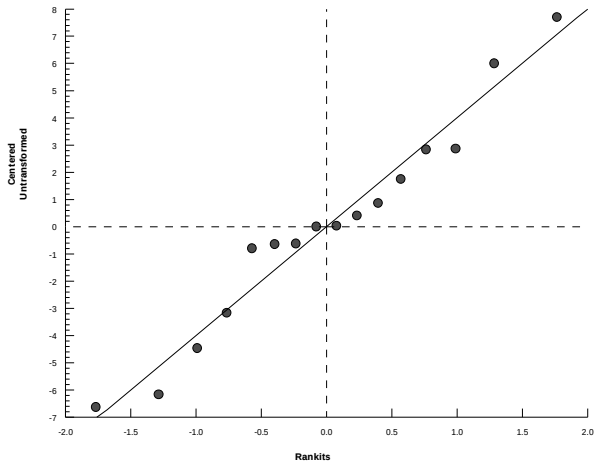
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
006	6.333	9.5	15.5	11.25	8.875	8.857	3.333	12.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-8428-3191	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-3690-0995	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	40.3%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		005	-2.267	1.761	4.02	14	0.9801	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.129	2.586	0.3491	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	107.0794	107.0794	1	5.139	0.0398	Significant Effect
Error	291.7337	20.83813	14			
Total	398.8131		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.193	8.885	0.8217	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9728	0.8408	0.8811	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
005	8	15.14	11.16	19.12	16.71	5.75	19.67	1.684	31.46%	-51.93%

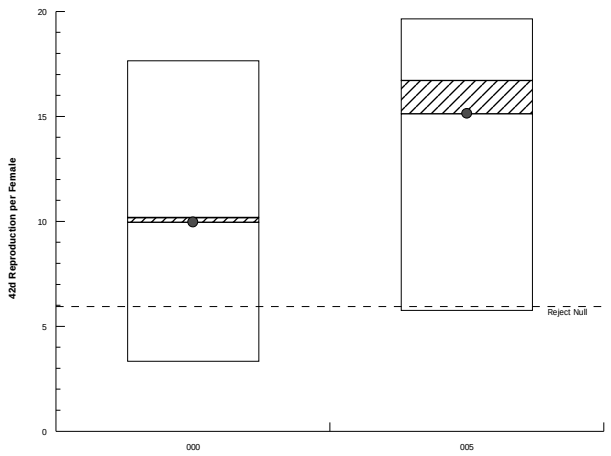
42d Reproduction per Female Detail

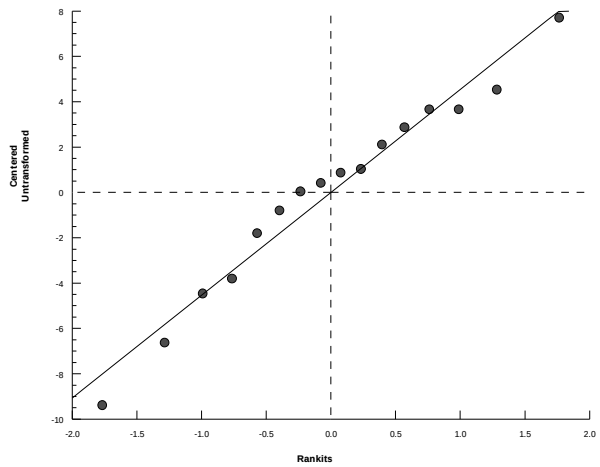
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
005	17.25	5.75	19.67	18.8	18.8	13.33	16.17	11.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	04-3690-0995	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:26	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-0284-9369	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	35.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		004	0.544	1.761	3.558	14	0.2975	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.974	2.586	0.5798	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.830838	4.830838	1	0.296	0.5950	Non-Significant Effect
Error	228.5058	16.32184	14			
Total	233.3366		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.393	8.885	0.6728	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.979	0.8408	0.9549	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
004	8	8.865	5.777	11.95	8.5	2.667	13.2	1.306	41.66%	11.03%

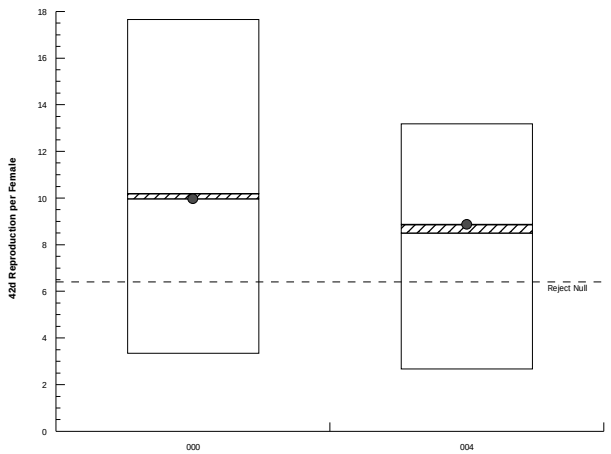
42d Reproduction per Female Detail

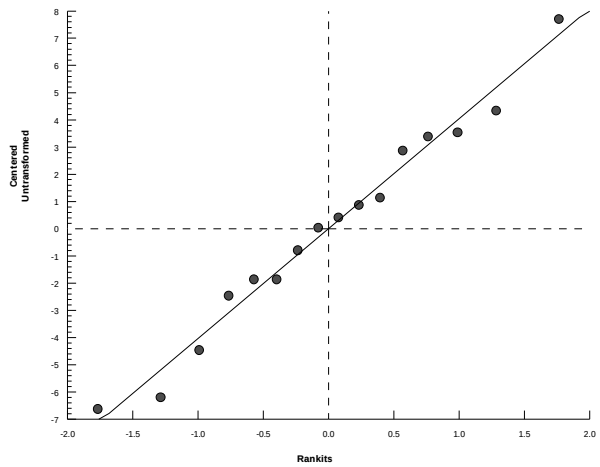
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
004	10	12.25	13.2	6.4	2.667	12.4	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	16-0284-9369	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-3912-7319	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	45.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		003	-0.4899	1.761	4.577	14	0.6841	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.994	2.586	0.5435	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.482783	6.482783	1	0.24	0.6318	Non-Significant Effect
Error	378.1103	27.00788	14			
Total	384.593		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.843	8.885	0.4387	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9745	0.8408	0.9050	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
003	8	11.24	6.29	16.18	11.17	2.667	21.25	2.092	52.66%	-12.78%

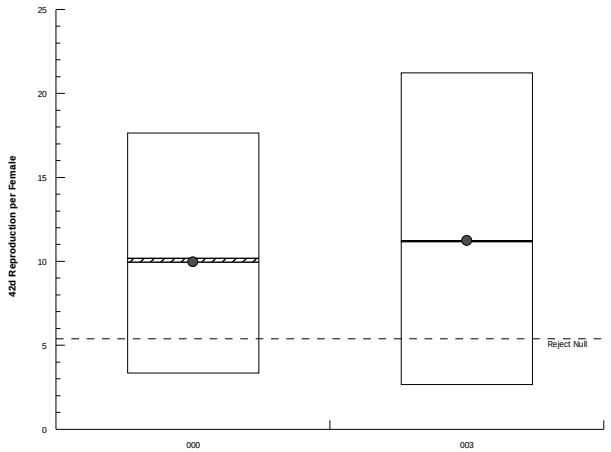
42d Reproduction per Female Detail

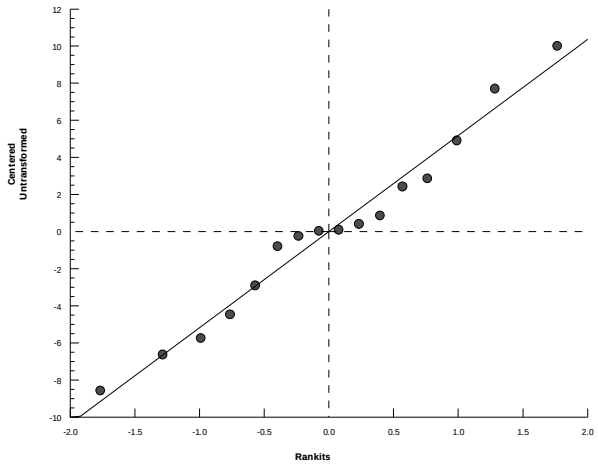
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
003	21.25	2.667	16.14	8.333	11	11.33	13.67	5.5

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-3912-7319	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4539-5975	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	38.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		002	-1.171	1.761	3.831	14	0.8694	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.139	2.586	0.3368	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	25.95235	25.95235	1	1.371	0.2611	Non-Significant Effect
Error	264.9482	18.92487	14			
Total	290.9005		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.008	8.885	0.9916	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9502	0.8408	0.4921	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
002	8	12.51	8.881	16.14	11.15	8.286	21.5	1.535	34.7%	-25.56%

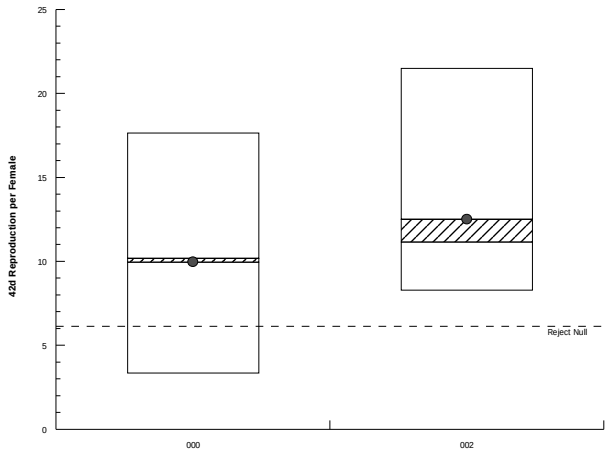
42d Reproduction per Female Detail

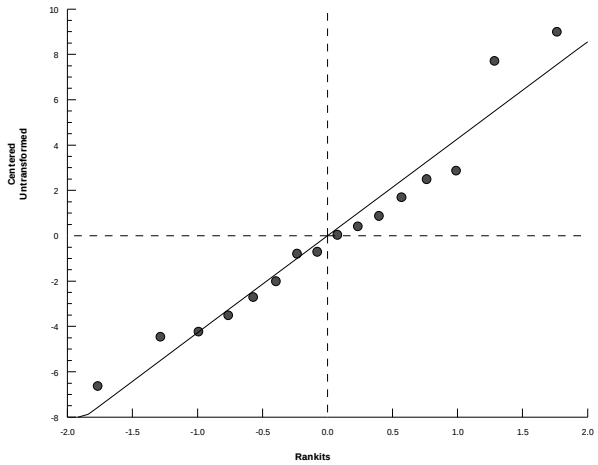
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
002	15	9	21.5	8.286	10.5	9.8	14.2	11.8

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-4539-5975	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:27	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7005-3564	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	36.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		001	-2.042	1.761	3.664	14	0.9698	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.916	2.586	0.6891	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	72.21458	72.21458	1	4.172	0.0604	Non-Significant Effect
Error	242.3563	17.31116	14			
Total	314.5709		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.217	8.885	0.8025	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9714	0.8408	0.8602	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
001	8	14.21	10.91	17.52	14.3	7.25	20	1.397	27.81%	-42.65%

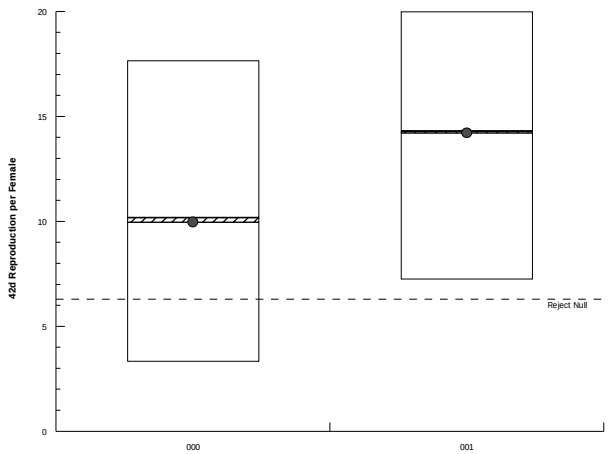
42d Reproduction per Female Detail

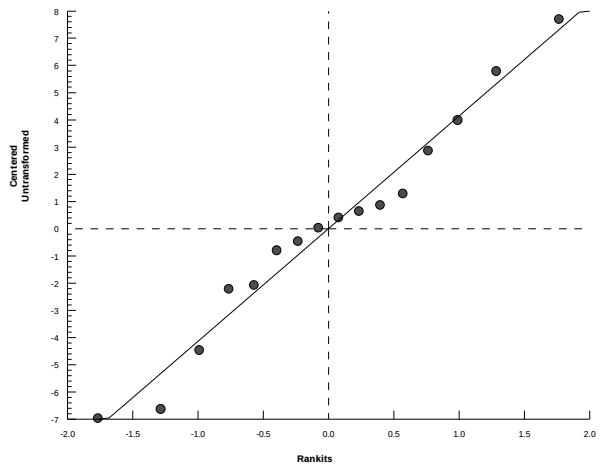
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
001	18.2	13.75	20	12	7.25	12.14	15.5	14.86

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-7005-3564	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-9739-9839	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	32.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		008	0.08278	1.761	3.226	14	0.4676	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.176	2.586	0.2947	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.091975	0.091975	1	0.006853	0.9352	Non-Significant Effect
Error	187.9011	13.4215	14			
Total	187.993		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.424	8.885	0.2656	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9565	0.8408	0.5987	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	1.52%

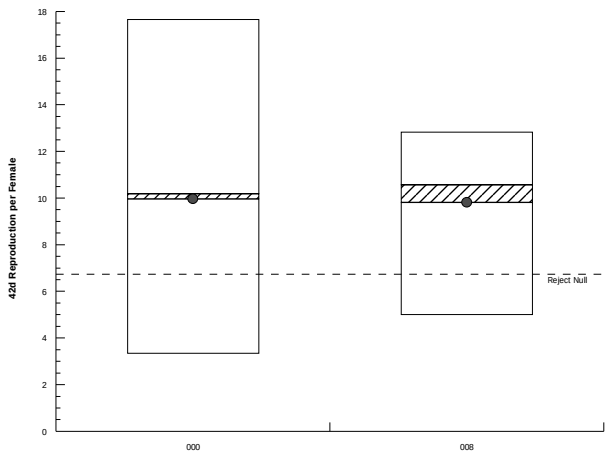
42d Reproduction per Female Detail

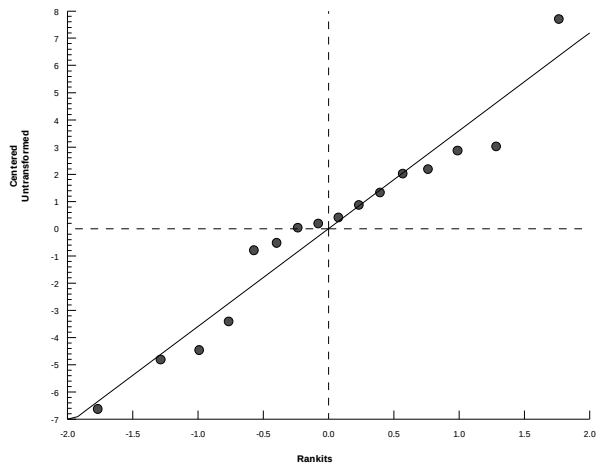
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
008	11.83	12	10	11.14	6.4	5	9.286	12.83

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-9739-9839	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:28	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-9898-1162	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
000	05-2104-3821	02 Nov-12 12:00	02 Nov-12 12:00	96h	CH2M Hill	Ecological Risk Asse
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
000	Laboratory Control S	CTO-WE04, Cheatham Annex	Laboratory Control; 22654-000		
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	42.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
000		007	-0.7705	1.771	4.248	13	0.7726	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.923	2.548	0.6191	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	12.75473	12.75473	1	0.5936	0.4548	Non-Significant Effect
Error	279.3226	21.48635	13			
Total	292.0773		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.283	9.155	0.7444	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9274	0.8328	0.2497	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
000	8	9.964	6.319	13.61	10.19	3.333	17.67	1.541	43.75%	0.0%
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	-18.55%

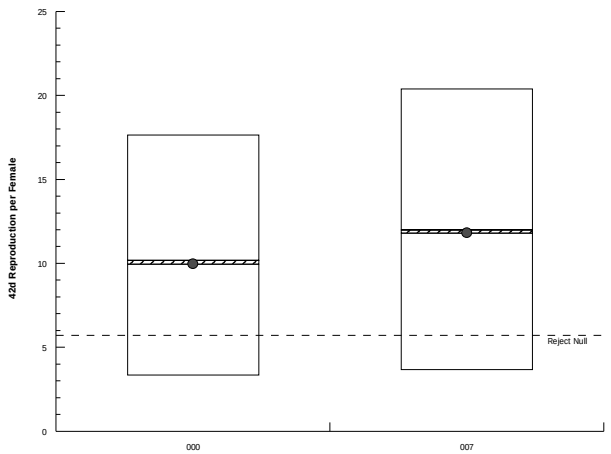
42d Reproduction per Female Detail

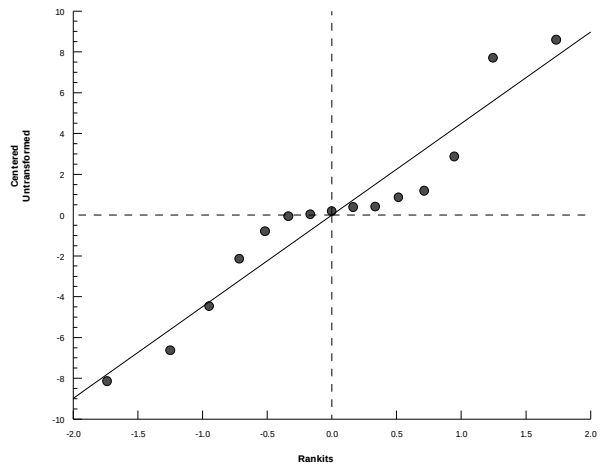
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
000	10.38	5.5	10	17.67	12.83	3.333	9.167	10.83
007	9.667	20.4	13	12	12.2	3.667	11.75	

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-9898-1162	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:29	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-6336-2021	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	33.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		006	1.036	1.771	3.957	13	0.1596	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.065	2.548	0.3923	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	19.99286	19.99286	1	1.073	0.3192	Non-Significant Effect
Error	242.2534	18.63488	13			
Total	262.2463		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.779	9.155	0.4681	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9559	0.8328	0.6208	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
006	8	9.498	6.403	12.59	9.188	3.333	15.5	1.309	38.98%	19.59%

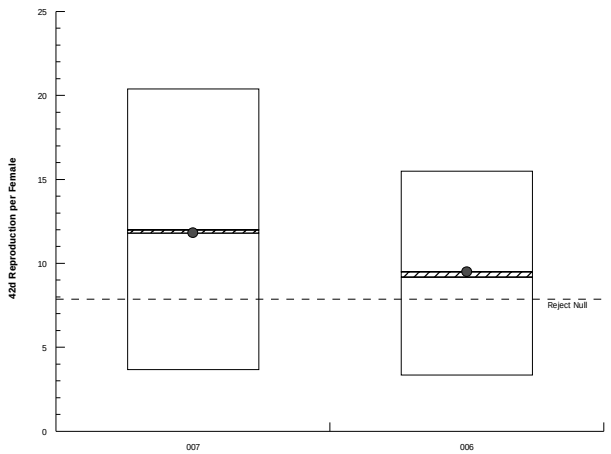
42d Reproduction per Female Detail

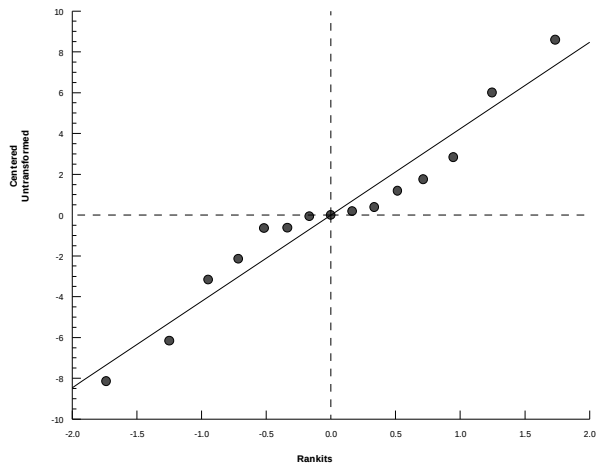
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
006	6.333	9.5	15.5	11.25	8.875	8.857	3.333	12.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	12-6336-2021	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	21-1783-7932	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	37.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		005	-1.327	1.771	4.44	13	0.8963	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.011	2.548	0.4686	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	41.28911	41.28911	1	1.76	0.2075	Non-Significant Effect
Error	305.0186	23.46297	13			
Total	346.3077		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.075	9.155	0.9128	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9563	0.8328	0.6278	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
005	8	15.14	11.16	19.12	16.71	5.75	19.67	1.684	31.46%	-28.15%

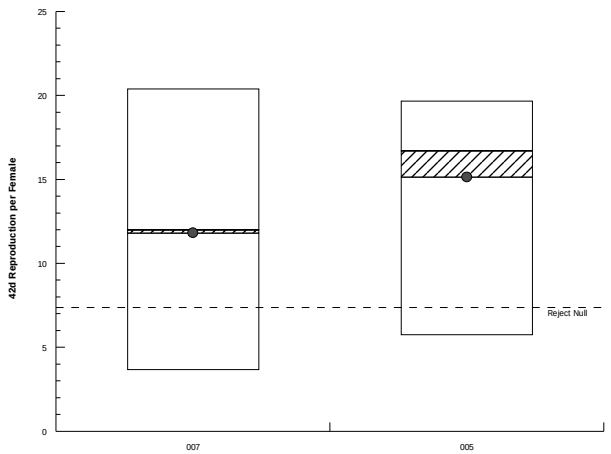
42d Reproduction per Female Detail

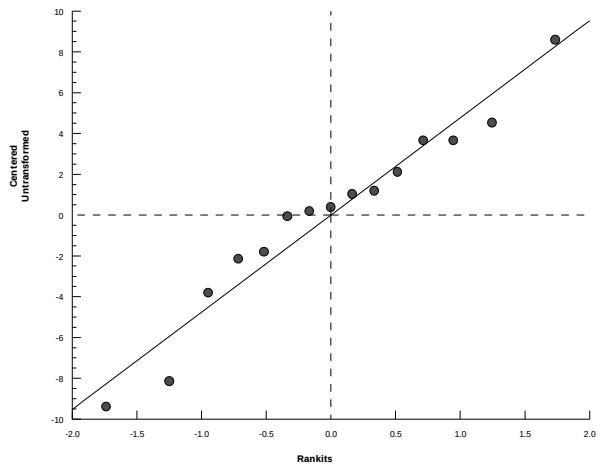
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
005	17.25	5.75	19.67	18.8	18.8	13.33	16.17	11.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	21-1783-7932	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:30	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-5173-0424	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	33.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		004	1.32	1.771	3.953	13	0.1047	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.067	2.548	0.3897	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	32.43036	32.43036	1	1.744	0.2095	Non-Significant Effect
Error	241.7906	18.59928	13			
Total	274.221		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.788	9.155	0.4645	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9724	0.8328	0.8915	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
004	8	8.865	5.777	11.95	8.5	2.667	13.2	1.306	41.66%	24.95%

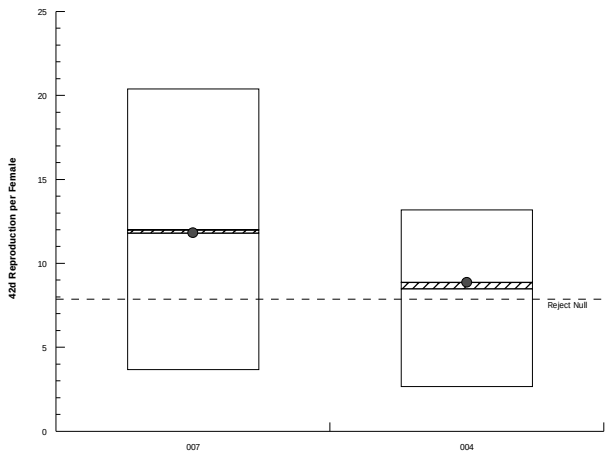
42d Reproduction per Female Detail

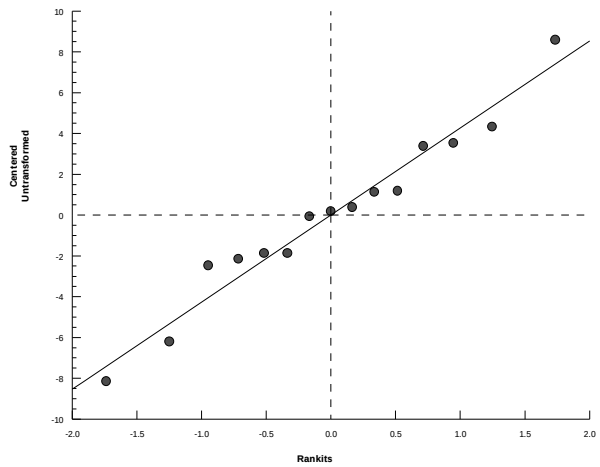
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
004	10	12.25	13.2	6.4	2.667	12.4	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	09-5173-0424	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-4425-3035	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	42.6%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		003	0.2026	1.771	5.029	13	0.4213	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.894	2.548	0.6751	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.235611	1.235611	1	0.04104	0.8426	Non-Significant Effect
Error	391.3951	30.10732	13			
Total	392.6307		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.436	10.79	0.6753	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9494	0.8328	0.5147	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
003	8	11.24	6.29	16.18	11.17	2.667	21.25	2.092	52.66%	4.87%

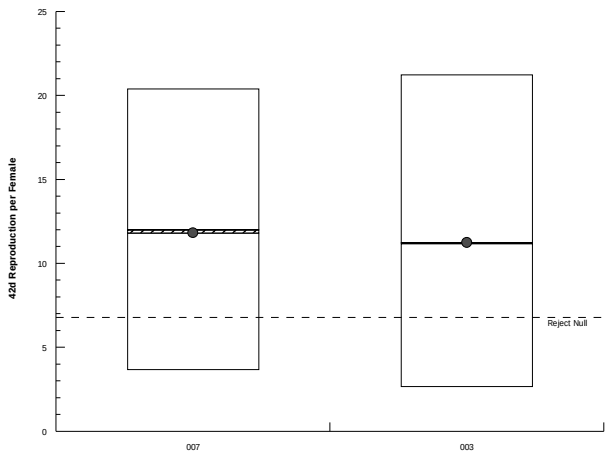
42d Reproduction per Female Detail

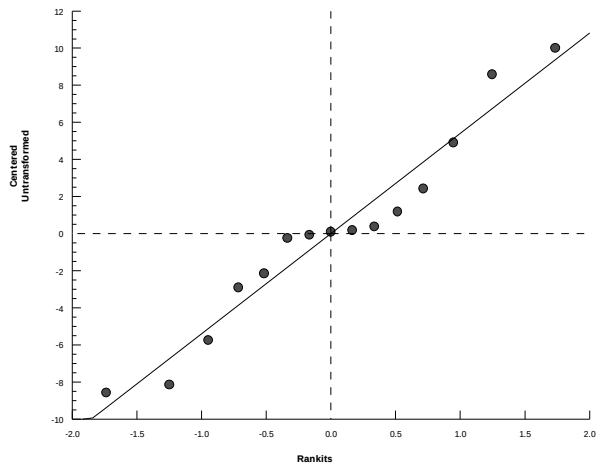
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
003	21.25	2.667	16.14	8.333	11	11.33	13.67	5.5

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	14-4425-3035	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4460-2821	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	35.9%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		002	-0.2919	1.771	4.24	13	0.6125	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.016	2.548	0.4607	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.823116	1.823116	1	0.08518	0.7750	Non-Significant Effect
Error	278.233	21.40254	13			
Total	280.0561		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.294	9.155	0.7367	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9301	0.8328	0.2735	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
002	8	12.51	8.881	16.14	11.15	8.286	21.5	1.535	34.7%	-5.92%

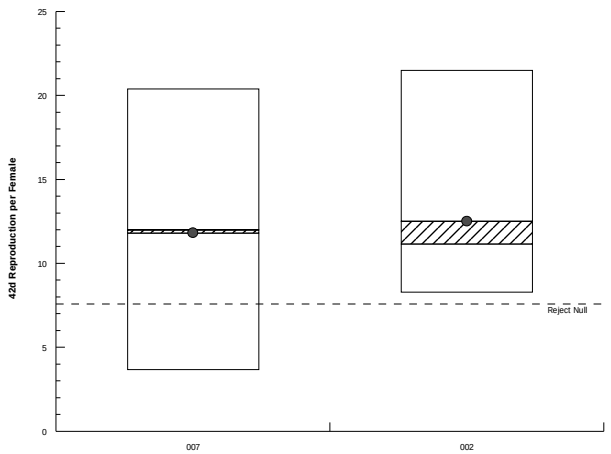
42d Reproduction per Female Detail

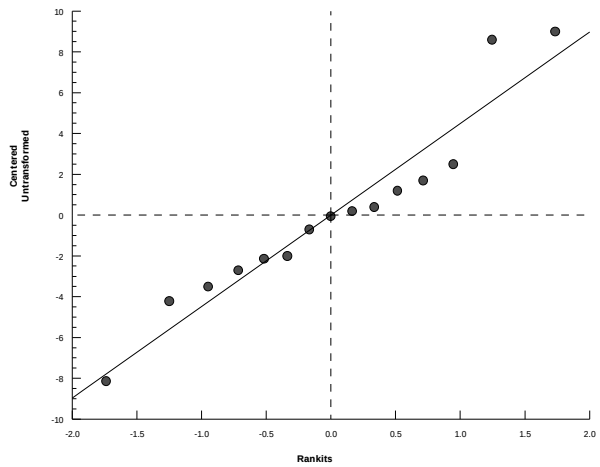
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
002	15	9	21.5	8.286	10.5	9.8	14.2	11.8

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-4460-2821	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:31	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-2409-6642	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
007	07-2125-7426	09 Oct-12 14:50	10 Oct-12 11:30	27d 21h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
007	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD02-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	34.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
007		001	-1.046	1.771	4.064	13	0.8427	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.01	2.548	0.4708	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	21.51467	21.51467	1	1.094	0.3146	Non-Significant Effect
Error	255.6412	19.6647	13			
Total	277.1558		14			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.561	9.155	0.5713	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9499	0.8328	0.5236	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
007	7	11.81	7.245	16.38	12	3.667	20.4	1.866	41.81%	0.0%
001	8	14.21	10.91	17.52	14.3	7.25	20	1.397	27.81%	-20.32%

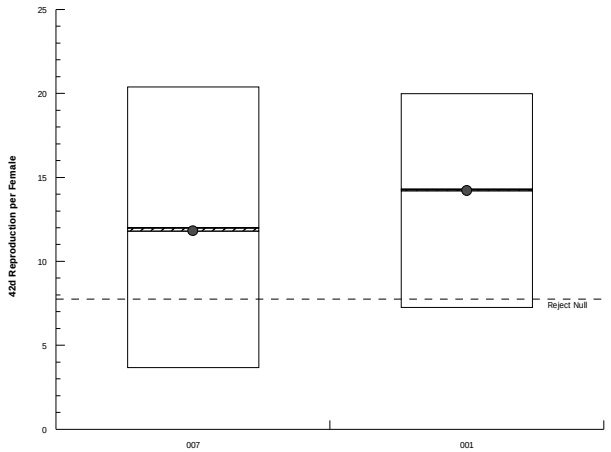
42d Reproduction per Female Detail

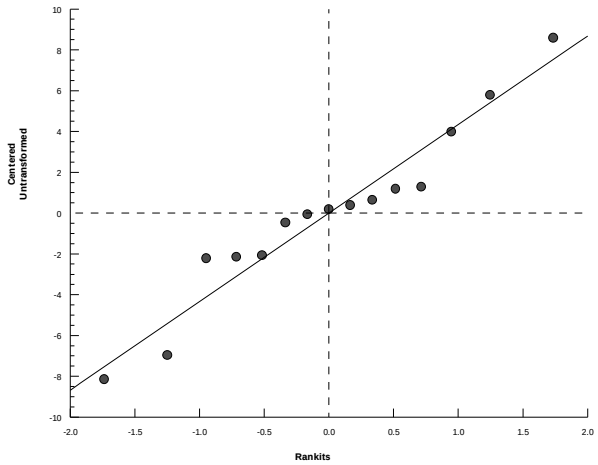
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
007	9.667	20.4	13	12	12.2	3.667	11.75	
001	18.2	13.75	20	12	7.25	12.14	15.5	14.86

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	13-2409-6642	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:32	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9676-6757	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
006	16-3864-3955	02 Oct-12 14:45	03 Oct-12 17:00	34d 21h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
006	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD22-1012; 22654-006		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	29.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		006	0.1914	1.761	2.891	14	0.4255	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.944	2.586	0.6346	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.394728	0.394728	1	0.03664	0.8510	Non-Significant Effect
Error	150.8319	10.7737	14			
Total	151.2266		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.748	8.885	0.4785	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9674	0.8408	0.7943	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
006	8	9.498	6.403	12.59	9.188	3.333	15.5	1.309	38.98%	3.2%

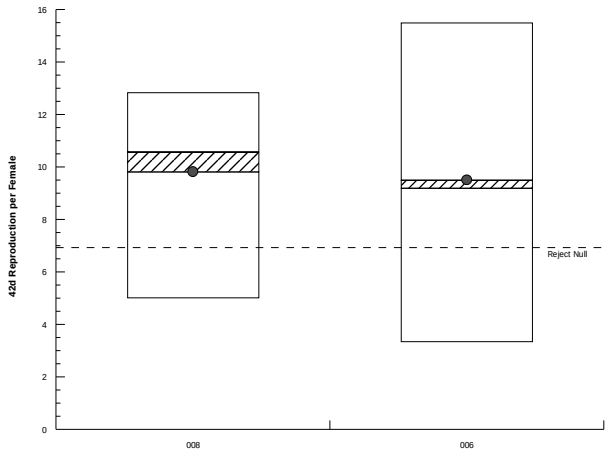
42d Reproduction per Female Detail

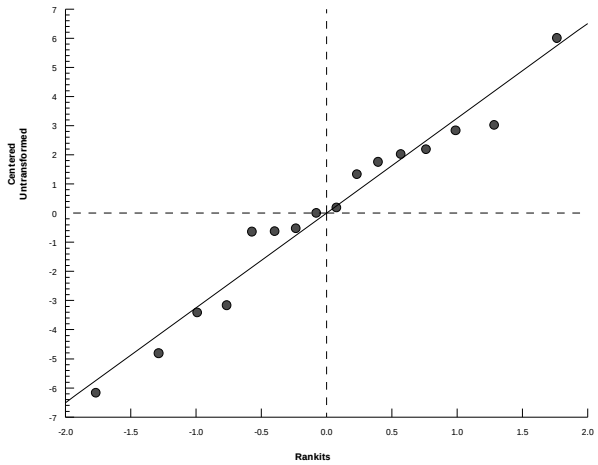
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
006	6.333	9.5	15.5	11.25	8.875	8.857	3.333	12.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	11-9676-6757	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-9391-1612	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
005	20-1642-7273	02 Oct-12 14:20	03 Oct-12 17:00	34d 22h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
005	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD21-1012; 22654-005		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	35.1%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		005	-2.727	1.761	3.44	14	0.9918	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.488	2.586	0.0814	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	113.4479	113.4479	1	7.436	0.0164	Significant Effect
Error	213.597	15.25693	14			
Total	327.0449		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.892	8.885	0.1846	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.906	0.8408	0.1005	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
005	8	15.14	11.16	19.12	16.71	5.75	19.67	1.684	31.46%	-54.28%

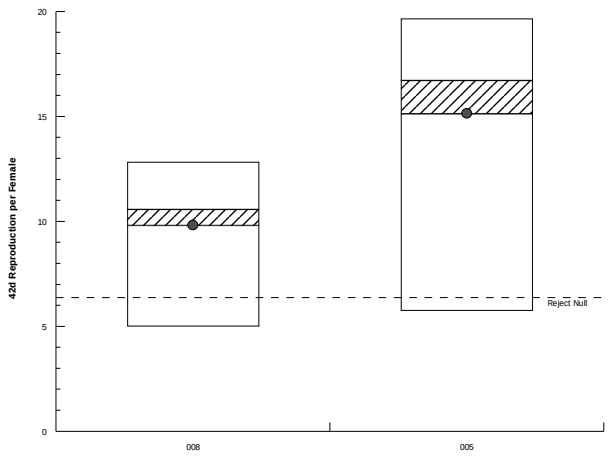
42d Reproduction per Female Detail

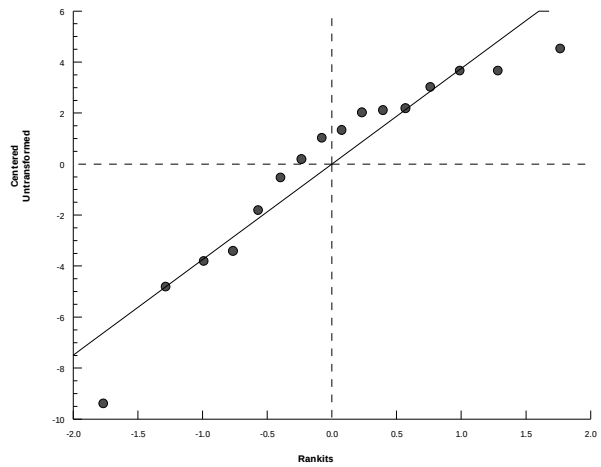
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
005	17.25	5.75	19.67	18.8	18.8	13.33	16.17	11.33

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-9391-1612	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:34	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-3193-1478	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
004	13-5199-9722	02 Oct-12 16:20	03 Oct-12 17:00	34d 20h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
004	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD23-1012; 22654-004		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	29.4%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		004	0.5781	1.761	2.886	14	0.2862	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	1.958	2.586	0.6091	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.589672	3.589672	1	0.3342	0.5724	Non-Significant Effect
Error	150.3691	10.74065	14			
Total	153.9588		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.74	8.885	0.4822	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9506	0.8408	0.4986	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
004	8	8.865	5.777	11.95	8.5	2.667	13.2	1.306	41.66%	9.66%

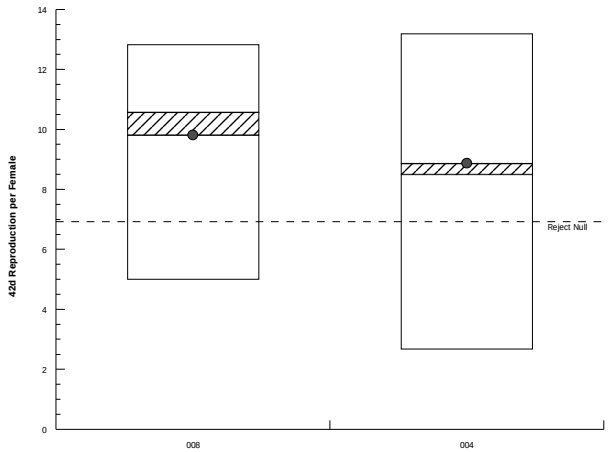
42d Reproduction per Female Detail

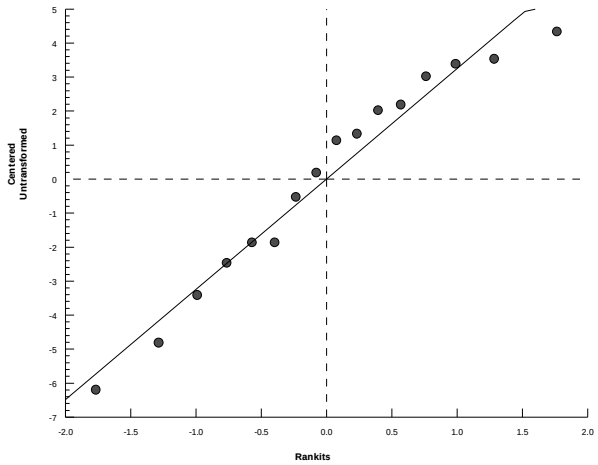
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
004	10	12.25	13.2	6.4	2.667	12.4	7	7

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	06-3193-1478	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-5647-2923	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
003	03-0860-9856	02 Oct-12 09:50	03 Oct-12 17:00	35d 2h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
003	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD18-1012; 22654-003		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	41.5%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		003	-0.6156	1.761	4.076	14	0.7260	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.239	2.586	0.2336	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.119107	8.119107	1	0.3789	0.5481	Non-Significant Effect
Error	299.9736	21.42668	14			
Total	308.0927		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	4.466	8.885	0.0667	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.974	0.8408	0.8982	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
003	8	11.24	6.29	16.18	11.17	2.667	21.25	2.092	52.66%	-14.52%

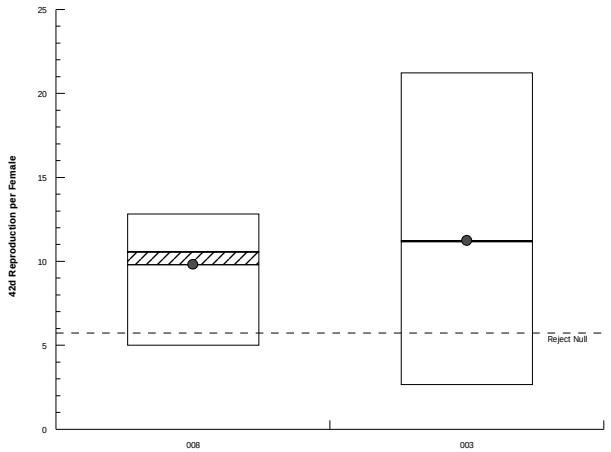
42d Reproduction per Female Detail

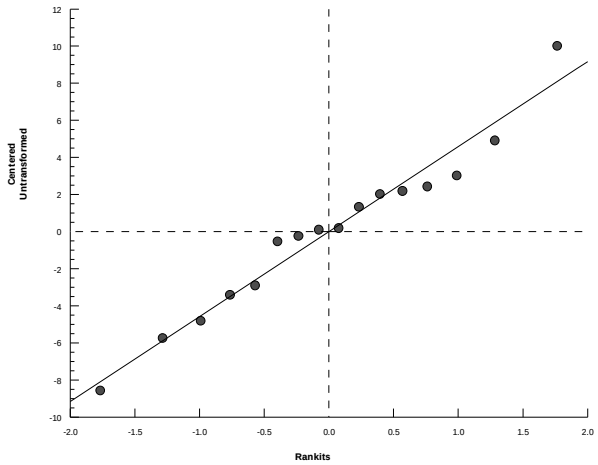
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
003	21.25	2.667	16.14	8.333	11	11.33	13.67	5.5

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	18-5647-2923	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-5899-9759	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
002	00-1587-6753	02 Oct-12 12:50	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
002	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD19-1012; 22654-002		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	32.8%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		002	-1.478	1.761	3.217	14	0.9192	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.547	2.586	0.0609	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	29.13429	29.13429	1	2.183	0.1616	Non-Significant Effect
Error	186.8115	13.34368	14			
Total	215.9458		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.404	8.885	0.2700	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.926	0.8408	0.2108	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
002	8	12.51	8.881	16.14	11.15	8.286	21.5	1.535	34.7%	-27.51%

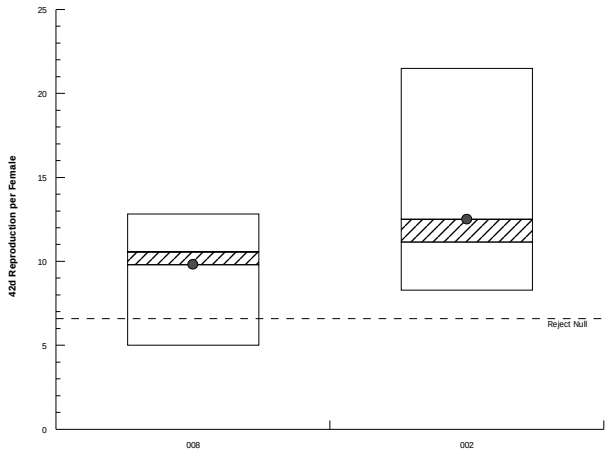
42d Reproduction per Female Detail

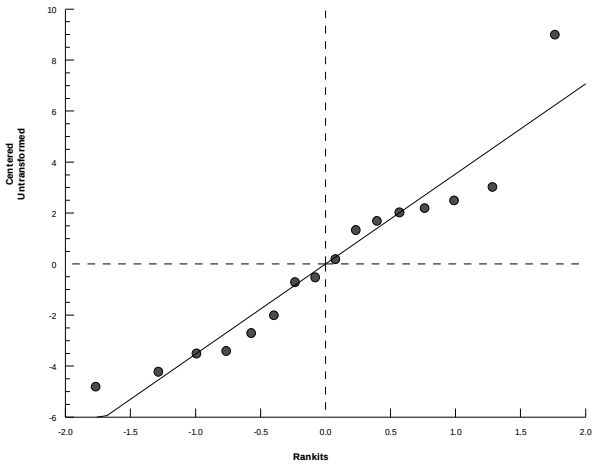
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
002	15	9	21.5	8.286	10.5	9.8	14.2	11.8

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	08-5899-9759	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:35	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-5903-0278	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Batch ID:	07-3027-1026	**Test Type:**	Hyalella (42d)	**Analyst:**	
Start Date:	06 Nov-12 12:00	**Protocol:**	EPA/600/R-99/064 (2000)	**Diluent:**	Not Applicable
Ending Date:	04 Dec-12 12:00	**Species:**	Hyalella azteca	**Brine:**	Not Applicable
Duration:	28d 0h	**Source:**	ARO - Aquatic Research Organisms, NH	**Age:**	

Sample Code	Sample ID	Sample Date	Receive Date	Sample Age	Client Name	Project
008	14-9153-3458	09 Oct-12 11:20	10 Oct-12 11:30	28d 1h	CH2M Hill	Ecological Risk Asse
001	13-6707-4324	02 Oct-12 13:25	03 Oct-12 17:00	34d 23h		

Sample Code	Material Type	Sample Source	Station Location	Latitude	Longitude
008	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAREFS04-SD04-1012; 22654-00		
001	Freshwater Sedimen	CTO-WE04, Cheatham Annex	CAS04-SD20-1012; 22654-001		

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C > T	NA	NA	30.7%	

Equal Variance t Two-Sample Test

Sample Code	vs	Sample Code	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
008		001	-2.57	1.761	3.016	14	0.9889	CDF	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Extreme Value	Grubbs Extreme Value	2.104	2.586	0.3796	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	77.46095	77.46095	1	6.604	0.0222	Significant Effect
Error	164.2196	11.72997	14			
Total	241.6806		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.992	8.885	0.3833	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9835	0.8408	0.9851	Normal Distribution

42d Reproduction per Female Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
008	8	9.812	7.471	12.15	10.57	5	12.83	0.99	28.54%	0.0%
001	8	14.21	10.91	17.52	14.3	7.25	20	1.397	27.81%	-44.85%

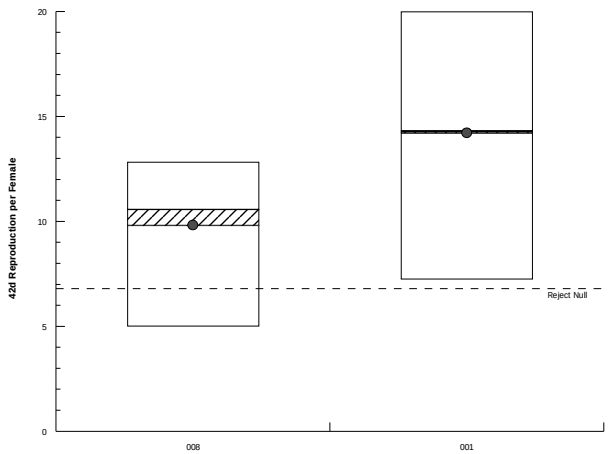
42d Reproduction per Female Detail

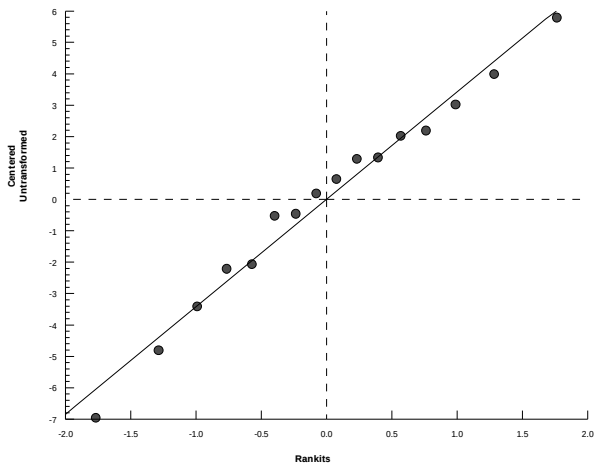
Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
008	11.83	12	10	11.14	6.4	5	9.286	12.83
001	18.2	13.75	20	12	7.25	12.14	15.5	14.86

Hyalella 42-d Survival, Growth, and Reproduction Sediment Test — **EnviroSystems, Inc.**

Analysis ID:	15-5903-0278	**Endpoint:**	42d Reproduction per Female	**CETIS Version:**	CETISv1.8.6
Analyzed:	08 Jan-13 15:36	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Graphics





STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Overlying Water Alkalinity Summary
METHOD: EPA 310.2

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-000	Laboratory Control	000	0	22654-100	Water	68	2	mg/L	11/07/12 0930	11/13/12 1514
22654-001	CAS04-SD20-1012	001	0	22654-101	Water	78	2	mg/L	11/07/12 0930	11/13/12 1516
22654-002	CAS04-SD19-1012	002	0	22654-102	Water	76	2	mg/L	11/07/12 0930	11/13/12 1517
22654-003	CAS04-SD18-1012	003	0	22654-103	Water	78	2	mg/L	11/07/12 0930	11/13/12 1518
22654-004	CAS04-SD23-1012	004	0	22654-104	Water	79	2	mg/L	11/07/12 0930	11/13/12 1520
22654-005	CAS04-SD21-1012	005	0	22654-105	Water	80	2	mg/L	11/07/12 0930	11/13/12 1521
22654-006	CAS04-SD22-1012	006	0	22654-106	Water	74	2	mg/L	11/07/12 0930	11/13/12 1522
22654-008	CAREFS04-SD02-1012	007	0	22654-107	Water	77	2	mg/L	11/07/12 0930	11/13/12 1524
22654-009	CAREFS04-SD04-1012	008	0	22654-108	Water	85	2	mg/L	11/07/12 0930	11/13/12 1525
22654-000	Laboratory Control	000	7	22654-200	Water	65	2	mg/L	11/14/12 1000	11/23/12 1024
22654-001	CAS04-SD20-1012	001	7	22654-201	Water	69	2	mg/L	11/14/12 1000	11/23/12 1025
22654-002	CAS04-SD19-1012	002	7	22654-202	Water	66	2	mg/L	11/14/12 1000	11/23/12 1027
22654-003	CAS04-SD18-1012	003	7	22654-203	Water	73	2	mg/L	11/14/12 1000	11/23/12 1028
22654-004	CAS04-SD23-1012	004	7	22654-204	Water	69	2	mg/L	11/14/12 1000	11/23/12 1029
22654-005	CAS04-SD21-1012	005	7	22654-205	Water	75	2	mg/L	11/14/12 1000	11/23/12 1031
22654-006	CAS04-SD22-1012	006	7	22654-206	Water	71	2	mg/L	11/14/12 1000	11/23/12 1032
22654-008	CAREFS04-SD02-1012	007	7	22654-207	Water	78	2	mg/L	11/14/12 1000	11/23/12 1037
22654-009	CAREFS04-SD04-1012	008	7	22654-208	Water	92	2	mg/L	11/14/12 1000	11/23/12 1038
22654-000	Laboratory Control	000	14	22654-300	Water	66	2	mg/L	11/21/12 1000	11/21/12 1534
22654-001	CAS04-SD20-1012	001	14	22654-301	Water	77	2	mg/L	11/21/12 1000	11/21/12 1535
22654-002	CAS04-SD19-1012	002	14	22654-302	Water	75	2	mg/L	11/21/12 1000	11/21/12 1537
22654-003	CAS04-SD18-1012	003	14	22654-303	Water	85	2	mg/L	11/21/12 1000	11/21/12 1538
22654-004	CAS04-SD23-1012	004	14	22654-304	Water	76	2	mg/L	11/21/12 1000	11/21/12 1539
22654-005	CAS04-SD21-1012	005	14	22654-305	Water	91	2	mg/L	11/21/12 1000	11/21/12 1541
22654-006	CAS04-SD22-1012	006	14	22654-306	Water	75	2	mg/L	11/21/12 1000	11/21/12 1542
22654-008	CAREFS04-SD02-1012	007	14	22654-307	Water	73	2	mg/L	11/21/12 1000	11/21/12 1546
22654-009	CAREFS04-SD04-1012	008	14	22654-308	Water	85	2	mg/L	11/21/12 1000	11/21/12 1548
22654-000	Laboratory Control	000	21	22654-400	Water	62	2	mg/L	11/28/12 0830	12/10/12 1051
22654-001	CAS04-SD20-1012	001	21	22654-401	Water	71	2	mg/L	11/28/12 0830	12/10/12 1054

TASK: Overlying Water Alkalinity Summary
METHOD: EPA 310.2

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-002	CAS04-SD19-1012	002	21	22654-402	Water	69	2	mg/L	11/28/12 0830	12/10/12 1056
22654-003	CAS04-SD18-1012	003	21	22654-403	Water	74	2	mg/L	11/28/12 0830	12/10/12 1100
22654-004	CAS04-SD23-1012	004	21	22654-404	Water	80	2	mg/L	11/28/12 0830	12/10/12 1102
22654-005	CAS04-SD21-1012	005	21	22654-405	Water	82	2	mg/L	11/28/12 0830	12/10/12 1103
22654-006	CAS04-SD22-1012	006	21	22654-406	Water	78	2	mg/L	11/28/12 0830	12/10/12 1104
22654-008	CAREFS04-SD02-1012	007	21	22654-407	Water	73	2	mg/L	11/28/12 0830	12/10/12 1106
22654-009	CAREFS04-SD04-1012	008	21	22654-408	Water	81	2	mg/L	11/28/12 0830	12/10/12 1107
22654-000	Laboratory Control	000	28	22654-500	Water	55	2	mg/L	12/05/12 0800	12/19/12 1339
22654-001	CAS04-SD20-1012	001	28	22654-501	Water	65	2	mg/L	12/05/12 0800	12/19/12 1341
22654-002	CAS04-SD19-1012	002	28	22654-502	Water	62	2	mg/L	12/05/12 0800	12/19/12 1342
22654-003	CAS04-SD18-1012	003	28	22654-503	Water	65	2	mg/L	12/05/12 0800	12/19/12 1343
22654-004	CAS04-SD23-1012	004	28	22654-504	Water	73	2	mg/L	12/05/12 0800	12/19/12 1345
22654-005	CAS04-SD21-1012	005	28	22654-505	Water	75	2	mg/L	12/05/12 0800	12/19/12 1346
22654-006	CAS04-SD22-1012	006	28	22654-506	Water	75	2	mg/L	12/05/12 0800	12/19/12 1347
22654-008	CAREFS04-SD02-1012	007	28	22654-507	Water	68	2	mg/L	12/05/12 0800	12/19/12 1348
22654-009	CAREFS04-SD04-1012	008	28	22654-508	Water	85	2	mg/L	12/05/12 0800	12/19/12 1350
22654-000	Laboratory Control	000	35	22654-600	Water	56	2	mg/L	12/12/12 1145	12/21/12 1448
22654-001	CAS04-SD20-1012	001	35	22654-601	Water	58	2	mg/L	12/12/12 1145	12/21/12 1452
22654-002	CAS04-SD19-1012	002	35	22654-602	Water	56	2	mg/L	12/12/12 1145	12/21/12 1453
22654-003	CAS04-SD18-1012	003	35	22654-603	Water	58	2	mg/L	12/12/12 1145	12/21/12 1458
22654-004	CAS04-SD23-1012	004	35	22654-604	Water	59	2	mg/L	12/12/12 1145	12/21/12 1459
22654-005	CAS04-SD21-1012	005	35	22654-605	Water	58	2	mg/L	12/12/12 1145	12/21/12 1501
22654-006	CAS04-SD22-1012	006	35	22654-606	Water	58	2	mg/L	12/12/12 1145	12/21/12 1502
22654-008	CAREFS04-SD02-1012	007	35	22654-607	Water	60	2	mg/L	12/12/12 1145	12/21/12 1503
22654-009	CAREFS04-SD04-1012	008	35	22654-608	Water	60	2	mg/L	12/12/12 1145	12/21/12 1504
22654-000	Laboratory Control	000	42	22654-700	Water	56	2	mg/L	12/19/12 1210	12/26/12 1209
22654-001	CAS04-SD20-1012	001	42	22654-701	Water	56	2	mg/L	12/19/12 1210	12/26/12 1210
22654-002	CAS04-SD19-1012	002	42	22654-702	Water	56	2	mg/L	12/19/12 1210	12/26/12 1211
22654-003	CAS04-SD18-1012	003	42	22654-703	Water	57	2	mg/L	12/19/12 1210	12/26/12 1213
22654-004	CAS04-SD23-1012	004	42	22654-704	Water	56	2	mg/L	12/19/12 1210	12/26/12 1214
22654-005	CAS04-SD21-1012	005	42	22654-705	Water	57	2	mg/L	12/19/12 1210	12/26/12 1215
22654-006	CAS04-SD22-1012	006	42	22654-706	Water	58	2	mg/L	12/19/12 1210	12/26/12 1216
22654-008	CAREFS04-SD02-1012	007	42	22654-707	Water	56	2	mg/L	12/19/12 1210	12/26/12 1225
22654-009	CAREFS04-SD04-1012	008	42	22654-708	Water	57	2	mg/L	12/19/12 1210	12/26/12 1229

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Overlying Water Hardness Summary
METHOD: SW846 3rd Ed. 6020

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-000	Laboratory Control	000	0	22654-109	Water	92	0.4	mg/L	11/07/12 0930	11/23/12
22654-001	CAS04-SD20-1012	001	0	22654-110	Water	110	0.4	mg/L	11/07/12 0930	11/23/12
22654-002	CAS04-SD19-1012	002	0	22654-111	Water	100	0.4	mg/L	11/07/12 0930	11/23/12
22654-003	CAS04-SD18-1012	003	0	22654-112	Water	100	0.4	mg/L	11/07/12 0930	11/23/12
22654-004	CAS04-SD23-1012	004	0	22654-113	Water	110	0.4	mg/L	11/07/12 0930	11/23/12
22654-005	CAS04-SD21-1012	005	0	22654-114	Water	110	0.4	mg/L	11/07/12 0930	11/23/12
22654-006	CAS04-SD22-1012	006	0	22654-115	Water	100	0.4	mg/L	11/07/12 0930	11/23/12
22654-008	CAREFS04-SD02-1012	007	0	22654-116	Water	100	0.4	mg/L	11/07/12 0930	11/23/12
22654-009	CAREFS04-SD04-1012	008	0	22654-117	Water	110	0.4	mg/L	11/07/12 0930	11/23/12
22654-000	Laboratory Control	000	7	22654-209	Water	86	0.4	mg/L	11/14/12 1000	11/23/12
22654-001	CAS04-SD20-1012	001	7	22654-210	Water	93	0.4	mg/L	11/14/12 1000	11/23/12
22654-002	CAS04-SD19-1012	002	7	22654-211	Water	91	0.4	mg/L	11/14/12 1000	11/23/12
22654-003	CAS04-SD18-1012	003	7	22654-212	Water	99	0.4	mg/L	11/14/12 1000	11/23/12
22654-004	CAS04-SD23-1012	004	7	22654-213	Water	92	0.4	mg/L	11/14/12 1000	11/23/12
22654-005	CAS04-SD21-1012	005	7	22654-214	Water	99	0.4	mg/L	11/14/12 1000	11/23/12
22654-006	CAS04-SD22-1012	006	7	22654-215	Water	97	0.4	mg/L	11/14/12 1000	11/23/12
22654-008	CAREFS04-SD02-1012	007	7	22654-216	Water	100	0.4	mg/L	11/14/12 1000	11/23/12
22654-009	CAREFS04-SD04-1012	008	7	22654-217	Water	120	0.4	mg/L	11/14/12 1000	11/23/12
22654-000	Laboratory Control	000	14	22654-309	Water	92	0.4	mg/L	11/21/12 1000	11/23/12
22654-001	CAS04-SD20-1012	001	14	22654-310	Water	110	0.4	mg/L	11/21/12 1000	11/23/12
22654-002	CAS04-SD19-1012	002	14	22654-311	Water	110	0.4	mg/L	11/21/12 1000	11/23/12
22654-003	CAS04-SD18-1012	003	14	22654-312	Water	120	0.4	mg/L	11/21/12 1000	11/23/12
22654-004	CAS04-SD23-1012	004	14	22654-313	Water	110	0.4	mg/L	11/21/12 1000	11/23/12
22654-005	CAS04-SD21-1012	005	14	22654-314	Water	130	0.4	mg/L	11/21/12 1000	11/23/12
22654-006	CAS04-SD22-1012	006	14	22654-315	Water	130	0.4	mg/L	11/21/12 1000	11/23/12
22654-008	CAREFS04-SD02-1012	007	14	22654-316	Water	100	0.4	mg/L	11/21/12 1000	11/23/12
22654-009	CAREFS04-SD04-1012	008	14	22654-317	Water	110	0.4	mg/L	11/21/12 1000	11/23/12
22654-000	Laboratory Control	000	21	22654-409	Water	90	0.4	mg/L	11/28/12 0830	12/04/12
22654-001	CAS04-SD20-1012	001	21	22654-410	Water	100	0.4	mg/L	11/28/12 0830	12/04/12

TASK: Overlying Water Hardness Summary
METHOD: SW846 3rd Ed. 6020

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-002	CAS04-SD19-1012	002	21	22654-411	Water	100	0.4	mg/L	11/28/12 0830	12/04/12
22654-003	CAS04-SD18-1012	003	21	22654-412	Water	110	0.4	mg/L	11/28/12 0830	12/04/12
22654-004	CAS04-SD23-1012	004	21	22654-413	Water	120	0.4	mg/L	11/28/12 0830	12/04/12
22654-005	CAS04-SD21-1012	005	21	22654-414	Water	120	0.4	mg/L	11/28/12 0830	12/04/12
22654-006	CAS04-SD22-1012	006	21	22654-415	Water	130	0.4	mg/L	11/28/12 0830	12/04/12
22654-008	CAREFS04-SD02-1012	007	21	22654-416	Water	110	0.4	mg/L	11/28/12 0830	12/04/12
22654-009	CAREFS04-SD04-1012	008	21	22654-417	Water	120	0.4	mg/L	11/28/12 0830	12/04/12
22654-000	Laboratory Control	000	28	22654-509	Water	85	0.4	mg/L	12/05/12 0800	12/19/12
22654-001	CAS04-SD20-1012	001	28	22654-510	Water	100	0.4	mg/L	12/05/12 0800	12/19/12
22654-002	CAS04-SD19-1012	002	28	22654-511	Water	98	0.4	mg/L	12/05/12 0800	12/19/12
22654-003	CAS04-SD18-1012	003	28	22654-512	Water	120	0.4	mg/L	12/05/12 0800	12/19/12
22654-004	CAS04-SD23-1012	004	28	22654-513	Water	110	0.4	mg/L	12/05/12 0800	12/19/12
22654-005	CAS04-SD21-1012	005	28	22654-514	Water	120	0.4	mg/L	12/05/12 0800	12/19/12
22654-006	CAS04-SD22-1012	006	28	22654-515	Water	120	0.4	mg/L	12/05/12 0800	12/19/12
22654-008	CAREFS04-SD02-1012	007	28	22654-516	Water	110	0.4	mg/L	12/05/12 0800	12/19/12
22654-009	CAREFS04-SD04-1012	008	28	22654-517	Water	160	0.4	mg/L	12/05/12 0800	12/19/12
22654-000	Laboratory Control	000	35	22654-609	Water	88	0.4	mg/L	12/12/12 1145	12/19/12
22654-001	CAS04-SD20-1012	001	35	22654-610	Water	90	0.4	mg/L	12/12/12 1145	12/19/12
22654-002	CAS04-SD19-1012	002	35	22654-611	Water	89	0.4	mg/L	12/12/12 1145	12/19/12
22654-003	CAS04-SD18-1012	003	35	22654-612	Water	92	0.4	mg/L	12/12/12 1145	12/19/12
22654-004	CAS04-SD23-1012	004	35	22654-613	Water	91	0.4	mg/L	12/12/12 1145	12/19/12
22654-005	CAS04-SD21-1012	005	35	22654-614	Water	91	0.4	mg/L	12/12/12 1145	12/19/12
22654-006	CAS04-SD22-1012	006	35	22654-615	Water	91	0.4	mg/L	12/12/12 1145	12/19/12
22654-008	CAREFS04-SD02-1012	007	35	22654-616	Water	93	0.4	mg/L	12/12/12 1145	12/19/12
22654-009	CAREFS04-SD04-1012	008	35	22654-617	Water	96	0.4	mg/L	12/12/12 1145	12/19/12
22654-000	Laboratory Control	000	42	22654-709	Water	92	0.4	mg/L	12/19/12 1210	12/20/12
22654-001	CAS04-SD20-1012	001	42	22654-710	Water	91	0.4	mg/L	12/19/12 1210	12/20/12
22654-002	CAS04-SD19-1012	002	42	22654-711	Water	91	0.4	mg/L	12/19/12 1210	12/20/12
22654-003	CAS04-SD18-1012	003	42	22654-712	Water	92	0.4	mg/L	12/19/12 1210	12/20/12
22654-004	CAS04-SD23-1012	004	42	22654-713	Water	90	0.4	mg/L	12/19/12 1210	12/20/12
22654-005	CAS04-SD21-1012	005	42	22654-714	Water	93	0.4	mg/L	12/19/12 1210	12/20/12
22654-006	CAS04-SD22-1012	006	42	22654-715	Water	92	0.4	mg/L	12/19/12 1210	12/20/12
22654-008	CAREFS04-SD02-1012	007	42	22654-716	Water	90	0.4	mg/L	12/19/12 1210	12/20/12
22654-009	CAREFS04-SD04-1012	008	42	22654-717	Water	94	0.4	mg/L	12/19/12 1210	12/20/12

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Overlying Water Ammonia Summary
METHOD: SM 4500-NH3 G

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-000	Laboratory Control	000	0	22654-118	Water	ND	0.1	mg/L as N	11/07/12 0930	11/20/12 1103
22654-001	CAS04-SD20-1012	001	0	22654-119	Water	0.29	0.1	mg/L as N	11/07/12 0930	11/20/12 1104
22654-002	CAS04-SD19-1012	002	0	22654-120	Water	0.66	0.1	mg/L as N	11/07/12 0930	11/20/12 1108
22654-003	CAS04-SD18-1012	003	0	22654-121	Water	0.5	0.1	mg/L as N	11/07/12 0930	11/20/12 1109
22654-004	CAS04-SD23-1012	004	0	22654-122	Water	0.67	0.1	mg/L as N	11/07/12 0930	11/20/12 1109
22654-005	CAS04-SD21-1012	005	0	22654-123	Water	0.62	0.1	mg/L as N	11/07/12 0930	11/20/12 1110
22654-006	CAS04-SD22-1012	006	0	22654-124	Water	0.54	0.1	mg/L as N	11/07/12 0930	11/20/12 1111
22654-008	CAREFS04-SD02-1012	007	0	22654-125	Water	0.49	0.1	mg/L as N	11/07/12 0930	11/20/12 1112
22654-009	CAREFS04-SD04-1012	008	0	22654-126	Water	0.38	0.1	mg/L as N	11/07/12 0930	11/20/12 1113
22654-000	Laboratory Control	000	7	22654-218	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1310
22654-001	CAS04-SD20-1012	001	7	22654-219	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1311
22654-002	CAS04-SD19-1012	002	7	22654-220	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1312
22654-003	CAS04-SD18-1012	003	7	22654-221	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1313
22654-004	CAS04-SD23-1012	004	7	22654-222	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1314
22654-005	CAS04-SD21-1012	005	7	22654-223	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1315
22654-006	CAS04-SD22-1012	006	7	22654-224	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1315
22654-008	CAREFS04-SD02-1012	007	7	22654-225	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1319
22654-009	CAREFS04-SD04-1012	008	7	22654-226	Water	ND	0.1	mg/L as N	11/14/12 1000	11/20/12 1320
22654-000	Laboratory Control	000	14	22654-318	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1104
22654-001	CAS04-SD20-1012	001	14	22654-319	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1108
22654-002	CAS04-SD19-1012	002	14	22654-320	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1108
22654-003	CAS04-SD18-1012	003	14	22654-321	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1109
22654-004	CAS04-SD23-1012	004	14	22654-322	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1110
22654-005	CAS04-SD21-1012	005	14	22654-323	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1111
22654-006	CAS04-SD22-1012	006	14	22654-324	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1112
22654-008	CAREFS04-SD02-1012	007	14	22654-325	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1112
22654-009	CAREFS04-SD04-1012	008	14	22654-326	Water	ND	0.1	mg/L as N	11/21/12 1000	11/29/12 1113
22654-000	Laboratory Control	000	21	22654-418	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1404
22654-001	CAS04-SD20-1012	001	21	22654-419	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1405

TASK: Overlying Water Ammonia Summary
METHOD: SM 4500-NH3 G

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-002	CAS04-SD19-1012	002	21	22654-420	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1406
22654-003	CAS04-SD18-1012	003	21	22654-421	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1407
22654-004	CAS04-SD23-1012	004	21	22654-422	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1413
22654-005	CAS04-SD21-1012	005	21	22654-423	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1415
22654-006	CAS04-SD22-1012	006	21	22654-424	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1416
22654-008	CAREFS04-SD02-1012	007	21	22654-425	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1417
22654-009	CAREFS04-SD04-1012	008	21	22654-426	Water	ND	0.1	mg/L as N	11/28/12 0830	11/29/12 1418
22654-000	Laboratory Control	000	28	22654-518	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1406
22654-001	CAS04-SD20-1012	001	28	22654-519	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1407
22654-002	CAS04-SD19-1012	002	28	22654-520	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1408
22654-003	CAS04-SD18-1012	003	28	22654-521	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1408
22654-004	CAS04-SD23-1012	004	28	22654-522	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1409
22654-005	CAS04-SD21-1012	005	28	22654-523	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1410
22654-006	CAS04-SD22-1012	006	28	22654-524	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1411
22654-008	CAREFS04-SD02-1012	007	28	22654-525	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1415
22654-009	CAREFS04-SD04-1012	008	28	22654-526	Water	ND	0.1	mg/L as N	12/05/12 0800	01/02/13 1415
22654-000	Laboratory Control	000	35	22654-618	Water	0.21	0.1	mg/L as N	12/12/12 1145	01/02/13 1342
22654-001	CAS04-SD20-1012	001	35	22654-619	Water	0.38	0.1	mg/L as N	12/12/12 1145	01/02/13 1342
22654-002	CAS04-SD19-1012	002	35	22654-620	Water	0.24	0.1	mg/L as N	12/12/12 1145	01/02/13 1343
22654-003	CAS04-SD18-1012	003	35	22654-621	Water	0.21	0.1	mg/L as N	12/12/12 1145	01/02/13 1344
22654-004	CAS04-SD23-1012	004	35	22654-622	Water	0.21	0.1	mg/L as N	12/12/12 1145	01/02/13 1345
22654-005	CAS04-SD21-1012	005	35	22654-623	Water	0.16	0.1	mg/L as N	12/12/12 1145	01/02/13 1346
22654-006	CAS04-SD22-1012	006	35	22654-624	Water	0.23	0.1	mg/L as N	12/12/12 1145	01/02/13 1347
22654-008	CAREFS04-SD02-1012	007	35	22654-625	Water	ND	0.1	mg/L as N	12/12/12 1145	01/02/13 1353
22654-009	CAREFS04-SD04-1012	008	35	22654-626	Water	0.18	0.1	mg/L as N	12/12/12 1145	01/02/13 1355
22654-000	Laboratory Control	000	42	22654-718	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1356
22654-001	CAS04-SD20-1012	001	42	22654-719	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1357
22654-002	CAS04-SD19-1012	002	42	22654-720	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1358
22654-003	CAS04-SD18-1012	003	42	22654-721	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1358
22654-004	CAS04-SD23-1012	004	42	22654-722	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1359
22654-005	CAS04-SD21-1012	005	42	22654-723	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1400
22654-006	CAS04-SD22-1012	006	42	22654-724	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1404
22654-008	CAREFS04-SD02-1012	007	42	22654-725	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1404
22654-009	CAREFS04-SD04-1012	008	42	22654-726	Water	ND	0.1	mg/L as N	12/19/12 1210	01/02/13 1405

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Overlying Water Sulfide Summary
METHOD: SW 846 9034

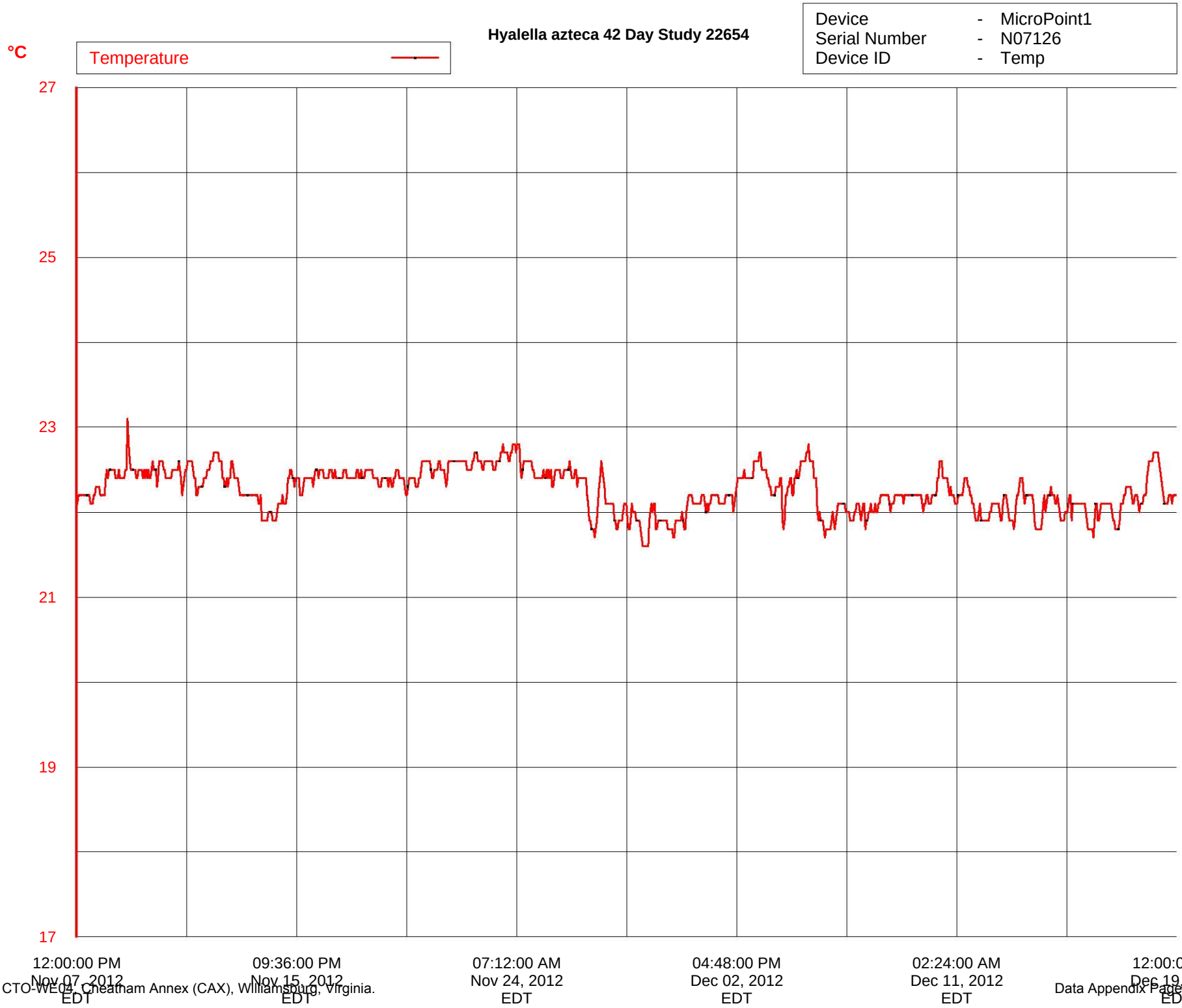
Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-000	Laboratory Control	000	0	22654-136	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-001	CAS04-SD20-1012	001	0	22654-137	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-002	CAS04-SD19-1012	002	0	22654-138	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-003	CAS04-SD18-1012	003	0	22654-139	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-004	CAS04-SD23-1012	004	0	22654-140	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-005	CAS04-SD21-1012	005	0	22654-141	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-006	CAS04-SD22-1012	006	0	22654-142	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-008	CAREFS04-SD02-1012	007	0	22654-143	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-009	CAREFS04-SD04-1012	008	0	22654-144	Water	ND	0.08	mg/L	11/07/12 0930	11/07/12 1300
22654-000	Laboratory Control	000	7	22654-227	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-001	CAS04-SD20-1012	001	7	22654-228	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-002	CAS04-SD19-1012	002	7	22654-229	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-003	CAS04-SD18-1012	003	7	22654-230	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-004	CAS04-SD23-1012	004	7	22654-231	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-005	CAS04-SD21-1012	005	7	22654-232	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-006	CAS04-SD22-1012	006	7	22654-233	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-008	CAREFS04-SD02-1012	007	7	22654-234	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-009	CAREFS04-SD04-1012	008	7	22654-235	Water	ND	0.1	mg/L	11/14/12 1000	11/14/12 1200
22654-000	Laboratory Control	000	14	22654-327	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-001	CAS04-SD20-1012	001	14	22654-328	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-002	CAS04-SD19-1012	002	14	22654-329	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-003	CAS04-SD18-1012	003	14	22654-330	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-004	CAS04-SD23-1012	004	14	22654-331	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-005	CAS04-SD21-1012	005	14	22654-332	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-006	CAS04-SD22-1012	006	14	22654-333	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-008	CAREFS04-SD02-1012	007	14	22654-334	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-009	CAREFS04-SD04-1012	008	14	22654-335	Water	ND	0.04	mg/L	11/21/12 1000	11/21/12 1230
22654-000	Laboratory Control	000	21	22654-427	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-001	CAS04-SD20-1012	001	21	22654-428	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100

TASK: Overlying Water Sulfide Summary
METHOD: SW 846 9034

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-002	CAS04-SD19-1012	002	21	22654-429	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-003	CAS04-SD18-1012	003	21	22654-430	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-004	CAS04-SD23-1012	004	21	22654-431	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-005	CAS04-SD21-1012	005	21	22654-432	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-006	CAS04-SD22-1012	006	21	22654-433	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-008	CAREFS04-SD02-1012	007	21	22654-434	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-009	CAREFS04-SD04-1012	008	21	22654-435	Water	ND	0.04	mg/L	11/28/12 0830	11/28/12 1100
22654-000	Laboratory Control	000	28	22654-536	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-001	CAS04-SD20-1012	001	28	22654-537	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-002	CAS04-SD19-1012	002	28	22654-538	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-003	CAS04-SD18-1012	003	28	22654-539	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-004	CAS04-SD23-1012	004	28	22654-540	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-005	CAS04-SD21-1012	005	28	22654-541	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-006	CAS04-SD22-1012	006	28	22654-542	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-008	CAREFS04-SD02-1012	007	28	22654-543	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-009	CAREFS04-SD04-1012	008	28	22654-544	Water	ND	0.04	mg/L	12/05/12 0800	12/05/12 1100
22654-000	Laboratory Control	000	35	22654-627	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-001	CAS04-SD20-1012	001	35	22654-628	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-002	CAS04-SD19-1012	002	35	22654-629	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-003	CAS04-SD18-1012	003	35	22654-630	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-004	CAS04-SD23-1012	004	35	22654-631	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-005	CAS04-SD21-1012	005	35	22654-632	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-006	CAS04-SD22-1012	006	35	22654-633	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-008	CAREFS04-SD02-1012	007	35	22654-634	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-009	CAREFS04-SD04-1012	008	35	22654-635	Water	ND	0.04	mg/L	12/12/12 1145	12/12/12 1400
22654-000	Laboratory Control	000	42	22654-727	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-001	CAS04-SD20-1012	001	42	22654-728	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-002	CAS04-SD19-1012	002	42	22654-729	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-003	CAS04-SD18-1012	003	42	22654-730	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-004	CAS04-SD23-1012	004	42	22654-731	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-005	CAS04-SD21-1012	005	42	22654-732	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-006	CAS04-SD22-1012	006	42	22654-733	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-008	CAREFS04-SD02-1012	007	42	22654-734	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600
22654-009	CAREFS04-SD04-1012	008	42	22654-735	Water	ND	0.04	mg/L	12/19/12 1210	12/19/12 1600

STUDY: 22654
CLIENT: CH2M Hill
PROJECT: CTO-WE04, Cheatham Annex
ASSAY: Hyalella azteca 42 Day Sediment Assay
TASK: Overlying Water Total Organic Carbon Summary
METHOD: SM 5310 C

Sample LAB ID	Field ID	Sample Number	Day	LAB ID	MATRIX	RESULT	QLIMIT	UNITS	SAMPLED	ANALYZED
22654-000	Laboratory Control	000	0	22654-127	Water	5.7	0.4	mg/L	11/07/12 0930	11/09/12
22654-001	CAS04-SD20-1012	001	0	22654-128	Water	4.4	0.4	mg/L	11/07/12 0930	11/09/12
22654-002	CAS04-SD19-1012	002	0	22654-129	Water	4.2	0.4	mg/L	11/07/12 0930	11/09/12
22654-003	CAS04-SD18-1012	003	0	22654-130	Water	4.1	0.4	mg/L	11/07/12 0930	11/09/12
22654-004	CAS04-SD23-1012	004	0	22654-131	Water	4.1	0.4	mg/L	11/07/12 0930	11/09/12
22654-005	CAS04-SD21-1012	005	0	22654-132	Water	4.2	0.4	mg/L	11/07/12 0930	11/09/12
22654-006	CAS04-SD22-1012	006	0	22654-133	Water	4.1	0.4	mg/L	11/07/12 0930	11/09/12
22654-008	CAREFS04-SD02-1012	007	0	22654-134	Water	5.1	0.4	mg/L	11/07/12 0930	11/09/12
22654-009	CAREFS04-SD04-1012	008	0	22654-135	Water	5	0.4	mg/L	11/07/12 0930	11/09/12
22654-000	Laboratory Control	000	28	22654-527	Water	5.1	0.4	mg/L	12/05/12 0800	12/12/12
22654-001	CAS04-SD20-1012	001	28	22654-528	Water	4.1	0.4	mg/L	12/05/12 0800	12/12/12
22654-002	CAS04-SD19-1012	002	28	22654-529	Water	3.8	0.4	mg/L	12/05/12 0800	12/12/12
22654-003	CAS04-SD18-1012	003	28	22654-530	Water	3.9	0.4	mg/L	12/05/12 0800	12/12/12
22654-004	CAS04-SD23-1012	004	28	22654-531	Water	3.9	0.4	mg/L	12/05/12 0800	12/12/12
22654-005	CAS04-SD21-1012	005	28	22654-532	Water	3.9	0.4	mg/L	12/05/12 0800	12/12/12
22654-006	CAS04-SD22-1012	006	28	22654-533	Water	4.1	0.4	mg/L	12/05/12 0800	12/12/12
22654-008	CAREFS04-SD02-1012	007	28	22654-534	Water	4.1	0.4	mg/L	12/05/12 0800	12/12/12
22654-009	CAREFS04-SD04-1012	008	28	22654-535	Water	4.7	0.4	mg/L	12/05/12 0800	12/12/12


Hyalella azteca 42 Day Study 22654
Device - MicroPoint1
Serial Number - N07126
Device ID - Temp
°C
Temperature
27
25
23
21
19
17
12:00:00 PM Nov 07, 2012 EDT
09:36:00 PM Nov 15, 2012 EDT
07:12:00 AM Nov 24, 2012 EDT
04:48:00 PM Dec 02, 2012 EDT
02:24:00 AM Dec 11, 2012 EDT
12:00:00 PM Dec 19, 2012 EDT

Report Name:	MicroPoint1 Statistics
Report Date:	Jan 08, 2013 12:41:10 PM EST
File Name:	P:\TELATEMP\N07126 08-29-12 TO 12-19-12.csv
Title:	Hyalella azteca 42 Day Study 22654
Device:	MicroPoint1 - Temperature Recorder
Hardware Revision:	REV2 (64K)
Serial Number:	N07126
Device ID:	Temp
Data Start Date:	Nov 07, 2012 12:20:00 PM EDT
Data End Date:	Dec 19, 2012 11:20:00 AM EDT
Reading Rate:	1 Hour
Readings:	1651 to 2658 of 2660
Last Calibration Date:	Jul 06, 2012
Next Calibration Date:	Jul 06, 2013

Channel 1 - Temperature

Minimum	.....	21.6 °C
Maximum	.....	23.1 °C
Average	.....	22.26389 °C
Standard Deviation	.....	0.2513628 °C
Mean Kinetic Temperature	.....	22.26729 °C

Device Name	MicroPoint1
Device Description	Temperature Recorder
Start Date	11/07/2012
End Date	12/19/2012
Reading Rate	1 per Hour
Serial Number	N07126
UserID	Temp
Calibration Date	07/06/2012
StartDate	08/30/2012
EndDate	12/19/2012

[Reading]

# ID #	Date	Time	# Temperature (°C) #
0	11/07/2012	12:20	22.2
1	11/07/2012	13:20	22.2
2	11/07/2012	14:20	22.2
3	11/07/2012	15:20	22.1
4	11/07/2012	16:20	22.1
5	11/07/2012	17:20	22.2
6	11/07/2012	18:20	22.2
7	11/07/2012	19:20	22.2
8	11/07/2012	20:20	22.2
9	11/07/2012	21:20	22.2
10	11/07/2012	22:20	22.2
11	11/07/2012	23:20	22.2
12	11/08/2012	00:20	22.2
13	11/08/2012	01:20	22.2
14	11/08/2012	02:20	22.2
15	11/08/2012	03:20	22.2
16	11/08/2012	04:20	22.1
17	11/08/2012	05:20	22.1
18	11/08/2012	06:20	22.1
19	11/08/2012	07:20	22.2
20	11/08/2012	08:20	22.2
21	11/08/2012	09:20	22.3
22	11/08/2012	10:20	22.3
23	11/08/2012	11:20	22.3
24	11/08/2012	12:20	22.3
25	11/08/2012	13:20	22.2
26	11/08/2012	14:20	22.2
27	11/08/2012	15:20	22.2
28	11/08/2012	16:20	22.2
29	11/08/2012	17:20	22.2
30	11/08/2012	18:20	22.4
31	11/08/2012	19:20	22.5
32	11/08/2012	20:20	22.4
33	11/08/2012	21:20	22.5
34	11/08/2012	22:20	22.5
35	11/08/2012	23:20	22.5
36	11/09/2012	00:20	22.5
37	11/09/2012	01:20	22.5
38	11/09/2012	02:20	22.5
39	11/09/2012	03:20	22.4

40	11/09/2012	04:20	22.4
41	11/09/2012	05:20	22.4
42	11/09/2012	06:20	22.5
43	11/09/2012	07:20	22.4
44	11/09/2012	08:20	22.4
45	11/09/2012	09:20	22.4
46	11/09/2012	10:20	22.4
47	11/09/2012	11:20	22.4
48	11/09/2012	12:20	22.5
49	11/09/2012	13:20	22.5
50	11/09/2012	14:20	23.1
51	11/09/2012	15:20	22.8
52	11/09/2012	16:20	22.6
53	11/09/2012	17:20	22.5
54	11/09/2012	18:20	22.5
55	11/09/2012	19:20	22.5
56	11/09/2012	20:20	22.5
57	11/09/2012	21:20	22.5
58	11/09/2012	22:20	22.4
59	11/09/2012	23:20	22.4
60	11/10/2012	00:20	22.5
61	11/10/2012	01:20	22.5
62	11/10/2012	02:20	22.5
63	11/10/2012	03:20	22.5
64	11/10/2012	04:20	22.4
65	11/10/2012	05:20	22.5
66	11/10/2012	06:20	22.4
67	11/10/2012	07:20	22.5
68	11/10/2012	08:20	22.4
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556	11/30/2012	16:20	21.9
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558	11/30/2012	18:20	22.0
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561	11/30/2012	21:20	21.8
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566	12/01/2012	02:20	22.2
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578	12/01/2012	14:20	22.2
579	12/01/2012	15:20	22.1
580	12/01/2012	16:20	22.0
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584	12/01/2012	20:20	22.1
585	12/01/2012	21:20	22.2
586	12/01/2012	22:20	22.2
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873	12/13/2012	21:20	22.2
874	12/13/2012	22:20	22.2
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876	12/14/2012	00:20	22.2
877	12/14/2012	01:20	22.2
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965	12/17/2012	17:20	22.3
966	12/17/2012	18:20	22.3
967	12/17/2012	19:20	22.3
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976	12/18/2012	04:20	22.1
977	12/18/2012	05:20	22.0
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988	12/18/2012	16:20	22.6
989	12/18/2012	17:20	22.6
990	12/18/2012	18:20	22.7
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993	12/18/2012	21:20	22.7

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1002	12/19/2012	06:20	22.1
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1005	12/19/2012	09:20	22.2
1006	12/19/2012	10:20	22.2
1007	12/19/2012	11:20	22.1
1008	12/19/2012	12:20	22.2

Aquatic Research Organisms

Rec. 11/06/12 AM

DATA SHEET

I. Organism History

Species Hyalella azteca

Source: Lab reared ✓ Hatchery reared_____ Field collected_____

Hatch date 10/31/12 Receipt date_____

Lot number 103112HA Strain ARO

Brood origination USFWS MO

II. Water Quality

Temperature 23 °C Salinity 0 ppt D.O. SAT ppm

pH 7.6 su Hardness ≈120 ppm Alkalinity ≈120 ppm

III. Culture Conditions

Freshwater ✓ Saltwater_____ Other_____

Recirculating_____ Flow through_____ Static renewal ✓

DIET: Flake food ✓ Phytoplankton_____ Trout chow ✓

Artemia_____ Rotifers_____ YCT_____ Other_____

Prophylactic treatments:_____

Comments:_____

IV. Shipping Information

Client: ESI # of Organisms 1600+

Carrier: PICK UP Date shipped 11/06/12

Biologist: Stan Sniteke

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM
WWW.AROFISH.US

Pre-Assay Monitoring
Hyalella azteca 42 Day Sediment Assay

Study: 22654	Client: CH2M Hill	Project: CTO-WE04, Cheatham Annex

Day	Date	Overlying Water Renewed		Notes
		Check	Initial	
0	11/01/12	—	AM	Test set up
1	11/02/12	✓	AM	
2	11/3/12	✓	CS	
3	11/4/12	✓	JM/AB	
4	11/5/12	✓	AM/JTP	
5	11/6/12	✓	AM/JTP	
6				
7				
8				
9				
10				

Notes:	23 °C	Overlying Water = MHR/Pond	Aerate if DO is below 2.5 mg/L	Two Volume Additions Daily

Test Sediment Preparation Notes

Study Number: 22654

Client: CH2M Hill

Project: CTO-WE04, Cheatham Annex

Field ID	Receipt Number	Sample Number	Notes
CAS04-SD20-1012	22654-001	001	High moisture content. Pudding like. Rocks, twigs, + leaf litter. ≈ 1/2L excluded.
CAS04-SD19-1012	22654-002	002	Same as sample #1. ≈ 1/4L excluded.
CAS04-SD18-1012	22654-003	003	High % moisture content. Pudding like. Rock and twigs prevalent. ≈ 1/3 of 1 gallon P. excluded.
CAS04-SD23-1012	22654-004	004	High % moisture. Pudding like with silt and fine organics. Twigs present. ≈ 1/2 L excluded.
CAS04-SD21-1012	22654-005	005	High % moisture. Pudding like with silt and fine organics. Twigs and seed present. 200mL excluded.
CAS04-SD22-1012	22654-006	006	Same as last ~~P~~ sample. EJM 11/01/12
CAREFS04-SD02-1012	22654-008	007	Same as last sample. 1/2 Liter excluded.
CAREFS04-SD04-1012	22654-009	008	Same as last sample. < 200mL excluded
Date: **Initial:**			

P:\GENERAL PROJECTS\FORMS\LABFORMS\SoilSedTests\Soil&SedPrep\Test Sediment Preparation Notes.wpd

All samples sieved to 2mm. AM 11/01/12

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	22654		
SDG No:			
Project:	CTO-WE04, Cheatham Annex		
Delivered via:	**FedEx**		
Date and Time Received:	10/10/12 1130	Date and TIme Logged into Lab:	10/10/12 1130
Recieved By:	AM	Logged into Lab by:	AM RAM RAM
Air bill / Way bill:	Yes	Air bill included in folder if received?	Yes
Cooler on ice/packs:	Yes	Custody Seals present?	Yes
Cooler Blank Temp (C) at arrival:	0C - 2C	Custody Seals intact?	Yes
Number of COC Pages:	4		
COC Serial Number(s):			
COC Complete:	Yes	Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required		

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
CAREFS04-SD05-1012	22654-007	S	Hold until notified by client	2x1 gallon P	4C	
CAREFS04-SD02-1012	22654-008	S	Hold until notified by client	2x1 gallon P	4C	
CAREFS04-SD04-1012	22654-009	S	Hold until notified by client	2x1 gallon P	4C	
CAREFS04-SD01-1012	22654-010	S	Hold until notified by client	2x1 gallon P	4C	

Notes and qualifications:

22654

B

Katahdin ANALYTICAL SERVICES

600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY CTO-WE63

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page ____ of ____

Client: CH2M HILL
Contact: Claiette Campbell
Phone #: (757) 671-6355
Fax #: ( )

Address: 5701 Cleveland St. Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462

Purchase Order #: 947233
Proj. Name / No.: CAX Site 4 / 436606.FI.FK
Katahdin Quote #:

Bill (if different than above):
Address:

Sampler (Print / Sign): Kathryn Smith / Kathryn Z Smith
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER ____

REMARKS: ____

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO: ____
TEMP°C ____ ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
007	CAREFS04-SD05-1012	10/9/12 / 1015	SD	2	2										
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COMMENTS

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
[signature]	10/9/12 1800				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/10/12 1130	[signature]			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS-COC1

C

Katahdin ANALYTICAL SERVICES

600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

22654

CHAIN of CUSTODY

CTO-WE63

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page 1 of 1

Client: CH2M HILL

Contact: Clairette Campbell

Phone #: (757) 671-6355

Fax #: ( )

Address: 5701 Cleveland St, Suite 200

City: Virginia Beach

State: VA

Zip Code: 23462

Purchase Order #: 947233

Proj. Name / No.: CAX Site 4 Ref/436606.F1.FK

Katahdin Quote #:

Bill (if different than above):

Address:

Sampler (Print / Sign): David Livingston

Copies To: S. Sawyer

LAB USE ONLY

WORK ORDER #:

KATAHDIN PROJECT NUMBER

REMARKS:

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT

AIRBILL NO:

TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

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	10/9/12				

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN

4

Katahdin ANALYTICAL SERVICES

600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

22654

CHAIN of CUSTODY

CTO-WE63

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page ____ of ____

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757) 671-6355
Fax #: ( )

Address: 5701 Cleveland St., Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462

Purchase Order #: 947233
Proj. Name / No.: CAX Site 4 Ref / 436606.FI.FK
Katahdin Quote #:

Bill (if different than above):
Address:

Sampler (Print / Sign): David Livingston /
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER ____

REMARKS: ____

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO: ____
TEMP°C ____ ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail (Filt. ❒Y ❒N)	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
009	CAREFS04-SD04-1012	10/9/12 / 1120	SD	2	2									
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COMMENTS

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	10/9/12 1800				
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	10/10/12 1130	Carlos Moore			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS-COC1

D

Katahdin ANALYTICAL SERVICES

600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

24654

CHAIN of CUSTODY

CTO-WE63

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page ____ of ____

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757) 671-6355
Fax #: ( )

Address: 5701 Cleveland St., Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462

Purchase Order #: 947233
Proj. Name / No.: CAX Site 4/436606.FI.FK
Katahdin Quote #:

Bill (if different than above):
Address:

Sampler (Print / Sign): Kathryn Smith / Kathryn Z Smith
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER ____

REMARKS: ____

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO: ____
TEMP°C ____ ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
010	CAREFS04-SD01-1012	10/9/12 / 1545	SD	2	2										
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COMMENTS

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[signature]	10/9/12 1848				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/10/12 1130	[signature]			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS-COC1

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

2°C

22654-007

From: (757) 671-6270
Toby Stewart
CH2M HILL VBO
5701 CLEVELAND ST STE 200

virginia beach, VA 23462

Origin ID: NTUA

FedEx Express

J12201207160325

Ship Date: 09OCT12
ActWgt: 65.0 LB
CAD: 104331162/INET3300

Dims: 24 X 14 X 16 IN

Delivery Address Bar Code

Ref # 436606.FI.FK
Invoice #
PO #
Dept #

SHIP TO: (603) 926-3345

BILL SENDER

Petra Karbe
Envirosystems, Inc.
1 LAFAYETTE RD
Building 6
HAMPTON, NH 03842

1 of 5

WED - 10 OCT A4
PRIORITY OVERNIGHT

TRK# 7991 4774 0476
0201

MASTER

XH IGGA

03842
NH-US
MHT

515G1/9CCB/AA44

After printing this label:

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

2°C

22654-005

From: (757) 671-6270
Toby Stewart
CH2M HILL VBO
5701 CLEVELAND ST STE 200

virginia beach, VA 23462

Origin ID: NTUA

FedEx Express

J12201207160325

Ship Date: 09OCT12
ActWgt: 65.0 LB
CAD: 104331162/INET3300

Dims: 24 X 14 X 16 IN

Delivery Address Bar Code

Ref # 436606.FI.FK
Invoice #
PO #
Dept #

SHIP TO: (603) 926-3345

BILL SENDER

Petra Karbe
Envirosystems, Inc.
1 LAFAYETTE RD
Building 6
HAMPTON, NH 03842

4 of 5

WED - 10 OCT A4
PRIORITY OVERNIGHT

MPS# 7991 4774 0660
0263
Mstr# 7991 4774 0476
0201

XH IGGA

03842
NH-US
MHT

515G1/9CCB/AA44

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

2°C
22654-009

Page 2 of 5

From: (757) 671-6270
Toby Stewart
CH2M HILL VBO
5701 CLEVELAND ST STE 200

virginia beach, VA 23462

Origin ID: NTUA

FedEx Express

J12201207160325

Ship Date: 09OCT12
ActWgt: 65.0 LB
CAD: 104331162/INET3300

Dims: 24 X 14 X 16 IN

Delivery Address Bar Code

Ref # 436606.FI.FK
Invoice #
PO #
Dept #

SHIP TO: (603) 926-3345

BILL SENDER

Petra Karbe
Envirosystems, Inc.
1 LAFAYETTE RD
Building 6
HAMPTON, NH 03842

2 of 5

WED - 10 OCT A4
PRIORITY OVERNIGHT

MPS# 7991 4774 0215
0263

Mstr# 7991 4774 0476 0201

XH IGGA

03842
NH-US
MHT

515G1/9CCB/AA44

SIGNATURE

Quality Environmental Containers
800-255-3950 • 304-255-3900

CUSTODY SEAL
DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

22654-01C

From: (757) 671-6270
Toby Stewart
CH2M HILL VBO
5701 CLEVELAND ST STE 200

virginia beach, VA 23462

Origin ID: NTUA

FedEx Express

J12201207160325

Ship Date: 09OCT12
ActWgt: 65.0 LB
CAD: 104331162/INET3300

Dims: 24 X 14 X 16 IN

Delivery Address Bar Code

Ref # 436606.FI.FK
Invoice #
PO #
Dept #

SHIP TO: (603) 926-3345

BILL SENDER

Petra Karbe
Envirosystems, Inc.
1 LAFAYETTE RD
Building 6
HAMPTON, NH 03842

3 of 5

WED - 10 OCT A4
PRIORITY OVERNIGHT

MPS# 7991 4774 0226
0263

Mstr# 7991 4774 0476 0201

XH IGGA

03842
NH-US
MHT

515G1/9CCB/AA44

DATE 10/9/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	22654		
SDG No:			
Project:	CTO-WE04, Cheatham Annex		
Delivered via:	**FedEx**		
Date and Time Received:	10/11/12 0930	Date and TIme Logged into Lab:	10/11/12 0930
Recieved By:	AM	Logged into Lab by:	AM RAM RAM
Air bill / Way bill:	Yes	Air bill included in folder if received?	Yes
Cooler on ice/packs:	Yes	Custody Seals present?	Yes
Cooler Blank Temp (C) at arrival:	2C	Custody Seals intact?	Yes
Number of COC Pages:	1		
COC Serial Number(s):			
COC Complete:	Yes	Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required		

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
CAREFS04-SD03-1012	22654-011	S	Hold until notified by client	2x1 gallon P	4C	

Notes and qualifications:

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page ____ of ____

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757)671-6355
Fax #: ( )
Address: 5701 Cleveland St, Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462
Purchase Order #: 947233
Proj. Name / No.: CAX Site 4 / 436606.F1.DK
Katahdin Quote #:
Bill (if different than above):
Address:
Sampler (Print / Sign): David Livingston /
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER ____
REMARKS: ____
SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO: ____
TEMP°C ____ ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxaphene 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
-001	CAS04-SD20-1012	10/2/12 / 1325	SD	2	2										
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COMMENTS

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	10/2/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/03/12 1700	Sherrie Morlsacc			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS COC1

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757) 671-6355
Fax #: ( )
Address: 5701 Cleveland St, Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462
Purchase Order #: 947233
Proj. Name / No.: CAX Site 4 / 436606.F1.PK
Katahdin Quote #:
Bill (if different than above):
Address:
Sampler (Print / Sign): David Livingston
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER
REMARKS:
SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO:
TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt. ❒Y ❒N: Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

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	10/2/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signatu
	10/03/12 1700				

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757) 671-6355
Fax #: ( )
Address: 5701 Cleveland St Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462
Purchase Order #: 947233
Proj. Name / No.: CAX Site 41 / 436606.A.FL
Katahdin Quote #:
Bill (if different than above):
Address:
Sampler (Print / Sign): David Livingston / [signature]
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER
REMARKS:
SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO:
TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
-003	CA504-SD18-1012	10/2/12 / 0950	SD	2	2										
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COMMENTS

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
[signature]	10/2/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/03/12 1700	Steve Mudrak			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS COC1

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE 63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Page 1 of 1

Client: CH2M HILL	Contact: Charlette Crayhell	Phone #: (757) 671-6355	Fax #: ( )
Address: 5701 Cleveland St, Suite 200	City: Virginia Beach	State: VA	Zip Code: 23462
Purchase Order #: 947233	Proj. Name / No.: CAX Site 4 / 436606.F.FK	Katahdin Quote #:	
Bill (if different than above):	Address:		
Sampler (Print / Sign): David Livingston		Copies To: S. Sawyer	

LAB USE ONLY WORK ORDER #:

KATAHDIN PROJECT NUMBER

REMARKS:

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT

AIRBILL NO:

TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail (Filt. ❒Y ❒N)	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

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	10/3/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/03/12 1700				

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS-COC1

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: CH2M HILL	Contact: Claiborne Campbell	Phone #: (757) 671-6355	Fax #: ( )
Address: 5701 Cleveland St, Suite 200	City: Virginia Beach	State: VA	Zip Code: 23462
Purchase Order #: 947233	Proj. Name / No.: CAX Site 4 / 436606.FM2	Katahdin Quote #	
Bill (if different than above)	Address		
Sampler (Print / Sign): David Livingston		Copies To: S. Sawyer	

LAB USE ONLY WORK ORDER #:

KATAHDIN PROJECT NUMBER _____

REMARKS: _____

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT

AIRBILL NO: _____

TEMP°C _____ ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

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	10/2/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/03/12 1700				

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

CTO-WE 63
22654

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: CH2M HILL
Contact: Clairette Campbell
Phone #: (757) 671-6355
Fax #: ( )
Address: 5701 Cleveland St Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462
Purchase Order #: 947233
Proj. Name / No.: CAX Site 4
Katahdin Quote #:
Bill (if different than above):
Address:
Sampler (Print / Sign): David Livingston / [signature]
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER
REMARKS:
SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO:
TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
[signature]	10/2/12 1845				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/03/12 1700	[signature]			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	22654		
SDG No:			
Project:	CTO-WE04, Cheatham Annex		
Delivered via:	**FedEx**		
Date and Time Received:	10/03/12 1700	Date and TIme Logged into Lab:	10/03/12 1700
Recieved By:	RAM	Logged into Lab by:	RAM RAM
Air bill / Way bill:	Yes	Air bill included in folder if received?	Yes
Cooler on ice/packs:	Yes	Custody Seals present?	Yes
Cooler Blank Temp (C) at arrival:	1C - 2C	Custody Seals intact?	Yes
Number of COC Pages:	6		
COC Serial Number(s):			
COC Complete:		Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required		

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
CAS04-SD20-1012	22654-001	S	Hold until notified by client	2x1 gallon P	4C	yes
CAS04-SD19-1012	22654-002	S	Hold until notified by client	2x1 gallon P	4C	yes
CAS04-SD18-1012	22654-003	S	Hold until notified by client	2x1 gallon P	4C	yes
CAS04-SD23-1012	22654-004	S	Hold until notified by client	2x1 gallon P	4C	yes
CAS04-SD21-1012	22654-005	S	Hold until notified by client	2x1 gallon P	4C	yes
CAS04-SD22-1012	22654-006	S	Hold until notified by client	2x1 gallon P	4C	yes

Notes and qualifications:

The time sampled for 22654-006 is noted as 1445 on the sample containers and 1420 on the chain of custody.

CUSTODY SEAL

Date: 10/02/12

Signature:

ENCO

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

CUSTODY SEAL

Date: 10/02/2012

Signature:

ENCO

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

CA504-SD20-1012
22654-001

2°C

ORIGIN ID: NTUA

SHIP DATE: 02OCT12
ACTWGT: 65.1 LB
CAD: /0FFC1322
DIMS: 24x14x13 IN

BILL THIRD PARTY

UNITED STATES US

TO PETRO KARBE
ENVIROSYSTEMS, INC
1 LAFAYETTE RD
BUILDING 6
HAMPTON NH 03842
(603) 926-3345

INV:
PO:
REF:
DEPT:

FedEx Express

J12201207160125

5 of 6

MPS# 0681 7957 6679 5961

Mstr# 8705 3402 0057

0200

WED - 03 OCT A4
PRIORITY OVERNIGHT

XH IGGA

03842
NH-US MHT

CUSTODY SEAL

Date: 10/2/12

Signature:

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

CUSTODY SEAL

Date: 10/2/12

Signature:

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

CAS04-SD19-1012
22654-002

1°C

ORIGIN ID: NTUA

UNITED STATES US

SHIP DATE: 02OCT12
ACTWGT: 63.0 LB
CAD: /OFFC1322
DIMS: 24x14x13 IN

BILL THIRD PARTY

TO PETRO KARBE
ENVIROSYSTEMS, INC
1 LAFAYETTE RD
BUILDING 6
HAMPTON NH 03842
(603) 926-3345 REF:
INV:
PO: DEPT:

Part # 156297-438 MI2 10/02 5156/9ACCA/A644
#1RR005R 10/02 5156/9ACCA/A644

FedEx Express

J12201207160125

4 of 6

MPS# 0681 7957 6679 5950

Mstr# 8705 3402 0057 0200

XH IGGA

WED - 03 OCT A4
PRIORITY OVERNIGHT

03842
NH-US MHT

Katahdin ANALYTICAL SERVICES

CUSTODY SEAL

Date: 10/2/12 Signature:

Katahdin ANALYTICAL SERVICES

CUSTODY SEAL

Date: 10/2/12 Signature:

VOC
CA504-SD18-1012
22654-003

2 of 6

MPS# 0681 7957 6679 5939

Mstr# 8705 3402 0057 0200

WED – 03 OCT A4
PRIORITY OVERNIGHT

XH IGGA

03842
NH – US MHT

FedEx Express US Airbill 8705 3402 0057 0200 Form ID No. **FedEx Retrieval Copy**

1 **From**

Date 10/2/12 Sender's FedEx Account Number 2336-3671-1

Sender's Name David Livingston Phone 757 518-9666

Company CH2M HILL

Address 5701 Cleveland St

Dept./Floor/Suite/Room

City Virginia Beach State VA ZIP 23462

2 **Your Internal Billing Reference** 186718208 / 436606. F1. FK

3 **To**

Recipient's Name Peter Kaebe Phone 603 926-3345

Company Environ Systems, Inc. 1 ☐ HOLD Weekday Print FedEx location address below. NOT available for FedEx First Overnight. 31 ☐ HOLD Saturday Print FedEx location address below. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Address 1 Lafayette Road

We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room

Address Building 6

Print FedEx location address here if a HOLD option is selected.

City Hampton State NH ZIP 03842

4a Express Package Service * To most locations. *Packages up to 150 lbs.*

1 ☒ FedEx Priority Overnight Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

5 ☐ FedEx Standard Overnight Next business afternoon.* Saturday Delivery NOT available.

6 ☐ FedEx First Overnight Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.

3 ☐ FedEx 2Day Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

20 ☐ FedEx Express Saver Third business day.* Saturday Delivery NOT available.

4b Express Freight Service ** To most locations. *Packages over 150 lbs.*

7 ☐ FedEx 1Day Freight Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

FedEx 1Day Freight Booking No.

8 ☐ FedEx 2Day Freight Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

83 ☐ FedEx 3Day Freight Third business day.** Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

6 ☐ FedEx Envelope* 2 ☐ FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak. 3 ☐ FedEx Box 4 ☐ FedEx Tube 1 ☒ Other

6 Special Handling and Delivery Signature Options

3 ☐ **SATURDAY DELIVERY**

☐ No Signature Required Package may be left without obtaining a signature for delivery.

10 ☐ Direct Signature Someone at recipient's address may sign for delivery. *Fee applies.*

34 ☐ Indirect Signature If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?

One box must be checked.

☒ No 4 ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. 6 ☐ Dry Ice Dry ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below. Obtain Recip. Acct. No. ☐

1 ☐ Sender Acct. No. in Section 1 will be billed. 2 ☐ Recipient 3 ☒ Third Party 4 ☐ Credit Card 5 ☐ Cash/Check

Total Packages 6 Total Weight 48 lbs. Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

Rev. Date 2/08•Part #158281•©1994–2008 FedEx•PRINTED IN U.S.A. SRY

fedex.com 1.800.GoFedEx 1.800.463.3339

8705 3402 0057

CUSTODY SEAL

Date: 10/02/12

Signature:

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

CUSTODY SEAL

Date: 10/02/12

Signature:

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

1°C

CA504-SD23-102
22654-004

ORIGIN ID: NTUA

UNITED STATES US

SHIP DATE: 02OCT12
ACTWGT: 63.8 LB
CAD: /OFFC1322
DIMS: 24x14x13 IN

BILL THIRD PARTY

TO PETRO KARBE
ENVIROSYSTEMS, INC
1 LAFAYETTE RD
BUILDING 6
HAMPTON NH 03842
(603) 926-3345
INV:
PO:
REF:
DEPT:

FedEx Express

J1220120716012S

3 of 6

MPS# 0681 7957 6679 5940

Mstr# 8705 3402 0057

0200

WED - 03 OCT A4
PRIORITY OVERNIGHT

XH IGGA

03842
NH-US MHT

CUSTODY SEAL
DATE 10/2/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

CUSTODY SEAL
DATE 10/2/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

CAS04-SD21-1012 1°C
22654-005

ORIGIN ID: NTUA

SHIP DATE: 02OCT12
ACTWGT: 67.3 LB
CAD: /0FFC1322
DIMS: 24x14x13 IN

BILL THIRD PARTY

UNITED STATES US

TO PETRO KARBE
ENVIROSYSTEMS, INC
1 LAFAYETTE RD
BUILDING 6
HAMPTON NH 03842
(603) 926-3345
INV:
PO:
REF:
DEPT:

Part # 156297-435-112 JUN 11
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FedEx Express

J12201207160125

1 of 6

TRK# 0200 8705 3402 0057

WED - 03 OCT A4
PRIORITY OVERNIGHT

MASTER

XH IGGA

03842
NH-US MHT

CUSTODY SEAL
DATE 10/2/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

CUSTODY SEAL
DATE 10/2/12
SIGNATURE

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

1°C
CAS04- SD22-1012
22654-006

ORIGIN ID: NTUA

SHIP DATE: 02OCT12
ACTWGT: 65.1 LB
CAD: /OFFC1322
DIMS: 24x14x13 IN

BILL THIRD PARTY

UNITED STATES US

TO PETRO KARBE
ENVIROSYSTEMS, INC
LAFAYETTE RD
BUILDING 6
HAMPTON NH 03842
(603) 926-3345 REF:
INV:
PO: DEPT:

Part # 156287-435 FM 12UGP
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FedEx Express

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6 of 6
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Mstr# 8705 3402 0057 0200

WED - 03 OCT A4
PRIORITY OVERNIGHT

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NH-US MHT

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CTO-WE63

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: CH2M HILL
Contact: Claivette Campbell
Phone #: (757) 671-6355
Fax #: ( )

Address: 5701 Cleveland St, Suite 200
City: Virginia Beach
State: VA
Zip Code: 23462

Purchase Order #: 947233
Proj. Name / No.: CAX Site 4 Ref / 436606.F1.FK
Katahdin Quote #:

Bill (if different than above):
Address:

Sampler (Print / Sign): David Livingston /
Copies To: S. Sawyer

LAB USE ONLY
WORK ORDER #:
KATAHDIN PROJECT NUMBER
REMARKS:

SHIPPING INFO: ❒ FED EX ❒ UPS ❒ CLIENT
AIRBILL NO:
TEMP°C ❒ TEMP BLANK ❒ INTACT ❒ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Toxicity 1 gallon pail (Filt. ❒Y ❒N)	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N	Filt. ❒Y ❒N
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COMMENTS

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Kathryn Smith	10/10/12 18:00				
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
	10/11/12 0930	Colin Moore			

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

KAS-COC1

2°C

22654-01

CUSTODY SEAL

Date: 10/10/12

Signature: Kathryn Smith

ENCO

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

From: (757) 671-6270
Toby Stewart
CH2M HILL VBO
5701 CLEVELAND ST STE 200

virginia beach, VA 23462

Origin ID: NTUA

FedEx Express

J12201207160325

Ship Date: 10OCT12
ActWgt: 65.0 LB
CAD: 104331162/INET3300

Dims: 24 X 14 X 16 IN

Delivery Address Bar Code

Ref # 436606.FI.FK
Invoice #
PO #
Dept #

SHIP TO: (603) 926-3345

BILL SENDER

Petra Karbe
Envirosystems, Inc.
1 LAFAYETTE RD
Building 6
HAMPTON, NH 03842

THU - 11 OCT A4
PRIORITY OVERNIGHT

TRK# 0201 7991 5650 4352

XH IGGA

03842
NH-US
MHT

515G1/9CCB/AA44

Date: 10/10/12

Signature: Kathryn Smith

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.
4810 Executive Park Ct., Ste 111 • Jacksonville, FL 32216-6069 • (904) 296-3007
10775 Central Port Drive • Orlando, FL 32824 • (407) 826-5314
102-A Woodwinds Industrial Court • Cary, NC 27511 • (919) 467-3090

Corrections/Clarifications to COCs

TO: Petra Karbe, Envirosystems,

COPIES: File
For samples to be received on 10/10/12.

FROM: Anita Dodson

DATE: October 10, 2012

This memo is to document corrections made to entries on the Chains of Custody (COC) for CAX, CTO-55, Site 4 Reference Sediment. These samples should be received at the laboratory on 10/10/12. Lab logins had not yet been received at the time this correction to file memo was prepared.

The corrections include clarifications to the COC identifying analysis 'On Hold' which should be reflected on the forthcoming Login:

Sample ID on Login	Analysis for removal	Analysis on hold*	Time Collected	SDG
CAREFS04-SD01-1012		Toxicity Testing	15:45	Not assigned at this time
CAREFS04-SD02-1012		Toxicity Testing	14:50	Not assigned at this time.
CAREFS04-SD04-1012		Toxicity Testing	11:20	Not assigned at this time
CAREFS04-SD04-1012		Toxicity Testing	10:15	Not assigned at this time.

* = Per laboratory subcontract these analysis are on hold, but this was not noted on COC.

Corrections/Clarifications to COCs

TO: Renee McIsaac, Envirosystems,

COPIES: File
For samples to be received on 10/11/12.

FROM: Anita Dodson

DATE: October 12, 2012

This memo is to document corrections made to entries on the Chains of Custody (COC) for CAX, CTO-55, Site 4 Reference Sediment. These samples were received at the laboratory on 10/11/12.

The corrections include clarifications to the COC identifying analysis 'On Hold' which should be reflected on the forthcoming Login:

Sample ID on Login	Analysis for removal	Analysis on hold*	Time Collected	SDG
CAREFS04-SD03-1012		Toxicity Testing	15:45	22654

* = Per laboratory subcontract these analysis are on hold, this was not noted on COC; however the lab login did identify this sample as being on hold.

Corrections to File

TO: Envirosystems

COPIES: File
Data Package

FROM: Clairette Campbell
Project Chemist
CH2M HILL

DATE: October 5, 2012

This memo is to document corrections made to the chain of custody for one sample received as part of the Cheatham Annex Site 4 work.

Sample ID	*Date Collected*	*Incorrect Time on Chain of Custody*	*Correct Time*
CAS04-SD22-1012	10/2/2012	14:20	14:45

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Subject: RE: Testing for the CTO-WE04
From: <Clairette.Campbell@ch2m.com>
Date: 10/17/2012 1:40 PM
To: <r.mcisaac@envirosystems.com>
CC: <ksimon@envirosystems.com>

Hello Renée,

Envirosystems has received all anticipated samples with this event. It will likely be another week before we know which samples to take off hold and which to cancel.

Thanks,
Clairette
Direct: 757-671-6335, internal ext. 46335

From: Renee McIsaac [mailto:r.mcisaac@envirosystems.com]
Sent: Wednesday, October 17, 2012 10:17 AM
To: Campbell, Clairette/VBO
Cc: Kenneth Simon
Subject: Testing for the CTO-WE04

Hello Clairette,

I was wondering if we should expect to receive more samples associated with the CTO-WE04 site testing.
Also do you had an idea when we could expect to hear which samples have been selected for testing.
Thanks,
Renée McIsaac
ERA Project Manager

EnviroSystems, Inc.
Specialists in Environmental Toxicology and Chemistry

P.O. Box 778
Hampton, NH 03843-0778
Voice: 603-926-3345 Ext. 212 / Fax: 603-926-3521

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Corrections/Clarifications to COCs

TO: Petra Karbe, Envirosystems,

COPIES: File
Lab Report for SDG 22654

FROM: Clairette Campbell

DATE: October 29, 2012

This memo is to document corrections made to entries on the Chains of Custody (COC) for CAX, CTO-55, Site 4 Sediment.

The corrections include clarifications to the COC identifying analysis to be performed or cancelled:

Sample ID	Date Collected	Time Collected	Analysis for Hyalella azteca, 42-day exposure
CAREFS04-SD01-1012	10/9/2012	15:45	Cancelled
CAREFS04-SD02-1012	10/9/2012	14:50	**Perform analysis**
CAREFS04-SD03-1012	10/10/2012	8:35	Cancelled
CAREFS04-SD04-1012	10/9/2012	11:20	**Perform analysis**
CAREFS04-SD05-1012	10/9/2012	10:15	Cancelled
CAS04-SD18-1012	10/2/2012	9:50	**Perform analysis**
CAS04-SD19-1012	10/2/2012	12:50	**Perform analysis**
CAS04-SD20-1012	10/2/2012	13:25	**Perform analysis**
CAS04-SD21-1012	10/2/2012	14:20	**Perform analysis**
CAS04-SD22-1012	10/2/2012	14:45	**Perform analysis**
CAS04-SD23-1012	10/2/2012	16:20	**Perform analysis**

Attachment 1
Photograph Log
CAX Site 4 and Youth Pond RI Report

Photo 1:
View of the wood planks near CAYP-SS01 (possibly treated with
wood tar creosote) used to store the Conex boxes above the ground surface

Photo 2:
View of the wood planks near CAYP-SS01 (possibly treated with wood
tar creosote) used to store the Conex boxes above the ground surface

Photo 3:
View of the location where CAYP-SS01 was collected.

Photo 4:
View of the drainage ditch where CAA03-SS06 was collected
(arrows indicate stormwater flow direction). Photographer is facing CAD 12.

Photo 5:
View of the side of CAD 12, facing northwest
(arrows indicate stormwater flow direction).

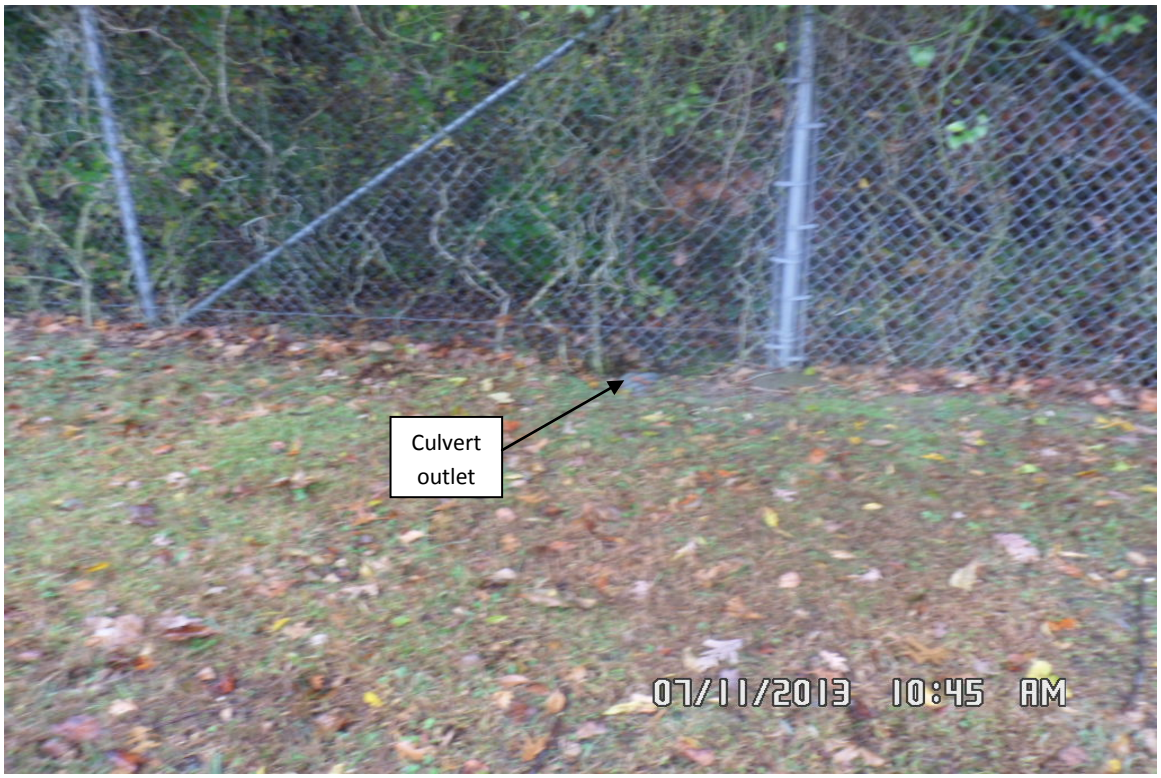

Photo 6:
View of the outlet of the drainage ditch that directs stormwater runoff from the vicinity of CAD 12 to Site 4. Photographer is facing south.

Regulatory Acceptance

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

September 19, 2014

Mr. Scott Park
NAVFAC MIDLANT, Building N-26, Room 3208
Attention: Code OPHE3, Mr. Scott Park
9742 Maryland Avenue
Norfolk, VA 23511-3095

Subject: Site 4 and Youth Pond Remedial Investigation, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia, May 2014

Mr. Park:

Thank you for the opportunity to review the subject document. Attached are EPA's comments on the document. The first set of comments are general comments regarding Site 4 and the process of moving forward with the RI/FS. With these general comments, I am trying to open up a dialogue between EPA, the Navy, and VADEQ as to the most efficient and practical approach to addressing the issues presented by this site. After the Navy has had an opportunity to consider them, I would suggest that the CAX Team discuss them in some detail. The second set of comments are more document specific comments. If you have any questions, please contact me at 215-814-2077.

Sincerely,

Gerald F. Hoover

Gerald F. Hoover, RPM
NPL/BRAC Federal Facilities Branch

cc: Wade Smith, VDEQ

GENERAL COMMENTS

1. Sediment contamination in Upstream Pond: EPA believes that there is sufficient data to conclude that there is potential ecological risk from PCBs in Upstream Pond and that remedial alternatives should be evaluated as part of the FS.

2. It appears that soil sample SS06 is a hot spot for PAHs and pesticides. EPA recommends that the Navy further characterize this hot spot and propose remedial alternatives for addressing it in the FS.

3. EPA strongly suggests that the Navy consider addressing the waste and debris in the burial areas in the FS. Please evaluate if there are any VADEQ regulations or other State or Federal regulations that may apply.

4. Non-Site Contaminant Sources: EPA agrees that contaminated stormwater runoff from non-site related sources are impacting the site. There are relatively simple/straight forward measures that are available to address this contaminated runoff issue. EPA would like the Navy to evaluate this issue further in the FS and consider potential alternatives as a protective measure to ensure site cleanup in the long-term.

DOCUMENT SPECIFIC COMMENTS

TOX COMMENTS

PAGE IV

In the first paragraph on this page (under the bullets), the text indicates that some of the CoCs identified in the BLRA were not site-related and, therefore, will not be considered further. A few sentences explaining this determination (site-related vs. non site-related CoCs) should be added to this section of the report.

APPENDIX K

Based on the data presented in the RAGS – Part D Table 3's for soil inside and outside the fenced areas, it appears that hotspots for arsenic and lead may be present. (Maximum respective concentrations of arsenic and lead were 350 mg/kg and 790 mg/kg, as compared to the exposure point concentrations used to determine potential risk, 40 mg/kg and 37 mg/kg.) These hotspots will not affect risk-based conclusions for arsenic, since arsenic in soil is a CoC that will be evaluated in the pending FS, but it could impact lead (under a residential exposure scenario), which has not been identified as a CoC. A discussion of these hotspots should be included in the report.

HYDRO COMMENTS

1. A couple of cross sections from north to south and west to east showing the monitoring wells details and lithology should be included in the report to better understand the nature and extent of contamination in groundwater.
2. The groundwater data from 2012 seems to be inconsistent with the groundwater data from 2009. There are not organics exeedances in 2012 contrasted with 2009 where few excedencees of organics were found. In 2012 the groundwater data was taken from permanent monitoring wells and the groundwater samples from 2009 were taken from temporary monitoring wells. A rationale about the use of the temporary wells versus the use of the permanent wells should be included in the report. Are the temporary wells installed in 2009 still useful for sampling or were abandoned?
3. The highest concentration of organics were detected at temporary wells CAA03-GW05 and CAA03-GW04 in 2009. Is there any plan to convert CAA03-GW05 and CAA03-GW04 to permanent monitoring wells.

BTAG COMMENTS

1. Page L-23: Section L.5.2 BERA Approach – The bullet describing background concentrations specifically refers to only inorganic constituents. Please explain why concentrations of organic chemicals at the sites are not also compared to background concentrations.

2. Page L-25: Section L.5.3.1.1 – Regarding Site 4 NW and the assessment of risk to plants and soil invertebrates, the maximum concentrations of acetone (640 μg/kg) was greater than the minimum ESV (173 μg/kg) for similar VOCs (acetone does not have a specific ESV). Therefore, acetone needs to be included as a COPC for further risk evaluation.

3. Page L-30: Section L5.4.1.2 Surface Sediment – Regarding the Upstream Pond, the text indicates that arsenic and beryllium were not retained. This conclusion is wrong. The information provided ("Arsenic exceeded ESVs, and beryllium did not have an ESV, but the maximum background UTL ratios were only 1.03 and 1.15, respectively, and there was only a single background UTL exceedance for each metal….") supports retaining these chemicals.

4. Page L-36: Section L.5.4.2 Aquatic Food Web Exposures – Regarding the Upstream Pond and Site 4 Streams, the conclusion is only PCBs were identified as COPCs for further risk evaluation. Please explain why endrin is not retained as a COPC.

5. Page L-41: Section L.5.5.2 – Regarding PCBs, the text refers to the use of EqP ESVs. Sediment quality guidelines should also be discussed.

Response to Comments
Site 4 and Youth Pond
Remedial Investigation
Naval Weapons Station Yorktown Cheatham Annex
Williamsburg, VA
October 30, 2014

Comments received by email on September 19, 2014 from Gerald Hoover, Environmental Protection Agency, Region 3.

GENERAL COMMENTS

EPA General Comment #1: Sediment contamination in Upstream Pond: EPA believes that there is sufficient data to conclude that there is potential ecological risk from PCBs in Upstream Pond and that remedial alternatives should be evaluated as part of the FS.

Navy Response: While the Navy does not believe that the PCBs in Upstream Pond are the result of a release from site-specific source areas, since there are no known non-anthropogenic sources of PCBs, the Navy will evaluate remedial alternatives to address PCBs in Upstream Pond as part of the FS. Those sections where recommendations were made to conduct an FS were revised (in part due to the response to General Comment #2 below) to state the following:

> A Feasibility Study (FS) should be performed to develop and evaluate remedial alternatives to address buried debris and potentially unacceptable human health or ecological risks associated with potentially site-related COCs in soil and groundwater at Site 4. In addition, while the RI findings indicate that the PCBs in Upstream Pond are not likely to be related to a Site 4 source, the FS should include remedial alternatives to address PCBs in Upstream Pond sediment and PAHs detected in the drainage channel directing stormwater runoff from the roof of CAD Building 12 and the adjacent paved areas to Site 4.

EPA General Comment #2: It appears that soil sample SS06 is a hot spot for PAHs and pesticides. EPA recommends that the Navy further characterize this hot spot and propose remedial alternatives for addressing it in the FS.

Navy Response: Soil sample SS06 is located in a small drainage channel that receives stormwater runoff from the expansive roof of CAD Building 12 and the adjacent paved surfaces and directs it to Site 4. In addition, this sample location is well outside of the Site 4 disposal areas and there is no evidence of any waste disposal activities at this location. Consequently, the detected PAH concentrations in this sample can be attributed to stormwater contact with well-known contributors to PAHs in urban runoff, namely the large roof of CAD Building 12 and the immediately adjacent asphalt-paved parking area, and not a CERCLA-regulated site release. Nevertheless, due to the very small size of this impacted area and since there are potential unacceptable risks from site-related constituents to be addressed at Site 4, the Navy will evaluate remedial alternatives for the limited vicinity of this sample location in the FS. Those sections where recommendations were made to conduct an FS were revised to state the following:

> A Feasibility Study (FS) should be performed to develop and evaluate remedial alternatives to address buried debris and potentially unacceptable human health or ecological risks associated with potentially site-related COCs in soil and groundwater at Site 4. In addition, while the RI findings indicate that the PCBs in Upstream Pond are not likely to be related to a Site 4 source, the FS should include remedial alternatives to address PCBs in Upstream Pond sediment and PAHs detected in the

drainage channel directing stormwater runoff from the roof of CAD Building 12 and the adjacent paved areas to Site 4.

EPA General Comment #3: EPA strongly suggests that the Navy consider addressing the waste and debris in the burial areas in the FS. Please evaluate if there are any VADEQ regulations or other State or Federal regulations that may apply.

Navy Response: The Navy will consider addressing the waste and debris in the burial areas in the FS. The RI Report has been revised to include this information. In addition, the Navy has reviewed state and federal regulations that may apply to surface and buried debris at CERCLA sites including 9VAC20-81-45, Section B.2.f - "In addition to those exceptions found in 40 CFR 257.1(c), the open dump criteria shall not apply to sites that are undergoing remediation per the requirements of CERCLA or the RCRA Corrective Action Program and are doing so with the department's and/or the Environmental Protection Agency's oversight."

EPA General Comment #4: Non-Site Contaminant Sources: EPA agrees that contaminated storm water runoff from non-site related sources are impacting the site. There are relatively simple/straight forward measures that are available to address this contaminated runoff issue. EPA would like the Navy to evaluate this issue further in the FS and consider potential alternatives as a protective measure to ensure site cleanup in the long-term.

Navy Response: While there may be relatively simple/straight forward measures that are available to address potentially contaminated stormwater runoff from non-site related sources, these activities would need to be addressed under the Navy's Stormwater Compliance division and not the Environmental Restoration Program, since the impacts are not the result of a release regulated under CERCLA. No changes to the RI Report were made.

DOCUMENT SPECIFIC COMMENTS

EPA Document Specific Comment #1: PAGE IV; In the first paragraph on this page (under the bullets), the text indicates that some of the CoCs identified in the BERA were not site-related and; therefore, will not be considered further. A few sentences explaining this determination (site-related vs. non site-related CoCs) should be added to this section of the report.

Navy Response: The Executive Summary was revised to include more information explaining how site-related and non-site-related COCs were determined.

EPA Document Specific Comment #2: APPENDIX K; Based on the data presented in the RAGS - Part D Table 3's for soil inside and outside the fenced areas, it appears that hotspots for arsenic and lead may be present. (Maximum respective concentrations of arsenic and lead were 350 mg/kg and 790 mg/kg, as compared to the exposure point concentrations used to determine potential risk, 40 mg/kg and 37 mg/kg.) These hotspots will not affect risk-based conclusions for arsenic, since arsenic in soil is a CoC that will be evaluated in the pending FS, but it could impact lead (under a residential exposure scenario), which has not been identified as a CoC. A discussion of these hotspots should be included in the report.

Navy Response: The hot spot for arsenic (350 mg/kg in sample CAS04-SS13-1012, in surface soil outside the fenced area of site) is within a debris area and the debris areas will be evaluated for remedial alternatives in the FS. Additionally, as indicated in comment, the HHRA identified arsenic as a COC, and it will, therefore, be evaluated in the FS. The potential risks associated with exposure to arsenic are primarily associated with soil in the debris area. The concentrations of arsenic in surface soil samples closest to CAS04-SS13-1012 were 2.7 mg/kg and 3.4 mg/kg, both also within a debris area. The next-highest detected concentration of arsenic was 12.7 mg/kg, at location CAA03-SB09-1109, in subsurface soil outside the fenced area, but not within a debris area.

The hot spot for lead (793 mg/kg in sample CAA03-SS06-1109) is an isolated occurrence that was detected in surface soil within the fenced area. This is the only detected concentration of lead that exceeds the residential lead soil screening level of 400 mg/kg in this area. The lead concentration in the sample collected closest to CAA03-SS06-1109 was 13.6 mg/kg; moreover, it was "B" qualified. The next highest detection of lead, 129 mg/kg in sample CAS004-4HA05-00-1199, does not exceed the residential lead screening level of 400 mg/kg. The highest detected concentration of lead was also below the industrial soil lead RSL of 800 mg/kg. This sample was collected within the fenced area, and the only current receptors to surface soil within the fenced area are industrial workers. Therefore, no unacceptable risks associated with current exposure to lead would be expected. Additionally, as this "hot spot" sample was collected from within the developed, fenced area of the site, future use of this area would require considerable re-working and re-grading of the area and the soil, such that the soil would be mixed, resulting in the isolated, more-concentrated lead soil to be mixed with soil having much lower lead concentrations, producing a soil with lead concentrations more similar to the mean concentration used in the IEUBK model and that demonstrated no adverse effects with future child residential exposure to soil.

The following changes have been made to the text:

<u>Section 5.4, Current and Future Industrial Worker, Appendix J, Section J.6.2.1, and Appendix J, Section 6.2.7, The Adult Lead Model bullet</u>. The following sentence has been added: "The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by industrial workers at this location."

<u>Section 5.4, Current and Future Adult and Child Visitor/Recreational User, and Appendix J, Section J.6.2.5, "Lead was identified as a…" bullet</u>. The following has been added: "There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level, and this sample is a surface soil sample from within the fenced, industrial area of the site. The next-highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and recreational exposure to lead at this location alone could potentially result in unacceptable risks, it is unlikely a future recreator would actually be exposed to lead in soil at this concentration. As this sample was collected from within the developed, fenced area of the site, future use of this area would require considerable re-working and re-grading of the area and the soil, such that the soil would be mixed, resulting in the isolated, more-concentrated lead soil to be mixed with soil having much lower lead concentrations, producing a soil with lead concentrations more similar to the mean concentration used in the IEUBK model and that demonstrated no adverse effects for exposure to soil."

<u>Section 5.4, Current and Future Maintenance Worker, and Appendix J, Section 6.2.8, "Lead was identified as a…" bullet</u>. The following has been added: "The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by maintenance workers at this location."

<u>Section 5.4, Future Construction Worker, and Appendix J, Section 6.2.6, "Lead was identified as a…" bullet</u>. The following has been added: "The one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, is below the industrial soil lead screening level of 800 mg/kg (USEPA, 2013); therefore, there would be no adverse effects associated with exposure to lead by construction workers at this location."

<u>Section 5.4, Future Resident (adult and child), and Appendix J, Section J.6.2.10, "Lead was identified as a…" bullet</u>. The following has been added: "There is one potential lead hot spot in soil, at a concentration of 793 mg/kg in sample CAA03-SS06-1109, above the residential soil lead screening level of 400 mg/kg (USEPA, 2013). This is the only detected concentration of lead above the residential soil screening level, and this

sample is a surface soil sample from within the fenced, industrial area of the site. The next-highest detected lead concentration was 129 mg/kg. Although this one detected concentration exceeds the screening level, and residential exposure to lead at this location alone would most likely result in unacceptable risks, it is unlikely a future resident would actually be exposed to lead in soil at this concentration. As this sample was collected from within the developed, fenced area of the site, future use of this area would require considerable re-working and re-grading of the area and the soil, such that the soil would be mixed, resulting in the isolated, more-concentrated lead soil to be mixed with soil having much lower lead concentrations, producing a soil with lead concentrations more similar to the mean concentration used in the IEUBK model and that demonstrated no adverse effects with future child residential exposure to soil."

EPA Document Specific Comment #3: A couple of cross sections from north to south and west to east showing the monitoring wells details and lithology should be included in the report to better understand the nature and extent of contamination in groundwater.

Navy Response: Cross sections from north to south and east to west showing monitoring well details and lithology were added to Section 3.

EPA Document Specific Comment #4: The groundwater data from 2012 seems to be inconsistent with the groundwater data from 2009. There are not organics exceedances in 2012 contrasted with 2009 where few exceedances of organics were found. In 2012 the groundwater data was taken from permanent monitoring wells and the groundwater samples from 2009 were taken from temporary monitoring wells. A rationale about the use of the temporary wells versus the use of the permanent wells should be included in the report. Are the temporary wells installed in 2009 still useful for sampling or were abandoned?

Navy Response: While not stated in the RI Report, the temporary monitoring wells installed in 2009 were installed using one-inch PVC casing with 0.010-inch machine-slotted screen surrounded by a pre-installed sand filter pack. Following installation, each temporary monitoring well was developed and purged prior to groundwater sampling (as is done with permanent monitoring wells). The monitoring well construction and development/purging process was conducted to ensure the temporary monitoring wells were as similar to permanent monitoring wells as possible, so that the groundwater was adequately characterized and the data collected could be used to adequately assess potential risk to human health and ecological receptors (this information was presented in the Site 4 RI UFP-SAP Response to Comment document dated June 26, 2012). In addition, the Site 4 RI UFP-SAP included information stating that the results of the RI groundwater sampling would be combined with the groundwater sampling data from the temporary wells evaluated in the SI to determine if there may be unacceptable risks to human health and the environment. The RI Report (specifically, Section 4.2.3) was revised to make it clear that the temporary monitoring wells have been abandoned.

EPA Document Specific Comment #5: The highest concentration of organics were detected at temporary wells CAA03-GW05 and CAA03-GW04 in 2009. Is there any plan to convert CAA03-GW05 and CAA03-GW04 to permanent monitoring wells.

Navy Response: There are no plans to convert CAA03-GW05 and CAA03-GW04 to permanent monitoring wells, as they have already been abandoned. However, it is likely that additional monitoring wells will need to be installed as part of future remedial design or remedial action activities. The Navy will consider installing permanent monitoring wells in the immediate vicinity of the CAA03-GW05 and CAA03-GW04 locations during future site activities. No changes to the RI Report were made.

EPA Document Specific Comment #6: 1. Page L-23: Section L. 5.2 BERA Approach - The bullet describing background concentrations specifically refers to only inorganic constituents. Please explain why concentrations of organic chemicals at the sites are not also compared to background concentrations.

Navy Response: For soil, background UTLs were only developed for inorganic constituents in the facility-wide background study. For surface water and sediment, background UTLs (developed for this evaluation

and the Penniman Lake evaluation based on data collected from Cheatham Pond; Appendix M) were developed for both inorganics and select organic constituents (e.g., PAHs and pesticides), which is now clarified in the RI. Background UTLs were not developed for fish and frog tissue; maximum reference concentrations (from Cheatham Pond) for tissue were directly compared to concentrations in site tissue samples for all constituent groups sampled.

EPA Document Specific Comment #7: Page L-25: Section L.5.3.1.1 - Regarding Site 4 NW and the assessment of risk to plants and soil invertebrates, the maximum concentrations of acetone (640 ug/kg) was greater than the minimum ESV (173 ug/kg) for similar VOCs (acetone does not have a specific ESV). Therefore, acetone needs to be included as a COPC for further risk evaluation.

Navy Response: Acetone is now included as a COPC for further risk evaluation for this spatial area.

EPA Document Specific Comment #8: Page L-30: Section L5.4.1.2 Surface Sediment - Regarding the Upstream Pond, the text indicates that arsenic and beryllium were not retained. This conclusion is wrong. The information provided ("Arsenic exceeded ESVs, and beryllium did not have an ESV, but the maximum background UTL ratios were only 1.03 and 1.15, respectively, and there was only a single background UTL exceedance for each metal .... ") supports retaining these chemicals.

Navy Response: The magnitude and frequency of background exceedance do not warrant retaining either of these constituents. However, they are now identified as COPCs for further risk evaluation for this spatial area, but will not be identified as COCs in the risk evaluation for the reasons stated in this section.

EPA Document Specific Comment #9: Page L-36: Section L.5.4.2 Aquatic Food Web Exposures Regarding the Upstream Pond and Site 4 Streams, the conclusion is only PCBs were identified as COPCs for further risk evaluation. Please explain why endrin is not retained as a COPC.

Navy Response: The text of this section was revised to indicate that endrin is a COPC for further risk evaluation for this spatial area. Endrin is already included in the risk evaluation discussion for this spatial area and pathway.

EPA Document Specific Comment #10: Page L-41: Section L.5.5.2 - Regarding PCBs, the text refers to the use of EqP ESVs. Sediment quality guidelines should also be discussed.

Navy Response: Screening level concentration ESVs was added to this discussion.

From: Smith, Wade (DEQ) <Wade.Smith@deq.virginia.gov>
Sent: Friday, September 05, 2014 8:26 AM
To: Park, Scott R CIV NAVFAC MIDLANT, EV
Cc: Ivester, Marlene/VBO; Sawyer, Stephanie/VBO; Hoover.Gerald@epa.gov
Subject: CAX: Site 4 and Youth Pond RI Report - DEQ Comments

The DEQ has completed its review of the Draft Site 4 and Youth Pond RI Report and does not have any comments at this time.
Please let me know if you have any questions.
Thanks,
wade

Wade M. Smith
Remediation Project Manager
Virginia Department of Environmental Quality
Office of Remediation Programs
Phone: (804) 698-4125
wade.smith@deq.virginia.gov

From: Hoover, Gerald <Hoover.Gerald@epa.gov>
Sent: Friday, October 31, 2014 4:28 PM
To: Sawyer, Stephanie/VBO
Cc: Ivester, Marlene/VBO; scott.park@navy.mil; Wade.Smith@deq.virginia.gov
Subject: RE: EPA comment letter on the Site 4 RI attached

Team,

EPA has reviewed the responses to our comments and the revised text. Although differences of opinion remain, EPA appreciates the Navy's efforts towards addressing our comments and has no objection to finalizing the Site 4 RI report.

Jerry

From: Stephanie.Sawyer@CH2M.com [mailto:Stephanie.Sawyer@CH2M.com]
Sent: Thursday, October 30, 2014 7:53 AM
To: Hoover, Gerald
Cc: Stephanie.Sawyer@CH2M.com; Marlene.Ivester@CH2M.com; scott.park@navy.mil; Wade.Smith@deq.virginia.gov
Subject: RE: EPA comment letter on the Site 4 RI attached

Jerry,

Attached are the Navy's responses to your comments on the CAX Site 4/Youth Pond RI Report. These responses were developed based on our team conversation on 10/17. In addition to the RTCs, I've attached a redline version of the report text, the new site cross-sections, and the portions of HHRA and ERA that were revised as a result of your comments (either in redline [word docs] or highlights [excel docs]).

If you have any questions regarding the attached files, please let me know. Upon your approval of the attached RTCs and redline edits, we will accept the document changes and issue the final Site 4/Youth Pond RI Report (in the form of change pages).

Thanks,
Stephanie

From: Hoover, Gerald [mailto:Hoover.Gerald@epa.gov]
Sent: Friday, September 19, 2014 6:24 PM
To: lboucher@up.net; Ivester, Marlene/VBO; scott.park@navy.mil; Sawyer, Stephanie/VBO; Wade.Smith@deq.virginia.gov
Subject: EPA comment letter on the Site 4 RI attached

Scott,

As you will see in the attached letter, there are some issues that you may need to discuss internally with the Navy and CH2MHill.

Stephanie,

I've included some BTAG comments that are pertinent to completing the RI Report. The responses you provided to these comments in draft form are adequate. The BTAG comments numbered 1 to 5 in my letter are comments 16, 18, 19, 20, and 22 from the draft comments I sent you.

I hope you all realize that it is 6:20pm on a Friday night. That means that I'm either a really hard worker or I have nothing better to do. There has to be something better than this! I'm out Monday, golfing. I'll talk to you all on Tuesday.

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Jerry Hoover
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